

Chapter 7. Environmental and Social Considerations

7.1 Backgrounds of Environmental and Social Considerations for the Project

7.1.1 Project Overview

-7-1: Project Overview

1.	Project	Improvement/Widening of two lane with paved shoulder of Khowai to Sabroom section of newly declared NH – 208 (Designed Length 134.71 km)
2.	Location of the proposed project	The proposed road alignment from Khowai to Sabroom is divided in to 2 section i.e Khowai to Teliamura (Section I) and Teliamura to Sabroom (Section II).
3.	Total Length of the proposed project	134.71 km
4.	Terrain	Plain, rolling and hilly
5.	Seismic Zone	Zone V
6.	Geographical Location	The Section 1 of proposed project transverses from 24°2'59.45"N 91°36'40.85"E (near Khowai town) to 23°50'21.88"N 91°37'36.12"E at NH-44 near Teliamura and Section 2 start from 23°49'45.03"N 91°37'50.10"E near Teliamura and Ends at 23° 2'26.16"N 91°40'10.92"E at Harina near Sabroom
	Proposed Bridges and ROB	60 no. of new bridges (02 major & 58 minor).
8.	Bus Bay/ Truck Lay Bye	20 nos. of bus bay and 02 no. of truck lay bye
9.	Design Speed	
	a) Plain Terrain (in general)	Ruling: 100 kmph Minimum: 80 kmp/h
	b) Rolling Terrain	Ruling: 80 kmph Minimum: 65 kmph
	c) Hilly Terrain	Ruling: 60 kmph Minimum: 40 kmph For Hair Pin Bend: min 20kmph
10.	Carriageway Width	7.0 m
11.	Width of Shoulder	In Rural/Built-up section:
	a) Paved	1.5m either side
	b) Earthen	1.0m either side
12.	Footpath width at built-up areas	1 m over RCC lined drain.
13.	Total Area of Land Acquisition	400.459ha (private land 266.69 ha and government land 133.76 ha)

Source: JICA Survey Team

7.1.2 Category of the Project for its Environmental and Social Impacts

This project is screened in accordance with the standards for “Category A” indicated in the categorization section of the JICA Guidelines for Environmental and Social Considerations (2010), as the project is located in a sensitive area and is likely to have significant adverse impact due to its characteristic under the JICA guidelines for environmental and social considerations (April 2010).

7.1.3 Clearances

The table below explains the list of project clearances. The preconstruction requirement is the forest clearance, construction time is machinery and waste clearances.

Table 7-2 Clearances of the Project

Required Clearance names	Ministry/Agency in charge	Status	Reason
Before Construction			
Environmental Clearance	MOEF&CC	Not required	Not Applicable as project activity does not attract provisions of EIA notification 2006 and its amendment till date.
Forest Clearance	MOEF&CC	Required	Forest land is required for project. The stage-1 clearance has already been obtained in section 1 and section 2 is under process.
Wildlife Clearance	MOEF&CC	Not required	Regarding the Gumti Wildlife Sanctuary, the closest part to the alignment is about 4.7 km from the sanctuary, and 3.5 km from the ESZ The other wildlife sanctuaries of Tripura that is Rowa, Sepahijala and Trishna are more than 10 km away from the proposed alignment. Therefore wildlife clearance is not applicable
During Construction			
Construction machinery Clearance (hot-mix plants, batching plants, sand mining etc.) under Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments(1987)	State Pollution Control Board - SPCB	Required	This will be taken by the contractor during construction period.
Construction machinery Clearance (hot-mix plants, batching plants, sand mining etc.) under Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments.	State Pollution Control Board - SPCB	Required	This will be taken by the contractor during construction period.

Required Clearance names	Ministry/Agency in charge	Status	Reason
Solid Waste Management Rules 2016	State Pollution Control Board - SPCB	Required	Contractor to follow all the rules during construction works.
Construction and Demolition Waste Management Rules 2016	State Pollution Control Board - SPCB	Required	Contractor to follow all the rules during construction works.

Source: JICA Survey Team

7.2 Natural and Socio-economic Environment of the Project Sites

7.2.1 Climate

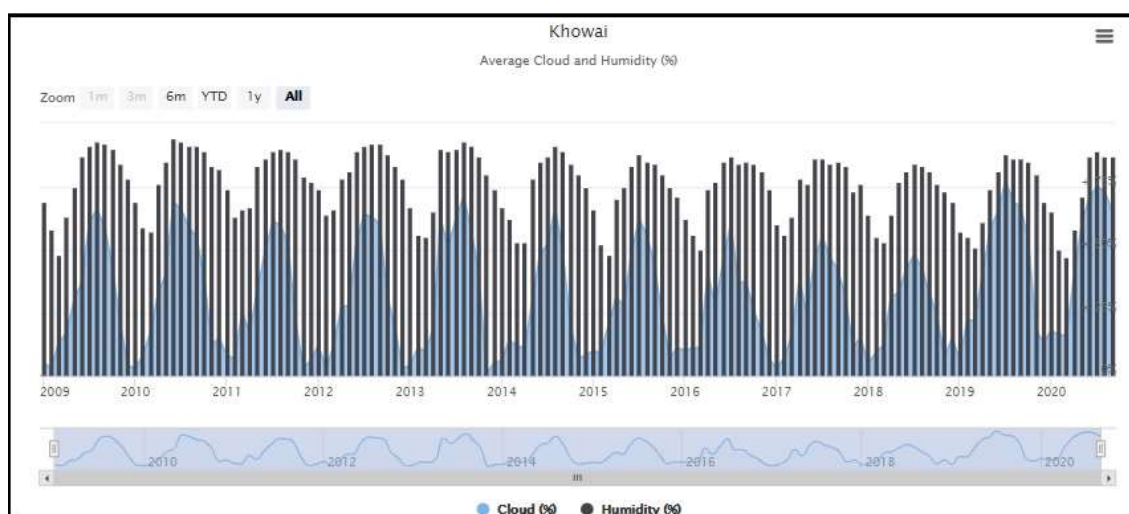
(1) Overview

The project state, Tripura falls under the sub-tropical to temperate climatic region. The climate of the project districts is characterized by moderate temperature and high humid nature. There are three prominent seasons summer, rainy and winter. The summer season spans from March to May and is followed by SW monsoon lasting till September. Winter season starts from November and lasts till the end of February. The temperature in the area varies from 5.2°C to 36.7°C. The humidity is generally high throughout the year. In summer season the relative humidity varies between 50 to 90 percent and in rainy season, the relative humidity is over 85 percent in morning and in evening it varies between 70 to 80 percent.

(2) Precipitation

The rainfall pattern in Tripura varies not only from place to place but also between seasons. Tripura experiences very heavy rain from June to September/October from the South West Monsoon. The rainfall is at higher side at southern and northern side of the state of Tripura. Winter seasons in Tripura are mostly dry. The annual average rainfall of the State is 2122 mm. The average monsoon rainfall for last 10 years is 1710 mm. The average numbers of rainy days for last 5 years is 95. The co-efficient of variation of rainfall in the area ranges from 6 - 32% suggested a low variability of annual rainfall.

Figure below shows the Graphical Representation of the Annual Trends of Rainfall in mm and Rainfall Days of Last Few Years in Khowai District



(Source: <https://www.worldweatheronline.com/lang/en-in>)

Figure 7-1: Graphical Representation Showing the Annual Trends of Rainfall in mm and Rainfall Days of Last Few Years in Khowai District

(3) Temperature

The temperature of the State shows a declining trend from west to east. This phenomenon can be attributed to the increase of height in eastern part of Tripura and increase in distance from Bay of Bengal. The summer in the state of Tripura is intense. Cold weather starts from about the end of November when the temperature of both day and night decreases steadily. January is the coldest month of the year. The highest temperature recorded from the monitoring conducted by IMD at A.D. Nagar weather monitoring station, Agartala during pre-monsoon was 39.5°C and the minimum temperature recorded during was 12.7°C.

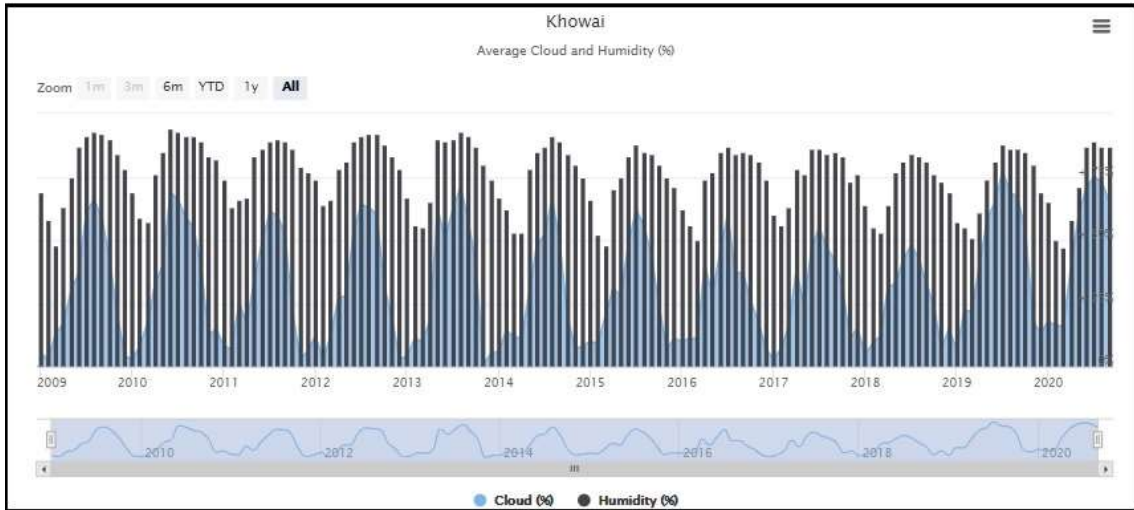


(Source: <https://www.worldweatheronline.com/lang/en-in>)

Figure 7-2: Graphical Representation Showing the Annual Trends of Temperature in ° C of Last Few Years in Khowai District

(4) Humidity

The relative humidity of the state stays at higher side throughout the year. In summer, the relative humidity lies between 50 to 74 percent whereas during rainy season it goes beyond 85 percent. The maximum and minimum relative humidity is 85 percent and 57 percent in the month of July and January respectively.

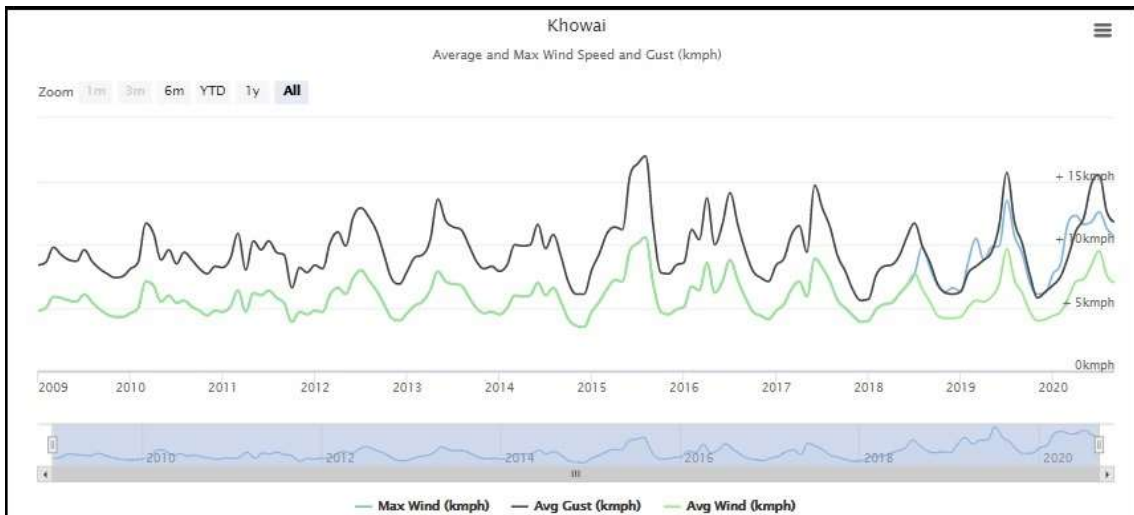


(Source: <https://www.worldweatheronline.com/lang/en-in>)

Figure 7-3: Graphical Representation Showing the Annual Trends of Relative Humidity in % of Last Few Years in Khowai

(5) Wind Speed

The wind speed and wind direction of an area influences the dispersal of pollutants from a point and non-point sources. The wind direction in the project district is from South East to North West and the maximum wind speed recorded is between 3.0 — 4.0m/sec.



(Source: <https://www.worldweatheronline.com/lang/en-in>)

Figure 7-4: Graphical Representation Showing the Annual Trends of Wind Speed and Gust in kmph of Last Few Years in Tripura

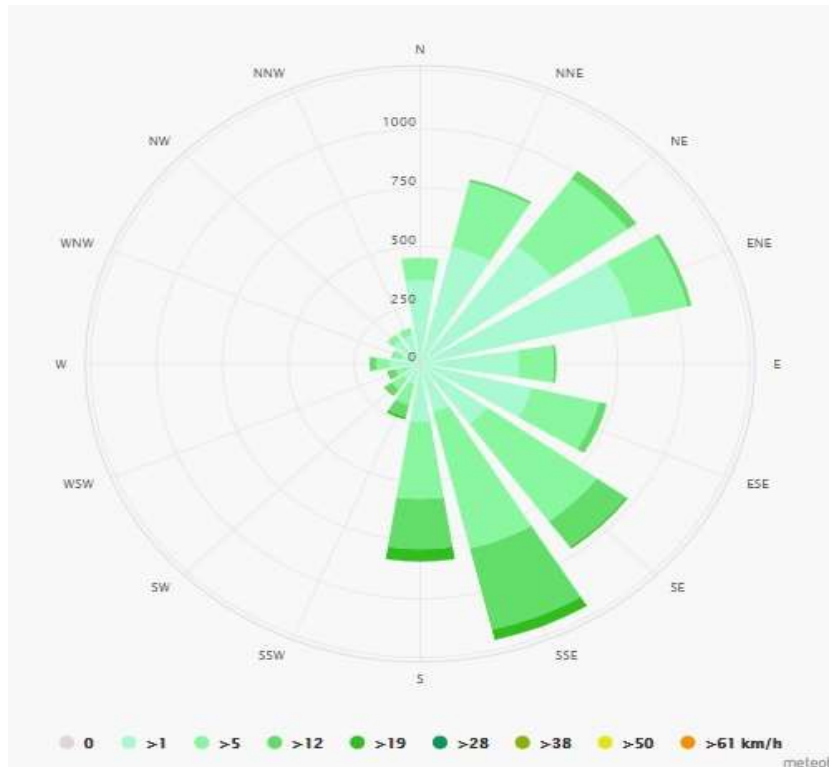
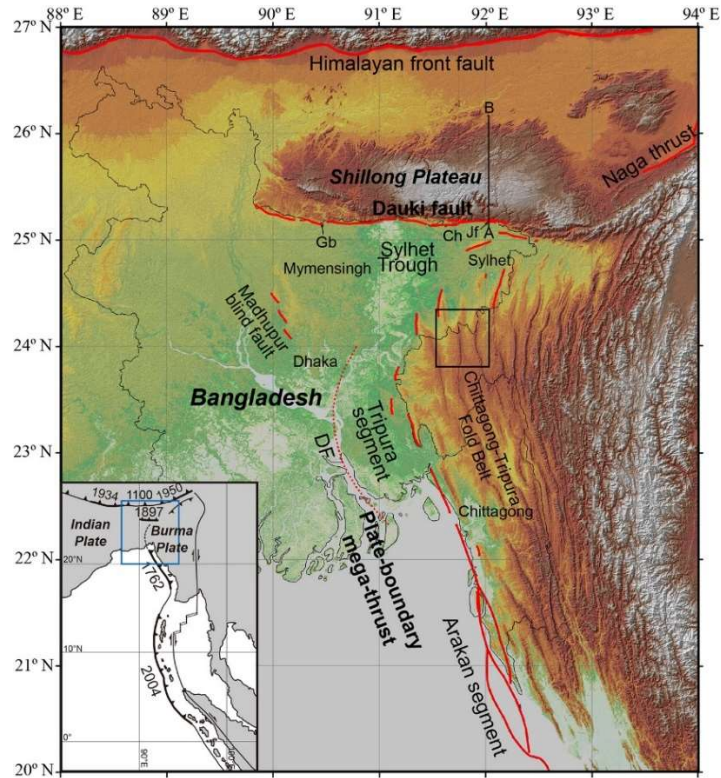


Figure 7-5: Windrose: Diagram Showing the Wind Direction in Tripura

(https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/kokrajhar_india_1266330)

7.2.2 Topography and Geology

The state of Tripura resides in the North-East corner of India and lying between the latitude of 22°56'N to 24°32'N and longitude 91°09'E to 92°20'E. The state shares state boundary with Assam and Mizoram in the east (53 and 109 km respectively) and international boundary - with Bangladesh (839 km.) General altitude of the state differs between 15m to 750m from MSL. The physiography of Tripura tends to flatten towards west. The longitudinal valleys are juxtaposed in between the numerous hillocks and undulating surfaces. Agricultural activities occur in the fertile soil of these valleys. Series of parallel hill-ranges running north to south divide the state into broad parallel valleys, consisting of undulating hillocks covered with jungle & meandering streams. The range of hills rises from the plains of Sylhet in Bangladesh at the north and proceeds southwards until they join the Chittagong hill tracts in the east. Principal ranges of western part of the state are Baramura - Deotamura and Atharamura ranges. Structurally, the State of Tripura represents the western fringe of the typical 'ridge and valley' structural province of the late tertiary fold mountain belt, commonly known as the Indo-Burma Ranges (Purbachal Range).



Source : Morino et al., 2014

**Figure 7-6: Shadow relief map of northeastern India and Bangladesh
Active fault location**

(1) Seismicity

The State of Tripura comes under the very high risk seismic zone in the country, namely, Zone V of seismic Zoning Map of India. A large number of moderate to large magnitude earthquakes have occurred within the State boundary as well as within 100 km distance around it. Major and significant earth quakes have been furnished in the table below.

Table 7-3 Significant Earthquake of Tripura

Date/ Year of Earthquake	Location of Epicentre	Remarks
1869	Within 18 km of the district town of Dharmanagar.	An earthquake of M 7.5 occurred, caused massive destruction in permanent infrastructures and lives. The old royal palace at Udavpur got destroyed form this earth

12th June 1897	In Shillong Plateau, near Rangjuli, Assam	An earthquake took place in the state and adjacent areas of which magnitude M 8.7. This was one of the most powerful earthquakes in the Indian sub-continent. The quake wreaked havoc across the present states of Tripura, Assam and Meghalaya.
1918	N.A.	Srimangal area experienced an earthquake with a magnitude of M 7.6 1930 Dubri An earth quake took place with a magnitude of M 7.1
15th Aug, 1950	Indo-China Border Region	An earth quake hit mainly the northern part of Tripura and it was originated from Indo-China boarder region. The magnitude of this earthquake was 8.5 Richter. It was the 6th largest earthquake of 20th century.
1950	N.A.	An Earthquake of magnitude 6.3 Richter occurred within North Tripura district caused damage to the buildings and other infrastructures
1970 to 2000	N.A.	According to the records of the Indian Meteorological Department, 41 earthquakes of 5.6 or lower magnitude have occurred within the coordinates 23.00°- 25.00°N and 91.00°-93.00°E

Source: Tripura Disaster Management Authority

From the above map it is clear that the project road comes under zone V, which is susceptible to major earthquakes.



Source: <http://asc-india.org/maps/hazard.htm>

Figure 7-7: Seismic Zone Map of India

(2) Land Use

A detailed land use map in 10 km radius from the proposed project road corridor has been prepared with the help of latest satellite imageries and based on the primary field observation. Dominant land use in the 10km radius of the project road is forest land with an area covering 62.51%. It is followed by crop land land which covers an area of 27.14% in 10km radius of the project road. Land Use Map is given in the next Figure and Table shows Land Use of the Project Road Corridor (10km radius)

Table 7-4: Land Use Classification of Study Area

Class	Area in Hectares	Area in Km	Percentage
Class 1 Forest	176,662.1	1,766.621	62.51
Class 2 Built-up	8,412.66	84.1266	2.98
Class 3 Wastelands /Unculturable	7,973.1	79.731	2.82
Class 4 Crop Land	76,708.3	767.083	27.14
Class 5 Water	12,848.0	128.48	4.54
Total	282,604.16	2,826.0416	100



Source: JICA Survey Team

Figure 7-8: Land Use and Land Cover along the Project Road

7.2.3 Forest and Ecosystem

(1) Forests

Forest classification

The state of Tripura is characterized by diverse natural resources and agronomically – potential tropical areas. The recorded forest area of the state is merely 6,294 sq. km which contributes forest cover to the tune of 60.02 per cent of the geographical area at the state level. Legally, the forest area in the State has been classified into three categories, viz., Reserved Forest, Protected Forest, and Unclassified Forest, which constitute 66.33 per cent, 0.03 per cent and 33.64 per cent of the total recorded forest area, respectively (FSI, 2017). In term of forest canopy density classes, the state has very dense forest 1.04 per cent, moderate dense forest 44.67 per cent, open forest 30.33 per cent, scrub 0.69 per cent, and non-forest 23.27 per cent.

Table 7-5: Forest Coverage in Tripura (Classification)

Category	Total	Reserved	Protected	Unclassified
Percentage (%)	100.00	66.33	0.030	33.64
Areas (sq km)	6294.00	4174.81	1.89	2117.30

Source: FSI

Table 7-6: Forest Coverage in Tripura (Type)

Category	Total Geographical Area	2011 Assessment			Others
		Dense Forest	Mod. Dense Forest	Open Forest	
Area (km2)	6294.0	65.5	2811.5	1890.1	1526.9
Percentage	100.00	1.0	44.7	30.0	24.3

Source: FSI

Project road is passing through reserve/protected forest at considerable length. 126.2014 ha of forest land need to be acquired for the project road as per the estimation. A total of approx. 36774 nos of trees expected to fell due to project road construction activities. The plantation will be done as per the norms fixed by the Forest Department.

Forest area condition

Common trees in the project road are seen as: Albizia procerra, Alstonia scholaris, Dillenia pentagyna, Garuga pinnata, Grewia microcos, Lagerstromia parviflora, Schima wallichii, Syziguim cuminii, Bamboo plays a very vital role in the economy of the State along with rubber plantation as it serves the artisan & non-artisan users of the state.

Table 7-7 Common Trees in the project area

Scientific name	Local name	Local availability
Albizia procerra	Karai	Common
Alstonia scholaris,	Chaitwan	Common
Dillenia pentagyna,	Hargaja	Common
Garuga pinnata,	Kekar	Rare
Grewia microcos,	Pichla	Common
Lagerstromia parviflora,	Ledi	Abundant
Schima wallichii,	Kanak	Common
Syziguim cuminii,	Kalajam	Very Common

Source: JICA Survey Team



Figure 7-9 Forest area and the Project alignment

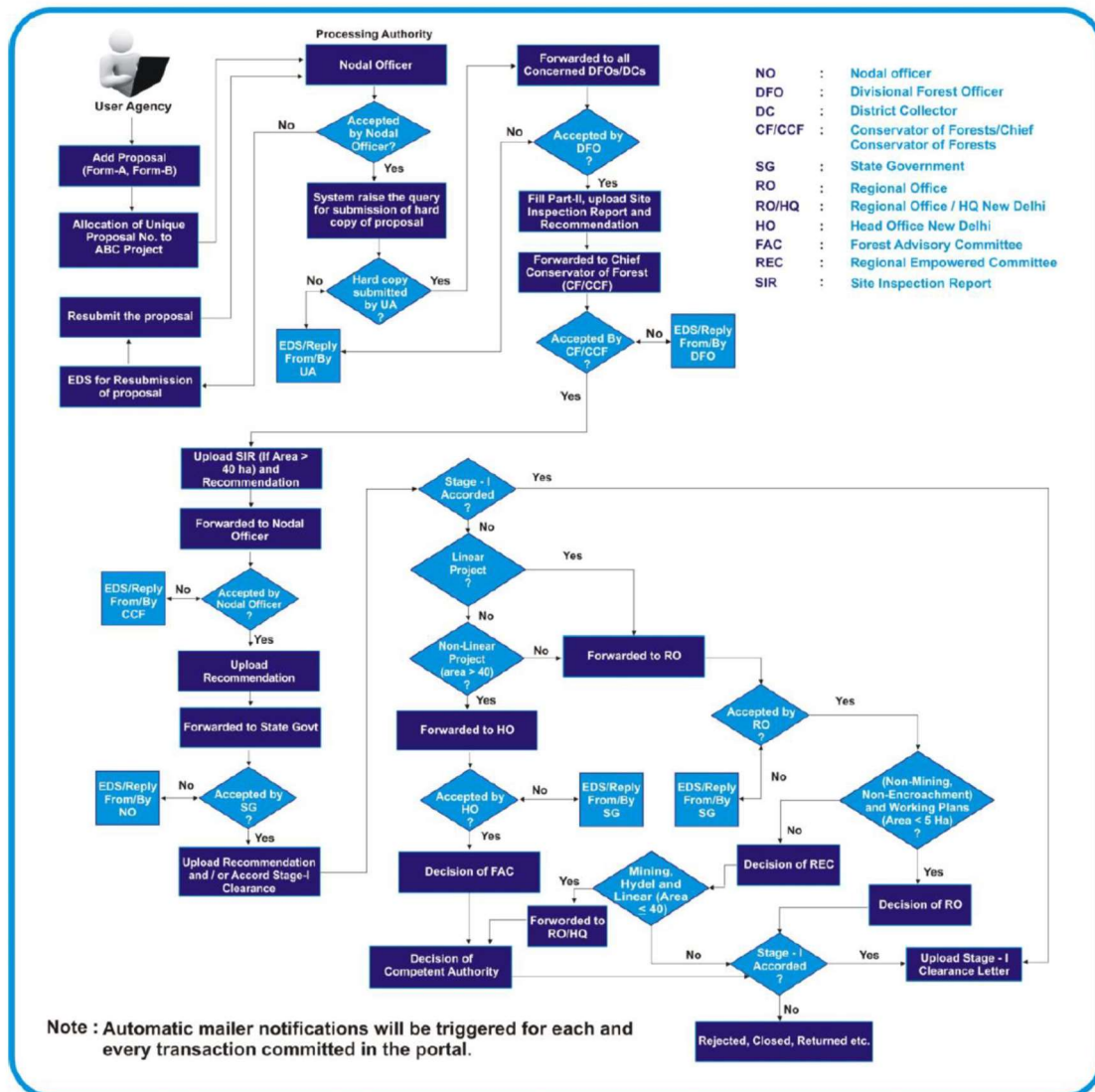
Source: mapsofindia 2012

Forest Clearance Procedures

The forest clearance is applicable as alignment is passing through forest area. MOEFCC has initiated online submission and disposal of forest clearance cases. The detail procedure is available on ministry website <http://forestsclearance.nic.in/>. The workflow is illustrated in figure below. The application must be processed by State Government as well as Central Government as follows:

- 1) Part 1 of the application is filled in by NHIDCL, the project proponent;
- 2) Part 2 will be cleared by the Forest Division of the State;
- 3) Part 3 will have to be cleared by the State Environment and Forest Department;
- 4) Part 4 have to be cleared by the Nodal Officer under Forest Conservation Act; and
- 5) Part 5 will be the responsibility of the Secretary of Department of Environment and Forest,

Government of Tripura before forwarding the forest clearance application to the MOEFCC for appraisal for issuing of the Forest Clearance Permit.



Source: forestclearance.nic.in

The Forest clearance proposal has not been submitted by NHIDCL till date, however from the earlier experience in Tripura, the rate per hectare of forest land diversion (NPV-Net Present Value) may varies from 7 to 1 million Rs. per hectare. Therefore, NPV for 126 ha forest land may come upto 126 ha X Rs. 1 million is Rs. 126 million Rs. The forest land comes under DFO, Khowai/Gumati/South Tripura.

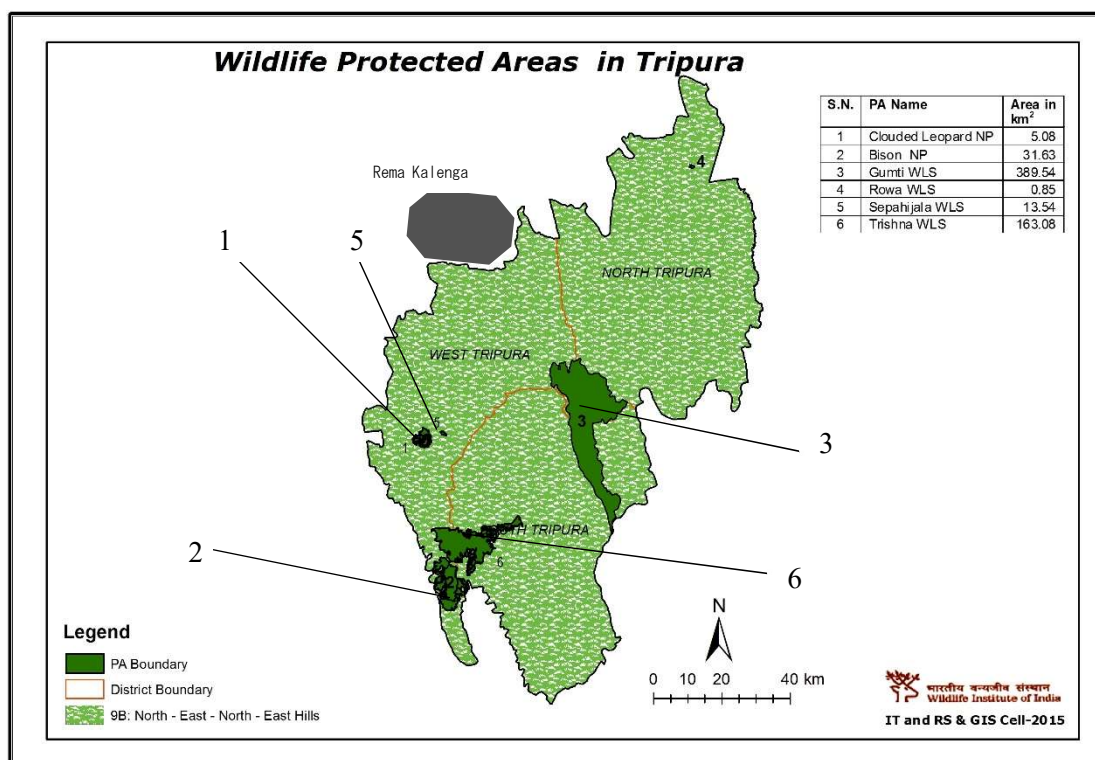
(2) Reserved Area

The following table shows the reserved areas in Tripura. The next Figure shows the positional relationship of the project sites in the State Reserve.

Table 7-8: Reserved Area /KBA/IBA/Ramsar sites found in Tripura State

S.No.	Name of Protected Area	District	Distance w.r.t project road
1	Clouded Leopard NP	West Tripura	32 km
2	Bison (Rajbali) NP (Inside Trishna WLS)	South Tripura	36 km
3	Gumti WLS	South Tripura	4.7 km
4	Rowa WLS	North Tripura	60.0 km
5	Sepahijala WLS	West Tripura	30.0 km
6	Trishna WLS	South Tripura	14.0 km
7	Rudrasagar Lake (Ramsar site)	West Tripura	32.0 km
8	Rema Kalenga WLS	Habiganj (Bangladesh)	6.0 km (from Khowai)
9	Satchari National Park	Habiganj (Bangladesh)	13.0 km

Source: JICA Survey Team



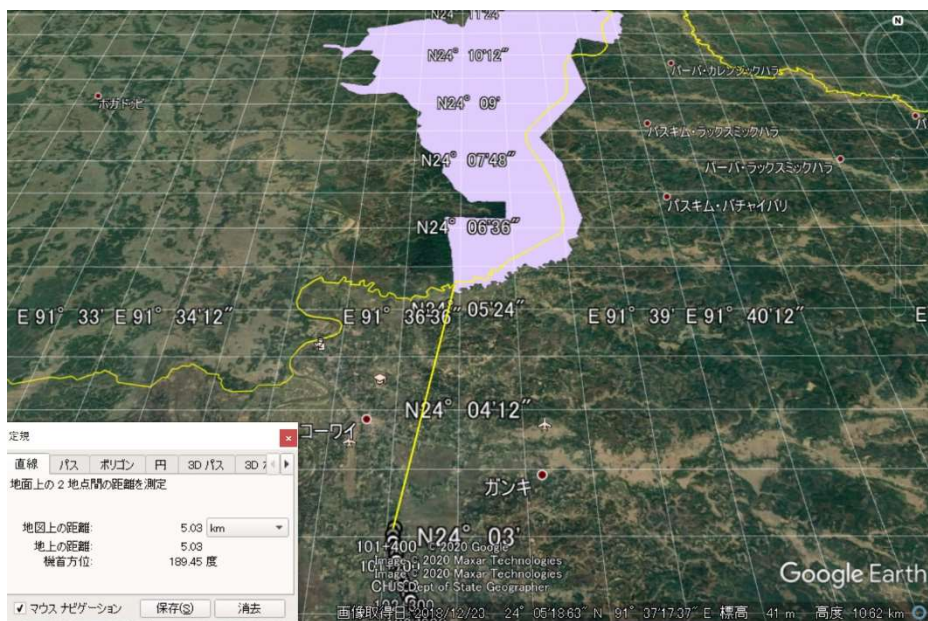
Source: Wildlife Institute of India

Figure 7-10: Reserved Area in Tripura

Rema Kalenga WLS (Bangladesh side)

Rema Kalenga WLS is a protected area in Bangladesh designated by the Government of Bangladesh. It borders Tripura and is about 5 km north of the target line. It is also a KBA

designated by IUCN and an IBA designated by Birdlife International. According to the KBA database by IUCN, the area as KBA is 1,095 ha, and Bengal tiger (CR) was once confirmed, but there are no recent observations of those animals and there is no information on other rare or endangered species.



Source: Made from Google earth

Figure 7-11 Positional relationship between Rema Kelanga Wildlife Sanctuary (in Bangladesh) and target routes

Gumti WLS

Gumti WLS is on the east side of the target line, and the closest boundary from the target line is about 4.7km away from the site at the closest point.

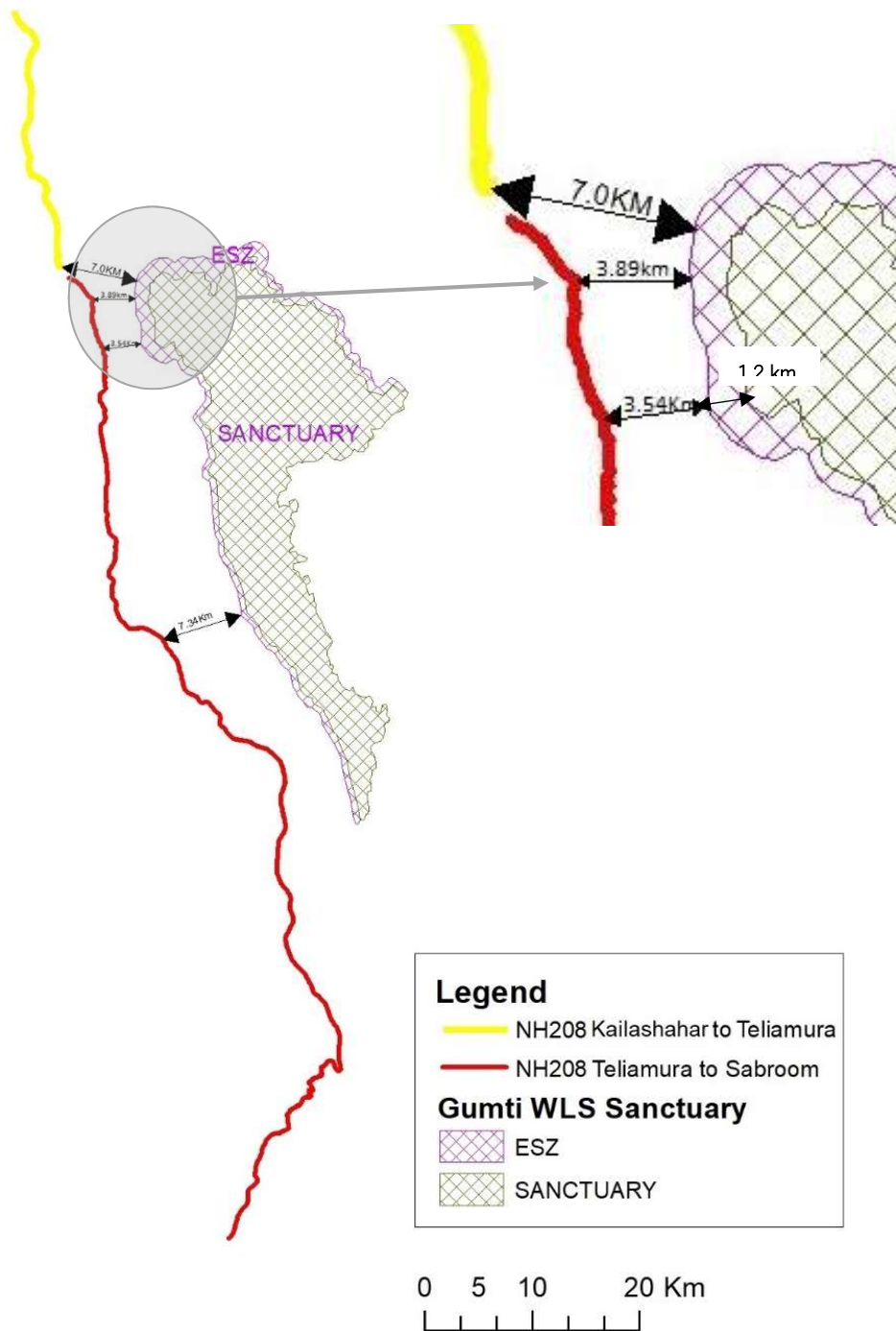
In addition to being designated as a Wildlife Sanctuary by the Government of India, it is also a KBA designated by IUCN and an IBA designated by Birdlife International. According to the KBA database by IUCN, the area as KBA is 38,954 ha whose water reservoir / water body covering approximately 300 square kilometers. The habitat of *Leptoptilos javanicus* (VU) has been confirmed.

In Indian Law, Eco-Sensitive Zones-ESZs are defined as the areas within 10 kms around Protected Areas, National Parks and Wildlife Sanctuaries (hereinafter, WLS). ESZs are notified by MoEFCC, Government of India, under the Environment Protection Act 1986. In this project, Gumti WLS, lies in the south east of the proposed road.

Theoretically, if we consider only the above-mentioned rule, the Project needs to obtain the WL clearance to pursue the further process as the Gumti Wildlife Sanctuary is located within 10 km from the end point of the road. However, the final ESZ notification no. 3663 dated 08.11.2019 of the sanctuary has been effective in October 2019, the ESZ is defined as 0~1.2 km buffer of the WLS, which is not touching the project area.

The diagram below shows positional relationship between Gumti Wildlife Sanctuary and target routes. The ESZ boundaries of the alignment side area are 1.2 km (north) and 0.5km (south)

respectively. The closest part to the alignment is about 4.7 km from the sanctuary, and 3.5 km from the ESZ. Though wildlife clearance is not necessary as EC is not required.



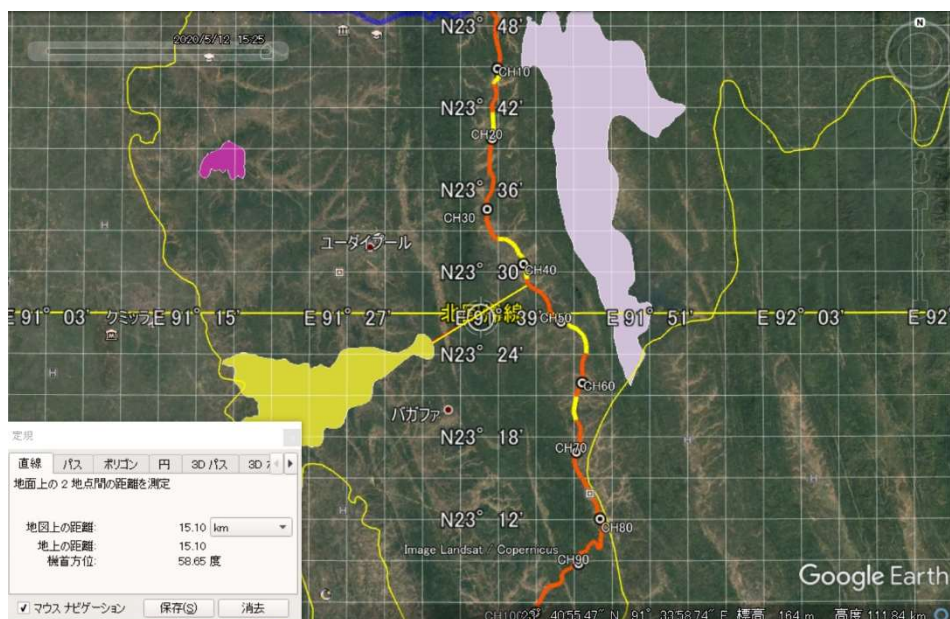
Source: Made from Google earth

Figure 7-12 Positional relationship between Gumti Wildlife Sanctuary and target routes

Trishna WLS

Trishna WLS is on the west side of the target line, and the closest boundary from the target line is about 15 km away. In addition to being designated as a Wildlife Sanctuary by the Government of India, it is also a KBA designated by IUCN and an IBA designated by Birdlife International.

According to the KBA database by IUCN, the area as KBA is 19,470ha, *Macaca leonina* (VU), *Bos gaurus* (VU), *Hoolock* spp. (EN or VU depending on the species)) have s been confirmed to inhabit in the WLS.



Source: Made from Google earth

Figure 7-13 Positional relationship between Trishna Wildlife Sanctuary and target routes

Sacred Forest⁴⁹

Sacred forests, or Sacred Groves, are patches of primeval forest that some rural communities protect as abodes of deities. Such “ecosystem people” draw their livelihoods from nearby resources and value nature for the ecological services it provides.

No Sacred Grove had been reported or mentioned by any Governmental sources or any reliable scientific studies from close vicinity of the present ROW, which is connecting Khowai-Sabroom. It must also be taken into account, as per data base of ENVIS Centre of Wildlife Institute of India, not a single Biodiversity Heritage Site, Conservation Reserves and Community Reserves is present with close proximity of the present ROW.

7.2.4 Socio-economic Profile

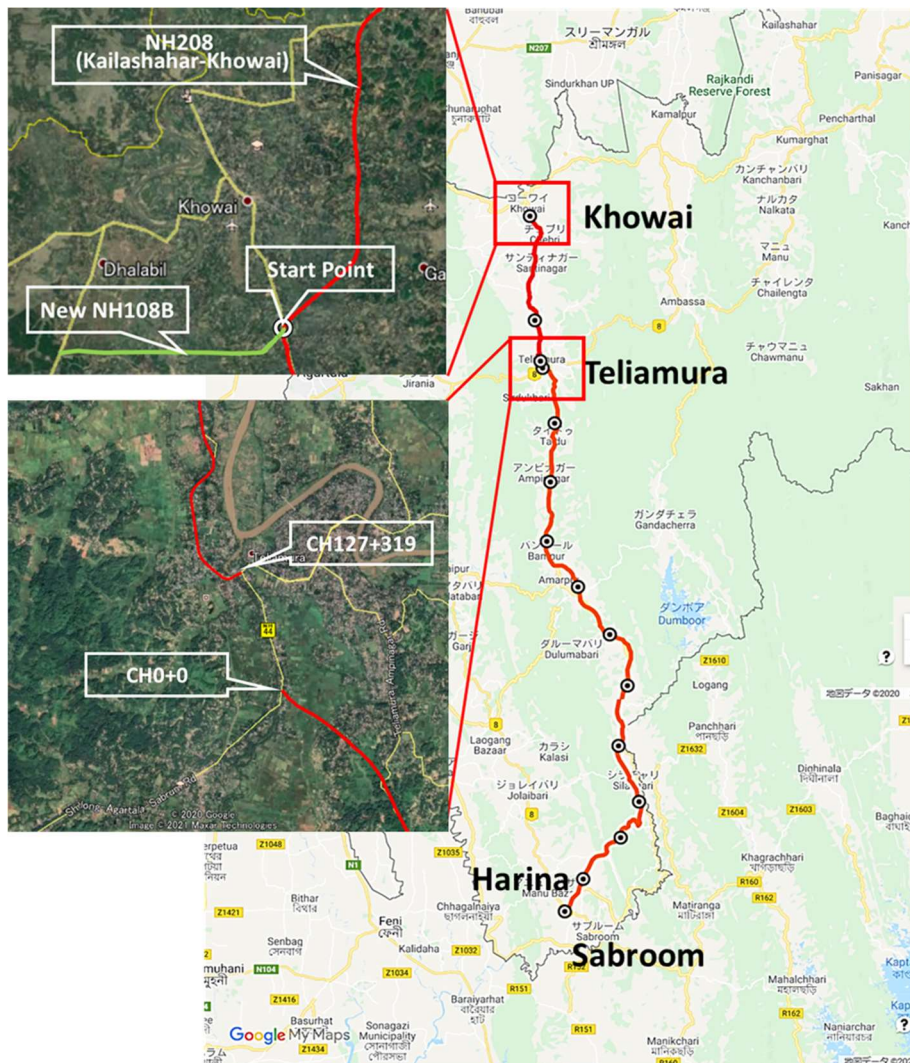
(1) Project Road and its Location

The proposed project transverses from 24°2'59.45"N, 91°36'40.85"E (near Khowai town) and ends at 23°2'26.16"N, 91°40'10.92"E at Harina near Sabroom. The proposed road alignment from Khowai to Sabroom having a design length of 134.71 km. The project road runs through Khowai, Gumti and South Tripura districts of Tripura. The project road passes through village /

⁴⁹ Bhattacharjee, S. (2015). Sacred Groves in Karbi Anglong: An Anthropological Observation. *The Eastern Anthropologist*, Vol-68 (1), pp.131-141.

- Medhi, P. and Borthakur, S. K. (2013). Sacred groves and sacred plants of the Dimasas of North Cachar Hills of Northeast India. *African Journal of Plant Science*, 7(2), pp.67-77.
- Talukdar, S. & A. Gupta (2017). Attitudes towards forest and wildlife, and conservation-oriented traditions, around Chakrashila Wildlife Sanctuary, Assam, India. *Oryx* 52(3): pp. 508-518.
- <http://www.wiienvi.nic.in/Home.aspx>
- http://www.cpreecenvi.nic.in/Database/Assam_2251.aspx

localities namely, Khowai, Kalyanpur, Twidu, Sonacherra, Amarpur, Nutan Bazar, Karbook, Ailmara, Khedacherri, Ropaichari and ends at Harina (T-Junction with NH-08). Sabroom is 8.1 km away from Harina junction. The Project road runs parallel to the International border (India – Bangladesh) in some of its length.

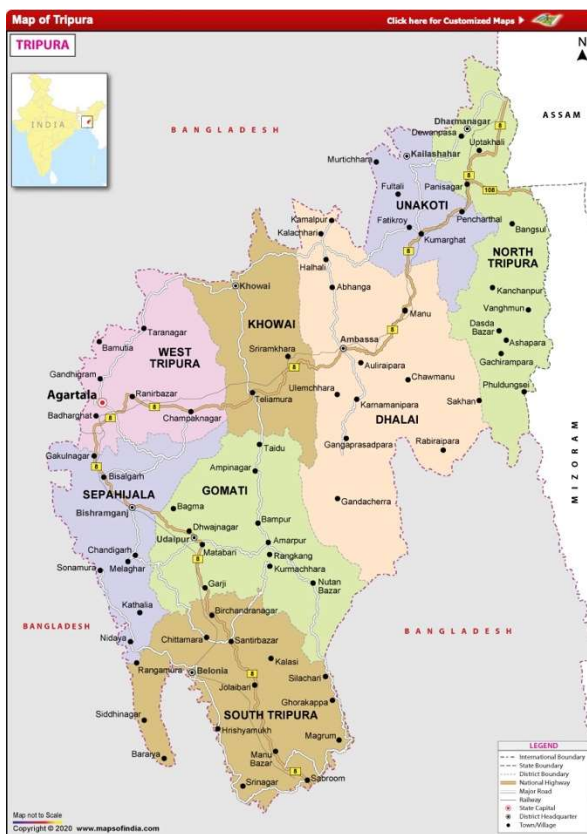


Source: JICA Survey Team

Figure 7-14: Locations of NH208 Tripura

(2) Profile of Tripura State

Tripura is a landlocked state in North East India, where the seven contiguous states, such as Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura are collectively known as the Seven Sister States. Spread over 10,491.69 km², Tripura is the third-smallest among the 29 states in the country, behind Goa and Sikkim. It extends from 22°56'N to 24°32'N, and 91°09'E to 92°20'E. Its maximum extent measures about 184 km from north to south, and 113 km east to west. Tripura is bordered by the country of Bangladesh to the west, north and south; and the Indian states of Assam to the north east; and Mizoram to the east. It is accessible by national highways passing through the Karimganj district of Assam and Mamit district of Mizoram.



Source: <https://www.mapsofindia.com/maps/tripura/>

Figure 7-15: Administrative boundaries around and in Tripura

The physiography is characterized by hill ranges, valleys and plains. The state has five anticlinal ranges of hills running north to south, from Boromura in the west, through Atharamura, Longtharai and Shakhan, to the Jampui Hills in the east. The intervening synclines are the Agartala–Udaipur, Khowai–Teliamura, Kamalpur–Ambasa, Kailashahar–Manu and Dharmanagar–Kanchanpur valleys. At an altitude of 939m, Betling Shib in the Jampui range is the state's highest point. The small isolated hillocks interspersed throughout the state are known as tillas, and the narrow fertile alluvial valleys, mostly present in the west, are called lungas. A number of rivers originate in the hills of Tripura and flow into Bangladesh. The Khowai, Dhalai, Manu, Juri and Longai flow towards the north; the Gumti to the west; and the Muhuriand Feni to the south west.

In January 2012, major changes were implemented in the administrative divisions of Tripura. Beforehand, there had been four districts, such as Dhalai (headquarters Ambassa), North Tripura (headquarters Kailashahar), South Tripura (headquarters Udaipur), and West Tripura (headquarters Agartala). Four new districts were carved out of the existing four in January 2012 such as Khowai, Unakoti, Sepahjala and Gomati. Six new subdivisions and five new blocks were also added. The subdivisions of each district are governed by a sub-divisional magistrate and each subdivision is further divided into blocks. The blocks consist of Panchayats (village councils) and town municipalities. As of 2012, the state had eight districts, 23 subdivisions and 45 development blocks. Agartala, the capital of Tripura, is the most populous city. Other major towns with a population of 10,000 or more (as per 2015 census) are Sabroom, Dharmanagar, Jogendranagar, Belonia, Khowai, Kailashahar, Pratapgarh, Udaipur, Amarpur, Gandhigram, Ranirbazar, Bishalgarh, Teliamura, Melaghar, Ambassa, Kamalpur, Bishramganj, Kathaliya and Baxanagar.

Tripura ranks second only to Assam as the most populous state in North East India. According to the results of 2011 census of India, Tripura has a population of 3,673,917 with 1,874,376 males and 1,799,541 females. It constitutes 0.3 per cent of India's population. The sex ratio of the state is 960 females per thousand males, higher than the national ratio 940. The density of population is 350 persons per square kilometer. The literacy rate of Tripura in 2011 was 87.22 per cent, higher than the national average 74.04 per cent, and third best among all the states. Percentage wise population growth in Tripura has been presented in the table below.

Table 7-9: Percentage wise population growth in Tripura

Population growth		
Census	Population	Percentage
1951	639,000	—
1961	1,142,000	78.7%
1971	1,556,000	36.3%
1981	2,053,000	31.9%
1991	2,757,000	34.3%
2001	3,199,203	16%
2011	3,673,917	14.7%

Source: Census of India, 2011

(3) Profile of Khowai District

Khowai is a town located in the Indian state of Tripura and a recent nagar panchayat forming into a Khowai Municipal Council in newly formed Khowai district in the Indian state of Tripura. The city lies on the banks of Khowai River and hence from the river the city gets its name. Located near the Bangladesh border it has boundaries with it on its entire Southern part.

As of 2011 India census, Khowai had a population of 327,564. Males constitute 51% of the population and females 49%. Khowai has an average literacy rate of 87.78%, higher than the national average of 59.5%: male literacy is 92.17%, and female literacy is 83.17%. In Khowai, 9% of the population is under 6 years of age.

There are two range sector offices in the sub-division of Khowai - (i) Khowai & (ii) Padmabil. The Khowai range has 13,578 hector land of forest whereas the Padmabil range has 6,468 hector of forest land. Some of the vital statistics of Khowai are presented in the table below.

Table 7-10: Statistics of Khowai District

Description	2011
Estimated total Population	327,564
Estimated Male Population	167,401
Estimated Female Population	160,163
Estimated ST Population	139,537
Estimated SC Population	63,062
Estimated Literacy Rate (%)	87.78
Estimated Male Literacy Rate (%)	92.17

Estimated Female Literacy Rate (%)	83.17
Estimated Child Population(0-6 yr)	38,659
Forest Area (in Sq.km)	587.224
Production of rice(in MT) (P)	69,580
Production of other pulses (in MT)	341
Production of potatoes (in MT)	Nil
Production of fruits (in MT)	Nil
Veterinary hospitals	1
Veterinary dispensary	4
Veterinary Sub Centre (First Aid centre/ Stockman centre)	48
Veterinary AI Centre	2
Cultivable water area (in ha)	2,910.85
Production of fish (in MT) (P)	8,138.14
Number of Co-operative Societies	178
Number of Vehicles	Nil
Number of Primary Schools	267
Number of Middle Schools	122
Number of High Schools	61
Number of H.S.(+2) Schools	35
Number of General Degree Colleges	2
Number of Anganwadi Centre	1,041
Number of Hospitals	1
Number of PHC/RH	7
Number of Dispensaries/ Sub-centres	109
Number of Ayurvedic Institutions	5
Number of Homeopathic Institutions	4
Number of beds available to patients	196
No. of traffic accident happening	87
No. of Persons killed by traffic accident	19
No. of Gram Panchayats with ADC area	113

Source: Website of Tripura State (<https://ecostat.tripura.gov.in/Khowai.pdf>)

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(4) Profile of Gomati District

The Gomati District is headquartered at Udaipur, created in the year 2012. Udaipur is popularly known as the city of lakes and was the capital of Tripura till 1760. The city is famous for its Mata Tripura Sundari Temple which is situated about 3 km away from Udaipur at Matabari.

As per the administrative reorganization effected in 2011, the Gomati District comprising of Udaipur, Amarapur and newly created Karbook subdivisions was created as truncated version of the erstwhile South Tripura district. There are 3 Revenue divisions, 1 Municipality and 1 Nagar Panchayat in the district comprising of 173 villages. Some of the vital statistics of Gumti are presented in the table below.

Table 7-11: Statistics of Gomati District

Description	Census 2011
Actual Population	441,538
Male	225,428

Female	216,110
Geographic Area sq. km	1,522.8
Population Density/km2 (undivided district)	286
Sex Ratio (undivided district)	957
Average Literacy % (2013)	100
Male Literacy % (2013)	100
Female Literacy % (2013)	100

Source: Website of Tripura State (www.gomati.nic.in)

(5) Profile of South Tripura District

South Tripura District was formed on 1 September 1970, as one of the three districts of Tripura. The undivided district headquarter was located at Udaipur. The district was reformed on 6th January, 2012 having its part carved out as Gomati District. The district headquarter is now located at Belonia town. The district has three sub-divisions (Belonia, Sabroom and Santirbazar). The district resides in two Lok Sabha constituencies: Tripura West (shared with West Tripura district) and Tripura East (shared with Dhalai and North Tripura districts).

The people of Tripura are mostly Scheduled Tribes (hereinafter referred to as “ST”), Bengalese, Manipuri and Muslim. The largest tribal group is Tripuri. In South Tripura district mainly Bengali, Muslim, and Reang, Chakma, Tripuri and Mog tribes inhabiting in the district. The most commonly spoken languages here are Bengali, Kok-Borok, Chakma, Mog and various dialects of the Tripuri language. Some of the vital statistics of South Tripura are presented in the below table.

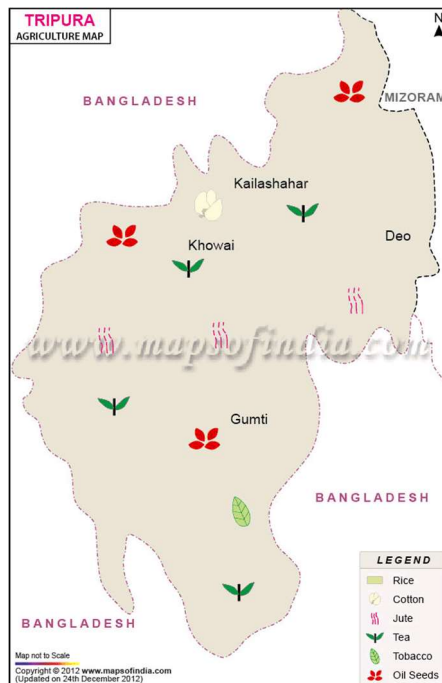
Table 7-12: Statistics of South Tripura District

Description	2011
Actual Population	453,079
Male	234,118
Female	218,961
Sex Ratio	935
Area Sq. Km	1,514.3
Population Density/km2	299
Average Literacy	85.09
Male Literacy	93.39
Female Literacy	79.54

Source: Website of Tripura State (www.gomati.nic.in)

(6) Agriculture in Tripura

The primary sector (Agricultural) contributes about 64% of total employment in the state and about 48% of the State Domestic Product (SDP). A variety of Horticultural/ Plantation Crops are produced in Tripura like Pineapple, Orange, Cashew nut, Jackfruit, Coconut, Tea, Rubber, Forest Plantations etc. At present both conventional settled agriculture in the plains and Jhum system of cultivation in the hills are practiced, although earlier many tribal people depended more on *jhum* system of cultivation, perhaps due to their life-pattern i.e. predominantly living in the hill areas.



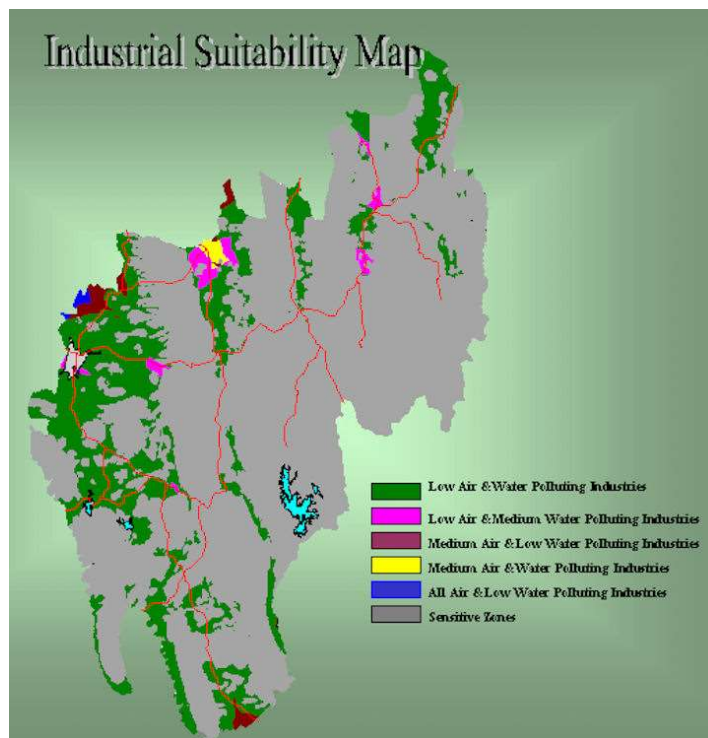
Source: <https://www.mapsofindia.com/maps/tripura/tripuraagriculture.htm>

Figure 7-16: Agriculture in Tripura

(7) Industries

The industry sector has remained undeveloped so far, despite the vast potential. The secondary sector contributes only about 5% of total employment and about 7% of the total income of the state at present. Tourism has been declared as an Industry in the state since 1987. Handicraft is emerging as a potential industry in Tripura. The Handloom Industry also plays an important role in rural Industry of Tripura.

Of late various industries have begun to come up with the possible encouragement from the state government, although industrial development as such, is yet to fall in place in true sense in the absence of big industries. In the industrial sector, rubber and tea-based industries form the prime share with cement, steel etc. industries following suit.



Source: www.globalsecurity.org

Figure 7-17: Industrial Suitability in Tripura

(8) Mineral resources

The most important minerals in the state are oil and natural gas. The Oil and Natural Gas Corporation (ONGC) has carried out drilling at several sites. Two thermal power stations run on natural gas is operational in Baramura hills and Rokhia. Another important mineral resource of the state is glass sand.

The ONGC-Tripura Power Company Ltd (OTPC) was set-up in September 2008 for subscribing the equity by Oil and Natural Gas Corporation (ONGC), Infrastructure Leasing and Financial Services Ltd (IL&FS) and Government of Tripura for implementation of 726.6 MW thermal power project at Palatana in Gomati District for the North Eastern States.

The mineral resources of any state provide an avenue for economic development but the process of mining may have extensive impact on land, soil and water resources. The mining projects have as a consequence become a part of development sector requiring environmental clearance under environmental protection act, 1986, EIA Notification 1994.

7.2.5 Tribal/Ethnic Profile

According to the result of 2011 census of India, the population of Tripura is 3,671,032. There are 19-scheduled tribes in the State with their own cultural identity, which includes Tripuri, Reang, Jamatia, Chakma, Lusai, Mog, Garo, Kuki, Chaimal, Uchai, Halam, Khasia, Bhutia, Munda, Orang, Lepcha, Santal, Bhil and Noatia. The Scheduled Tribes' population in Tripura was

1,166,813 that consist 31.8% of the total population⁵⁰. The targeted part of NH208 passes through Khowai district, Gomati district and South Tripura district.

Bengali is the official languages of Tripura. As in the rest of India, English is also used for official purpose. Kok-Borok is the mother tongue of 8 (eight) indigenous tribes of Tripura having its separate identity. The tribal communities have their own dialect for communication. The literacy rate of Tripura in 2011 was 87.22%.⁵¹ Majority of the Tripuri people follow Hinduism. Muslim, Christianity and Buddhism are also followed in the state.

7.2.6 Land Use, Indigenous Knowledge and Management of Natural Resources

The land use pattern among different north-eastern states varies widely. Major portion of the north-east is forests, and little area is available for settled cultivation. Shifting cultivation (“*Jhum*” cultivation) is the main form of agriculture in these hills. On average 386,900 ha is put under shifting cultivation every year and an estimated 443,000 households earn their livelihood from shifting cultivation. The land use in Tripura is shown in Table 7-13 and data on shifting cultivation are presented in Table 7-14 and Table 7-15 also describe land utilization pattern in Tripura.

Table 7-13: Percentage Share of Land Utilization in the Study Area

States	Total utilized area ('000 ha)	Forest (%)	Non-arable land (%)	Fallow land (%)	Net sown area (%)
Tripura	1,049	58	15	0	27
All India	305,903	23	23	8	46

Source: Basic Statistics of North Eastern Region 2015

Table 7-14: Status of Shifting Cultivation in the Study Area

States	Annual area under shifting cultivation (ha)	Fallow period (years)	No. of Jhumia families
Tripura	22,300	5-9	43,000

Source: Basic Statistics of North Eastern Region 2015

Table 7-15: Summary of Land Use in Each State

State	Description
Tripura	Out of the total geographical area of 1,049 thousand ha of the state, 58% is occupied by forests, followed by 26% as net sown area. The area sown more than once is 65%. The valley land locally known as lungas is well suited for common agricultural crops, while highlands locally called <i>tillas</i> are fit for plantation crops but are often used for shifting cultivation called <i>jhum</i> . Paddy alone occupies 58% of the total cropped area. The two important commercial crops grown are rubber (21,000 ha) and tea (5,780 ha). On the <i>tillas</i> and <i>lungas</i> cultivation of sugarcane, potato, groundnut, ginger, and turmeric is gradually getting popular. Double cropping is practiced in irrigated areas. A number of tropical and subtropical fruits, pineapple, jackfruit, orange, litchi, banana have been successfully grown on <i>tillas</i> . Introduction of cashewnut has been found promising.

Source: Indian Council of Agricultural Research (ICAR). 2010. *Degraded and Wastelands of India*.

Jhum is directly supported by the forest ecosystem. *Jhum* has been in use for centuries and still remains a major land-use practice despite recent government effort to discourage the practice

⁵⁰ Directorate of Economics & Statistics Planning (Statistics) Department, Government of Tripura. *Economic Review of Tripura, 2016-17*.

⁵¹ ditto

and provides a basis for subsistence farming, maintenance of cultural values and social stability for the people living in low population densities. Challenges associated with *jhum* are often caused by the high pressure due to local population growth, rather than the inherent problem of the system itself. In recent years, local farmers are responding to the new demands of the market economy and pressure on land by diversifying the cropping patterns. While *jhum* is a traditional farming method, its practice is not static but a dynamic one that continuously evolves with the changes of outside environment.

While shifting cultivation is commonly observed in the Northeast region in India, in Tripura it is practiced in limited area of Khowai, Gomati and South Tripura districts, the area under shifting cultivation in Tripura as estimated by different organizations and agencies hold opposing views significantly. A sizeable portion of population in the hills of Tripura still practices *jhum* cultivation. In the comparison of shifting cultivation as practiced, the tribes of Tripura are having very low ratio among the north-eastern states. Number of Households and persons dependent on *Jhum* farming activities have moved to community-based farming of rubber tree and other fruits and medicinal horticultural activities.

Table 7-16: Number of Households and Persons Dependent on Jhum

Year	Source of the Estimate	No. of Households	No. of Persons (in lakh)
1987	Benchmark Survey (1987)	55049	2.88
1999	Department of Tribal Welfare	51265	NA
2007	Forest Department	27278	1.36

Source – TDHR Journal, page 37

Jhum is predominant in unirrigated, difficult to access, usually at the slopes in mountainous areas, prevailing of community ownership or customary rights places dominated by the scheduled tribes. The alignment of NH208 to be improved by the project passes through well connected habituated area, costly land with irrigation and other resources. In the census survey conducted by the JICA Study Team, they did not find any area *jhum* is operated in the land need to be acquired. As per the Entitlement Matrix, *Jhum* or any form of cultivation will be compensated identically.

7.2.7 Stakeholder Consultations conducted before the study

(Khowai-Teliamura)

The Environmental and social considerations of the part of NH208 from Khowai to Teliamura was already planned under the “North East Road Network Connectivity Improvement Project (Phase 4)” (hereinafter referred to as “JICA Phase 4 Project”) implemented by JICA, As per the JICA Guidelines for Environmental and Social Considerations (2010), NHIDCL disclosed the DPR-EIA and DPR-SIA (originally approved in 2017) on its website and distributed the SIA summary in local language (Bengali) and English at each affected panchayat offices prior to the additional public consultations conducted by NHIDCL between 24 and 26 September 2019. In addition, in order to ensure the process of free, prior, and informed consultation (FPIC) with tribal peoples and confirm their consent, NHIDCL formally invited the representatives of the concerned TTAADC officials and encouraged project affected tribal persons to participate the additional public consultation through the local TTAADC offices. Series of actions for additional information disclosure were held.

During the DPR study under the JICA Phase 4 Project, the Survey Team carried out preliminary consultations through Focus Group Discussions (FGDS) and meetings with the Project Affected Persons (PAPs) as well as the general public in the project area. 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 large number of PAPs in nearly every affected village 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. Public discussions were conducted at important points, where people could assemble in large numbers. Panchayat members were contacted to inform the people. The Team also had informal meetings with village head, panchayat and other district level government officials, leaders of local level organization /association, trucker's association, and village women groups. General perception of the public consultation meetings was as follow:

- All the Pradhans of Gram Panchayat and all the officials promised that they would extend their co-operation in NH-208 work,
- The meeting ended with vote of thanks to chair, and
- Notable numbers of PAPs showed satisfaction of the proposed alignment avoiding major settlement area.

Joint public consultations for Supplementary EIA and stakeholder meetings for RAP (DPR/RAP) had been conducted at six locations from September 23 to 25 of 2019 after the series of advanced information disclosure described above. As the dominant spoken language and one of state's official languages is Bengali, presentation sheets were prepared in Bengali and explained in either Bengali or Hindi after confirming the consent of language use at the beginning. In order to ensure the participation of the PAPs from both non-tribal and tribal area, meeting halls were carefully arranged by consultation with relevant authorities. Attendants of the meetings range from 81 to 216 and female attendants range from 15 to 35.

(Teliamura-Sabroom)

In addition to the stakeholder consultations mentioned above, as a part of this Preparatory Study, following the JICA Guidelines for Environmental and Social Considerations, stakeholder consultation was conducted for the whole alignment from Khowai to Sabroom twice at the scoping level and the Draft Final Report level. The report of the consultations is shown in Section 7.11.

7.3 Legal Framework and Screening of the Project

7.3.1 Requirement of EIA under Indian Regulation

(1) National Law on Environment

The environment-related legislation in India entrusts the MoEFCC to operate the "Environmental Protection Act of 1986". The MoEFCC has the jurisdiction over the entire environment-related laws and regulations in India, and has a great power in the operation and revision, continuous development NH, and monitoring of environmental pollution.

In India, some terms that are different from those used in Japan are used in the legal system, so the terms used in Indian law and their order are shown below.

a. Acts:

This is approved by the Diet and this is ranked at the highest. It accompanies the obligations and penalties.

b. Rules:

Based on the law, the government agency (ministry) establishes the detailed rules for implementing the law.

c. Notifications:

It defines specific procedures and operational procedures to supplement the rules.

d. Guidelines:

It is created by the central competent authority to support the enforcement of rules by the local government agencies that are the rules' enforcement agents. It has no legal obligations, but it indicates recommended efforts.

Pollution-related laws in India are regulated by the Central Pollution Control Board (CPCB). Two Acts: 1) The Water (Prevention and Control of Pollution) Act, 1974; and 2) The Air (Prevention and Control of Pollution) Act, 1981 have been enacted prior to environmental protection-related laws and regulations. Then, in 1986, the Environmental (Protection) Act came into effect. In order to regulate the environmental pollution advocated in this, the following pollution-related laws and regulations were sequentially enacted.

- 1) The National Environmental Tribunal Act, 1995 India;
- 2) The National Environment Appellate Authority Act, 1997;
- 3) The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996;
- 4) The Bio-Medical Waste (Management and Handling) Rules, 1998;
- 5) The Recycled Plastics Manufacture and Usage Rules, 1999;
- 6) The Municipal Solid Wastes (Management and Handling) Rules, 2000;
- 7) The Noise Pollution (Regulation and Control) Rules, 2000;
- 8) The Ozone Depleting Substances (Regulation) Rules, 2000;
- 9) The Batteries (Management and Handling) Rules, 2001;
- 10) The Manufacturing, Storage and Import of Hazardous Chemicals (Amendment) Rules, 2000;
- 11) The Hazardous Waster (Management and Handling - Amendment) Rules, 2000.

Among the environmental laws and regulations in India, those that are particularly relevant to this project are shown in Table below.

Table 7-17: Environmental Acts and Regulations in India

No.	Acts and regulations	Purpose & outlines	Enforcement day or amendment day
1	Environment (Protection) Act	Basic act on the environment gives the central government the authority to make rules for environmental protection	1986
2	Notification on Environment Impact Assessment of Development projects (and amendments)	Prescribes the procedures for obtaining environmental approval required for implementing projects that may have a significant impact on the environment.	2006, 2009, 2012
3	Wildlife Protection Act	Protect wildlife and birds through the establishment of national parks and reserves	1972, 1982, 1986, 1991, 1993, 2002, 2006, 2013
4	Forest (Conservation) Act	Forest conservation and management	1927, 1980
5	Air (Prevention and Control of Pollution) Act (and subsequent amendments)	To prevent air pollution, manage it, and promote mitigation	1981
6	Water (Prevention and Control of Pollution) Act (and subsequent amendments)	To prevent water pollution, control it, and improve water quality	1974, 1988, 2003

7	Hazardous waste Handling and management act, 1989	Permit procedure for management and handling of hazardous waste	1989, 2003
8	Noise Pollution (Regulation and Control) rules 2000	Noise regulation and management	2000
9	Solid Waste Management Rules 2016	Municipal solid waste collection, separation, storage, transportation, treatment and disposal regulations, final disposal site regulations, composting, leachate treatment and incineration standards, etc.	2016
10	Construction and Demolition Waste Management Rules	Disposal of construction and demolition waste such as construction materials, debris and rubble	2016

Source: JICA Survey Team

(2) Laws on Environmental Impact Assessment and Environmental Clearance

The Environment Impact Assessment Notification of 1994⁵² is the first legal document established in India on Environmental Impact Assessment. The concept of EIA was introduced in 1979, but it was never mandatory for the government or private entities to conduct EIA.

EIA notification 2006⁵³ succeeded the 1994 notification, and it is the primary EIA legislation in India thus far. This notification divided all projects into two categories: Category "A" and "B." According to the and EIA notification of 2006 and its gazetted amendments up to now, any highway project including expressways falls under Category A, if the project entails:

- i) New National Highways; and
- ii) Expansion of National Highways greater than 100km involving an additional right of way or land acquisition greater than 40m on the existing alignments and 60m on re-alignments and bypasses.

Category B if the project entails:

- i) State Highway; and
- ii) State Highway Expansion projects in hilly terrain (above 1,000 m AMSL) and or ecologically sensitive areas.

According to EIA notification of 2013 (IRC:SP:93-2017 also cited), the requirement conditions of Environment Clearance-EC have some exceptions in case of road projects. The guideline stipulates that the road projects that can pursued without any ECs are the cases as below.

1. Road development projects other than State Highways and National Highways
2. State Highway widening projects located below an altitude of 1000m AMSL
3. State Highway widening projects not located in an ecologically sensitive area
4. National Highway widening projects of up to 100 km length
5. National Highway widening projects of more than 100 km length involving the additional right of way or land acquisition up to 40m (at any place) on existing alignment and 60 m (at any place) on re-alignments or bypasses. "New National Highways", though not defined anywhere, is understood to mean Greenfield projects

In the case of NH208, total length of 134.71 Km (Khowai to Sabroom), therefore, it is necessary to pay attention to no-EC conditions, case 5 “widening projects of more than 100 km length involving the additional right of way or land acquisition up to 40m (at any place) on existing alignment and 60 m (at any place) on re-alignments or bypasses,” mentioned above.

The additional land acquisition for this project is as follows.

- (i) Existing, less than 40m,
- (ii) Bypass is less than 60m.

Therefore, the proposed project does not require EC, because it is less than the requirement that EC is required if it exceeds 40m with the existing linear of requirement 5 and exceeds 60m with re-linear / bypass.

(3) State Law on Environment (Tripura State)

In connection with environmental law, the Ministry of Environment, Forest and Climate Change (MoEFCC) of the central government level and the State Environment Assessment Committee (SEAC) of the state government level will approve environmental permits and each review is being conducted.

In addition, the State Pollution Control Board (SPCB) will carry out approval under the Toxic Hazardous Materials Handling Act (1989). Regarding the environmental and social impact caused by this project and necessary procedures, interviews will be conducted with the project implementing body and related organizations and departments. Confirm the consistency between the Indian environmental system and the JICA Guidelines for Environmental and Social Considerations (April 2010). For the items that are inconsistent, we will fill the gap with the environmental research consultants, conducting an EIA survey locally, NHIDCL, the project implementing agency, State Public Works Department, and the department in charge of examining the EIA report of the state. ..

Tripura has a state-level legal system that includes:

- ✓ Tripura Forest Rules, 1985 and its amendments (1986, 2000, 2002, 2006, 2015, 2020)
- ✓ Guidelines for felling of trees from non-forest areas 2002 and its amendments (2004, 2010, 2014, 2019)
- ✓ Guidelines for extraction of Agar trees from private lands (2019)
- ✓ Notification for price of Agar wood (2010)
- ✓ Order for transporting of Agar wood/ oil related product (2019)
- ✓ Tripura Minor Minerals Concession Rules (2014)

(4) Gaps between Indian Law and JICA Guidelines on ESC

Applicability of JICA’s Guidelines for Environment and Social Considerations (ESC) is required if a project is funded by JICA. If a significantly adverse impact on the environment or society has been identified in JICA-assisted project, the following has to be thoroughly considered and studied. Table below shows the comparison JICA Guideline and Laws in India regarding EIA.

Table 7-18: Gaps between JICA Guideline and Laws in India regarding ESC

No.	Items	JICA Guideline	Laws in India	Principle for this Project
1	ESC requirement	ESCs are pre-requisite and comprehensively discussed in JICA guidelines. JICA will take necessary measures to ensure that the appropriate ESC is given; When JICA reviews a project proposal and finds that the project could cause negative impacts on the environment or society, JICA advises the project proponents to provide appropriate ESC; If the negative impact of the project cannot be avoided or mitigated to an acceptable level, JICA will not support its implementation.	Separately discussed in each constrictioin, law, standard.	Compliance with JICA guidelines, the national constrictioin, law, standards will be referred and ensured.
2	Requirement of EIA	<p>Environmental and social surveys at the EIA level</p> <p>(Category A projects) Proposed projects likely to have significant adverse impacts on the environment and society. Category A includes projects in sensitive sectors (ex. Roads, railways, and bridges), projects that have characteristics that are liable to cause adverse environmental impacts (ex. Large-scale involuntary resettlement), and projects located in or near sensitive areas.</p> <p>IEE level (Category B projects)</p> <p>Projects whose potential adverse impacts on the environment and society are less adverse than those of Category A projects.</p>	<p>EIA notification of 2006 5Projects requiring EIA</p> <p>(Category A projects) i)New National Highways ii)Expansion of National Highways greater than 100km involving an additional right of way or land acquisition greater than 40m on the existing alignments and 60m on re-alignments and bypasses.</p> <p>Projects whose requirements of EIA are judged by the state level</p> <p>Environment Impact Assessment Authority</p> <p>(Category B projects) i) State Highway ii)State highway Expansion projects in hilly terrain (above 1,000 m AMSL) and or ecologically sensitive areas</p>	EIA will be prepared as category A in accordance with JICA Guidelines though not required by Laws in India

No.	Items	JICA Guideline	Laws in India	Principle for this Project
3	Scope of Impacts to Be Assessed	In addition to the direct and immediate impacts of projects, their derivative, secondary, and cumulative impacts as well as the impacts of projects that are indivisible from the project are also to be examined and assessed to a reasonable extent.	In addition to the direct and immediate impacts of projects, their derivative, secondary, and cumulative impacts as well as the impacts of projects that are indivisible from the project are also to be examined and assessed to a reasonable extent.	Derivative, secondary, and cumulative impacts as well as the impacts of projects that are indivisible from the project are also to be examined.
4	Avoid Adverse effects	<p>Priority should be given to the avoidance of adverse impacts on the environment or society when a project is planned;</p> <p>Minimization or mitigation of impacts should be considered only if avoidance is not feasible and if the benefit of the project outweighs the cost of mitigation measures;</p> <p>The project proponents must assess the environmental and social impacts at the earliest possible stage of planning, and implement ESC measures in accordance with the ESC Guidelines.</p>	Separately discussed in each construction, law, standard.	The national and international laws and standards will be referred and ensured.
5	Stakeholder meetings/ Public consultation	Stakeholder meetings shall be held at the stages of the scoping draft and report draft.	Public consultation shall be conducted after submission of draft report.	To hold Stakeholder meetings at the stages of scoping draft and report draft.
6	Disclosure of EIA	EIA reports are required to be made available to local residents of the country in which the project is to be implemented. The EIA reports are required to be available at all times for perusal by project stakeholders such as local residents; and copying must be permitted.	MOEF&CC shall display the Summary of the draft EIA report on its website, and also make the full draft EIA available for reference at a notified place during normal office hours at the Ministry in Delhi.	To disclose EIA in accordance with JICA Guidelines.

No.	Items	JICA Guideline	Laws in India	Principle for this Project
7	Certificate regarding the environment and society	If the project requires a certificate other than an EIA regarding the environment and society, indicate the title of said certificate and confirm the approval. monitoring	Forest Clearance will be required. The Contractor has to obtain permits from MSPCB for setting up hot-mix plants, batching plants, etc., under the Air and the Water Acts, whose results shall be reported to the Project proponents.	To confirm requirement of permits in accordance with the laws in India.
8	Monitoring	available to local project stakeholders.	Project proponents are required to submit environmental management plan & programme. It shall be mandatory for the project management to submit every half a year compliance reports in respect to the stipulated prior environmental clearance terms and conditions.	To implement environmental monitoring in accordance with the laws in India.
9	Human rights	Development project should aim for fair distribution of its benefits and must not burden or exclude certain stakeholders for the sake of others; The project proponents must respect the rights of all people concerned, and pay special attention to vulnerable social groups such as women, elderly, the poor, people with disabilities, indigenous peoples, ethnic minorities, and other minority groups to ensure that they are involved in decision-making processes and that they benefit from the project	Six fundamental human rights in Indian Constitution. Rights Vulnerable social groups such as women, elderly, the poor, people with disabilities are covered. Regarding indigenous peoples, ethnic minorities, and other minority groups TTAADC will cover the situation.	To ensure human rights should be properly protected throughout the project period according as the national standards.

Source: JICA Study Team

(5) Environmental Standards

A variety of environmental standards have been established by CPCB in accordance with the above-mentioned laws and regulations. The various standards directly related to this project are shown below.

- 1) National Ambient Air Quality Standards
- 2) Water Quality Criteria
- 3) Vehicular Exhaust
- 4) Auto Fuel Quality
- 5) Noise and Emission Limits for Diesel Engines for Generators
- 6) Noise Standards

In addition, emission standards for various manufacturing industries have been established in detail for each industry. This project is a road widening project (including new bypass construction). Therefore, in the waste, soil, air, water pollution, noise and vibration during construction, and road usage after the completion of construction work, the problems of noise and vibration due to the increase in traffic volume must be considered. Among these environmental pollution issues in this project, there are no clear regulations regarding waste during construction, soil pollution, and vibration.

Each Environmental standard is shown as the followings.

Table 7-19: Air Pollution Standard of India

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO ₂), µg/m ³	Annual* 24 hours**	50 80	20 80	- Improved West and Gaeke -Ultraviolet fluorescence
2	Nitrogen Dioxide (NO ₂), µg/m ³	Annual* 24 hours**	40 80	30 80	- Modified Jacob & Hochheiser (Na-Arsenite) - Chemiluminescence
3	Particulate Matter (size less than 10µm) or PM ₁₀ µg/m ³	Annual* 24 hours**	60 100	60 100	- Gravimetric - TOEM - Beta attenuation
4	Particulate Matter (size less than 2.5µm) or PM _{2.5} µg/m ³	Annual* 24 hours**	40 60	40 60	- Gravimetric - TOEM - Beta attenuation
5	Ozone (O ₃) µg/m ³	8 hours** 1 hour**	100 180	100 180	- UV photometric - Chemiluminescence - Chemical Method
6	Lead (Pb) µg/m ³	Annual* 24 hours**	0.50 1.0	0.50 1.0	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter
7	Carbon Monoxide (CO) mg/m ³	8 hours** 1 hour**	02 04	02 04	- Non Dispersive Infra Red (NDIR) spectroscopy
8	Ammonia (NH ₃) µg/m ³	Annual* 24 hours**	100 400	100 400	-Chemiluminescence -Indophenol blue method

Source: National Pollution Control Board, India

Table 7-20: Air Pollution Standard of IFC Guidelines (Reference)

Table 1.1.1: WHO Ambient Air Quality Guidelines^{7,8}		
	Averaging Period	Guideline value in $\mu\text{g}/\text{m}^3$
Sulfur dioxide (SO₂)	24-hour	125 (Interim target-1) 50 (Interim target-2) 20 (guideline)
	10 minute	500 (guideline)
Nitrogen dioxide (NO₂)	1-year	40 (guideline)
	1-hour	200 (guideline)
Particulate Matter PM₁₀	1-year	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline)
	24-hour	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate Matter PM_{2.5}	1-year	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline)
	24-hour	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

Source: IFC General EHS Guidelines (2007)

https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines

Table 7-21: Water Pollution Standards in India

Designated best use	Class	Criteria
Drinking water source without conventional treatment but after disinfections	A	Total coliform organisms MPN/100ml shall be 50 or less
		pH between 6.5 and 8.5
		Dissolved oxygen 6 mg/l or more
		Biochemical oxygen demand 2 mg/l or Less
Outdoor bathing (organised)	B	Total coliform organisms MPN/100ml shall be 500 or less
		pH between 6.5 and 8.5 *Dissolved oxygen 5 mg/l or more
		Biochemical oxygen demand 3 mg/l or Less
Drinking water source with conventional treatment followed by disinfection	C	Total coliform organisms MPN/ 100ml shall be 5000 or less
		pH between 6 and 9
		Dissolved oxygen 4 mg/l or more
		Biochemical oxygen demand 3 mg/l or less
Propagation of wild life, fisheries	D	pH between 6.5 and 8.5
		Dissolved oxygen 4 mg/l or more *Free ammonia (as N) 1.2 mg/l or less
Irrigation, industrial cooling, controlled waste disposal	E	pH between 6.0 and 8.5
		Electrical conductivity less than 2250 micro mhos/cm
		Sodium absorption ratio less than 26
		Boron less than 2mg/l

Source: National Pollution Control Board, India

Table 7-22: Water Pollution Standards in the US (Reference)

Pollutant (P= Priority Pollutant)	CAS Number	Freshwater CMC1 (acute) (µg/L)	Freshwater CCC2 (chronic) (µg/L)	Saltwater CMC1 (acute) (µg/L)	Saltwater CCC2 (chronic) (µg/L)
Acrolein (P)	107028	3ug/L	3ug/L	—	—
Aesthetic Qualities	—	—	—	—	—
Aldrin (P)	309002	3	—	1.3	—
Alkalinity	—	—	20000	—	—
alpha-Endosulfan (P)	959988	0.22	0.056	0.034	0.0087
Aluminum pH 5.0 - 10.5	7429905	--	--	—	—
Ammonia	7664417	—	—	—	—
Arsenic	7440382	340	150	69	36
Atrazine	1912249	—	—	—	—
Bacteria	—	—	—	—	—
beta-Endosulfan (P)	33213659	0.22	0.056	0.034	0.0087
Boron	—	—	—	—	—
Cadmium (P)	7440439	1.8	0.72	33	7.9
Carbaryl	63252	2.1	2.1	1.6	—
Chlordane (P)	57749	2.4	0.0043	0.09	0.004
Chloride	16887006	860000	230000	—	—
Chlorine	7782505	19	11	13	7.5
Chlorpyrifos	2921882	0.083	0.041	0.011	0.0056
Chromium (III) (P)	16065831	570	74	—	—
Chromium (VI) (P)	18540299	16	11	1100	50
Color	—	—	—	—	—
Copper (P)	7440508	—	—	4.8	3.1
Cyanide (P)	57125	22	5.2	1	1

Pollutant (P= Priority Pollutant)	CAS Number	Freshwater CMC1 (acute) (µg/L)	Freshwater CCC2 (chronic) (µg/L)	Saltwater CMC1 (acute) (µg/L)	Saltwater CCC2 (chronic) (µg/L)
Demeton	8065483	—	0.1	—	0.1
Diazinon	333415	0.17ug/L	0.17ug/L	0.82ug/L	0.82ug/L
Dieldrin (P)	60571	0.24	0.056	0.71	0.0019
Endrin (P)	72208	0.086	0.036	0.037	0.0023
gamma-BHC (Lindane) (P)	58899	0.95	—	0.16	—
Gases, Total Dissolved	—	—	—	—	—
Guthion	86500	—	0.01	—	0.01
Hardness	—	—	—	—	—
Heptachlor (P)	76448	0.52	0.0038	0.053	0.0036
Heptachlor Epoxide (P)	1024573	0.52	0.0038	0.053	0.0036
Iron	7439896	—	1000	—	—
Lead (P)	7439921	82	3.2	140	5.6
Malathion	121755	—	0.1	—	0.1
Mercury (P)	7439976 22967926	1.4	0.77	1.8	0.94
Methoxychlor	72435	—	0.03	—	0.03
Methyl Tertiary-Butyl Ether (MTBE)	—	—	—	—	—
Mirex	2385855	—	0.001	—	0.001
Nickel (P)	7440020	470	52	74	8.2
Nonylphenol	84852153	28 ug/L	6.6 ug/L	7 ug/L	1.7 ug/L
Nutrients	—	—	—	—	—
Oil and Grease	—	—	—	—	—
Oxygen, Dissolved Freshwater	7782447	—	—	—	—
Oxygen, Dissolved Saltwater	—	—	—	—	—
Parathion	56382	0.065	0.013	—	—
Pentachlorophenol (P)	87865	19	15	13	7.9
pH	—	—	6.5 – 9	—	6.5 – 8.5
Phosphorus Elemental	7723140	—	—	—	—
Polychlorinated Biphenyls (PCBs) (P)	—	—	0.014	—	0.03
Selenium (P)	7782492	—	---	290	71
Silver (P)	7440224	3.2	—	1.9	—
Solids Suspended and Turbidity	—	—	—	—	—
Sulfide-Hydrogen Sulfide	7783064	—	2	—	2
Tainting Substances	—	—	—	—	—
Temperature	—	—	—	—	—
Toxaphene (P)	8001352	0.73	0.0002	0.21	0.0002
Tributyltin (TBT)	—	0.46	0.072	0.42	0.0074
Zinc (P)	7440666	120	120	90	81
4,4'-DDT (P)	50293	1.1	0.001	0.13	0.001

Source: <https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table>

Table 7-23: Fuel Standard in India

Diesel Specification

Contents	1996	2000	2005	2010
Cetane No, Min	45	48	48	51
Sulphur % W/w, Max	0.5	0.25 0.25(metro)	0.05	0.035
Distillation T95	-	370	370	360
Polyaromatic	-	-	-	11

Gasoline Specification

Contents	1996	2000	2005	2010
RVP at 38 Deg.c,kpa	35-70	-	35-60	60
Benzine % by Vol.,Max	5	5.0 3.0(metro)	3.0 (all) 1.0 (metro)	1
Lead G/m3, Max	0.15% (low Pb) 0.013% (unleaded)	0.013	0.013	0.005
Sulphur % by mass, Max	0.10 (low Pb) 0.20 (unleaded)	0.1	0.05	0.015
Aromatics % v/v., Max	-	-	45	42
Oxygen %by Vol., Max	-	-	2	2.7

Source: National Pollution Control Board, India

Table 7-24: Noise Standard by Diesel Generators in India

No.	Descriptio
1	The maximum permissible sound pressure level for new diesel generator (DG) sets with rated capacity upto 1000 KVA, manufactured on or after the 1st January, 2005 shall be 75 dB(A) at 1 metre from the enclosure surface.
2	Noise limits for diesel generator sets not covered by 1, shall be as follows:-
	2.1 Noise from DG set shall be controlled by providing an acoustic enclosure or by treating the room acoustically, at the users end.
	2.2 The acoustic enclosure or acoustic treatment of the room shall be designed for minimum 25 dB (A) insertion loss or for meeting the ambient noise standards, whichever is on the higher side (if the actual ambient noise is on the higher side, it may not be possible to check the performance of the acoustic enclosure/acoustic treatment. Under such circumstances the performance may be checked for noise reduction upto actualambient noise level, preferably, in the night time). The measurement for Insertion Loss may be done at different points at 0.5 m from the acoustic enclosure/ room, then averaged.
	2.3 The DG set shall be provided with proper exhaust muffler with insertion loss of minimum 25 dB (A).
	2.4 Guidelines for the manufacturers/ users of Diesel Generator sets shall be as under:-
	2.4 (1) The manufacturer shall offer to the user a standard acoustic enclosure of 25 dB (A) insertion loss and also a suitable exhaust muffler with insertion loss of 25 dB(A).
	2.4 (2) The user shall make efforts to bring down the noise levels due to the DG set, outside his premises, within the ambient noise requirements by proper citing and control measures.
	2.4 (3) Installation of DG set must be strictly in compliance with the recommendations of the DG set manufacturer.
	2.4 (4) A proper routine and preventive maintenance procedure for the DG set should be set and followed in consultation with the DG set manufacturer which would help prevent noise levels of the DG set from deteriorating with use.

Source: National Pollution Control Board, India

Table 7-25: Emission Standard in India (From 1991)

Norms	Passenger Car	Heavy Diesel Vehicles			
	CO (g/km)	CO (g/km)	HC (g.km.hr)	NOx (g.km.hr)	PM (g.km.hr)
1991Norms	14.3-27.1	14	3.5	18.0	-
1996 Norms	8.68-12.40	11.2	2.4	14.4	-
1998Norms	4.34-6.20	-	-	-	-
India stage 2000 norms	2.72	4.5	1.1	8.0	0.4
Bharat stage-II	2.2	4.0	1.1	7.0	0.2
Bharat Stage-III	2.3	2.1	1.6	5.0	0.1
Bharat Stage-IV	1.0	1.5	1.0	3.5	0.0

Source: National Pollution Control Board, India

Note: Bharat is the emission standard name of India, and Stage IV is the standard applied from April 2010. Same standard as Euro Stage

Table 7-26: Noise Standards in India (Vehicles)

S. No.	Type of vehicle	Noise Limits from 1 st January, 2003, dB(A)
1.0	Two wheeler	
1.1	Displacement upto 80 cc	75
1.2	Displacement more than 80 cc but upto 175 cc	77
1.3	Displacement more than 175 cc	80
2.0	Three wheeler	
2.1	Displacement upto 175 cc	77
2.2	Displacement more than 175 cc	80
3.0	Vehicles used for carriage of passengers and capable of having not more than nine seats, including the driver's seat	74
4.0	Vehicles used for carriage of passengers having more than nine seats, including the driver's seat, and a maximum gross Vehicle Weight(GVW) of more than 3.5 tonnes	
4.1	With an engine power less than 150 KW	78
4.2	With an engine power of 150 KW or above	80
5.0	Vehicles used for carriage of passengers having more than nine seats, including the driver's seat: Vehicles used for carriage goods.	
5.1	With maximum GVW not exceeding 2 tonnes	76
5.2	With maximum GVW greater than 3 tonnes but not exceeding 3.5 tonnes	77
6.0	Vehicles used for transport of goods with a maximum GVW exceeding 3.5 tonnes.	
6.1	With an engine power less than 75 KW	77
6.2	With an engine power of 75 KW or above but less than 150 KW	78
6.3	With an engine power of 150 KW or above,	80"

Source: National Pollution Control Board, India

Table 7-27: Noise Standards in India

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

Source: Gazette Notification dated 26th December 1989. It is based on the weighted equivalent noise level (Leq).

* Day time is from 6 am to 9 pm whereas night time is from 9 pm to 6 am

** Silence zone is defined as area up to 100 meters around premises of hospitals, educational institutions and courts. Use of vehicles horns, loud speakers and bursting of cracking are banned in these zones

These noise standards have been given the status of statutory norms vide Noise Pollution (Regulation and Control) Rules, 2000. However, these rules have changed the periods for 'Day Time' and 'Night Time' to 6 a.m. to 10 p.m. and 10 p.m. to 6 am respectively.

Table 7-28: Noise Standards by IFC Guidelines (References)

Table 1.7.1- Noise Level Guidelines ⁵⁴		
Receptor	One Hour L _{Aeq} (dBA)	
	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational ⁵⁵	55	45
Industrial; commercial	70	70

Source: https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines

7.3.2 Legal Framework Applicable to Land Acquisition, Resettlement and Rehabilitation

(1) Legal Framework

As per the JICA Guidelines of Environmental and Social Considerations, this project is categorized as Category A. Thus, a full Resettlement Action Plan will be prepared on the possible impacts identified and measured in social impact assessment and mitigation measures as provisioned in the Entitlement Matrix created from the RFCTLARR Act, 2013, and will be as per the JICA's Guidelines in accordance of World Bank's OP 4.12.

The Resettlement Plan will be disclosed and implemented in the project and the compensation and resettlement and rehabilitation assistances will be released to the PAHs before any impact of the land acquisition is realised. The Resettlement Plan will be implemented, and the Monitoring of the Resettlement Plan will be guided by the Policy and Guidelines of JICA and World Bank which is discussed in this Report.

Brief description of the legal provisions of relevant acts, policies and their applicability to the project is discussed below in Table 7-29.

Table 7-29: Legal Framework and Applicability

Sl. No.	Acts, Notifications and Policies	Relevance to this Project	Applicability
National and State Acts and Policies			
1	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCTLARR, 2013)	The act extends to the whole of India. The act provides for a transparent process and fair compensation in land acquisition for public purpose and provides for rehabilitation and resettlement of landowners and those affected by land acquisition. It comprises four schedules that provide the minimum applicable norms for compensation based on market value, multiplier and solatium; resettlement and rehabilitation (resettlement and rehabilitation) entitlements to landowners and livelihood losers; and facilities at resettlement sites for Project Affected Persons, besides providing flexibility to states and implementing agencies to provide higher norms for compensation and resettlement and rehabilitation.	Applicable to payment of compensation in association with Tripura RFTCTARR Rules 2015. Not applicable to land acquisition as National Highway Act, 1956 is applied to land acquisition.

Sl. No.	Acts, Notifications and Policies	Relevance to this Project	Applicability
2	Tripura Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Rules, 2015	Rules to enforce RFCTLARR, 2013 in Tripura state.	ditto
3	Minimum Wages Act, 1948	The act provides for fixing minimum rates of wages in certain employments. WHEREAS it is expedient to provide for fixing minimum rates of wages in certain employments	Applicable
4	Equal Remuneration Act, 1976	The act provides for the payment of equal remuneration to men and women workers and for the prevention of discrimination, on the ground of sex, against women in the matter of employment and for matters connected therewith or incidental thereto	Applicable
5	The Child and Adolescent Labour (Prohibition and Regulation) Act, 1986	The act prohibits the engagement of children in any occupations and to prohibit the engagement of adolescents in hazardous occupations and processes and the matters connected herewith or incidental thereto	Applicable
6	Scheduled Castes and Scheduled Tribes Orders (Amendment) Act 2002	This act provides the inclusion in the lists of Scheduled Tribes, of certain tribes or tribal communities or parts of or groups within tribes or tribal communities, equivalent names or synonyms of such tribes or communities, removal of area restrictions and bifurcation and clubbing of entries; imposition of area restrictions in respect of certain caste in the list of Schedule Castes and exclusion of certain castes and tribes from the list of Schedule Castes and Schedule Tribes, in relation to the states of Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Goa, Gujrat, Himachal Pradesh, Jharkhand, Karnataka, Kerala, Madhya Pradesh, .Maharastra, Manipur, Mizoram, Orissa, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh and West Bengal.	Applicable
7	The Constitution (Eighty-Ninth Amendment) Act, 2003	The Constitution (Eighty-Ninth Amendment) Act, 2003 amend the article 338 by insert article 338A on 28th September 2003. Thus the National Commission for Scheduled Castes and Scheduled Tribes was bifurcated into the National Commission for Scheduled Castes and the National Commission for Scheduled Tribes	Applicable
8	Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006	This act has been enacted to recognize and vest the forest rights and occupation of forest land in forest dwelling Scheduled Tribes and other traditional forest dwellers, who have been residing in such forests for generations, but whose rights could not be recorded.	Applicable
9	Schedule VI Sixth Schedule, Tribal Areas and Autonomous District/ Regional Councils	The Constitution of India makes special provisions for the administration of the tribal dominated areas in four states viz. Assam, Meghalaya, Tripura and Mizoram. As per article 244 and 6th Schedule, these areas are called "Tribal Areas", which are technically different from the Scheduled Areas under 5th schedule. Only the Governor is empowered to increase or decrease the areas or change the names of the autonomous districts. The Autonomous District Council (ADC) is the district within a state to which central government has given varying degrees of autonomy within the state legislature.	Applicable
10	National Tribal Policy in 2006.	Ministry of Tribal Affairs had prepared a draft National Tribal Policy in 2006. This became out of context in view of certain legislative and policy changes and these necessitated further	Applicable

Sl. No.	Acts, Notifications and Policies	Relevance to this Project	Applicability
		revision of the draft policy. Meanwhile, a High Level Committee (HLC) was constituted on 14.08.2013 to prepare a position paper on socio-economic status of STs and suggest a way forward. The Committee submitted its Report on 29.05.2014 which contains 108 recommendations cutting across various Central Ministries/Departments as well as State Governments.	
11	World Bank OP/BP 4.12 – Involuntary Resettlement	The project involves land acquisition for widening, realignments, junction improvements, bypasses etc. It would also adversely affect structures used for various purposes, livelihood of people (mainly earning their livelihood by means of petty shops and providing various services). Many of them have been operating in the government land. Thus both title holders and non-title holders alike would be affected as a consequence of the project.	Applicable
12	World Bank OP/BP 4.10 – Indigenous People	In the context of India Indigenous Peoples may be referred to "scheduled tribes". A part of the project area is under the administrative control of Tripura Tribal Ares Autonomous District Council. The policy on Indigenous People would not be triggered if presence of tribal groups with close attachment to land in the project area is not established as there is already a highway and the project is only upgrading it. Further, this policy is not triggered if there is no "collective attachment to geographically distinct habitats" or "institutions that are separate from those of the dominant society and culture".	Applicable
13	World Bank Policy – Access to Information	The policy governs the public accessibility of information in the Bank's possession. The Bank allows access to any information in its possession that is not on a list of exceptions. Documents such as all SIA and RAP will be disclosed both by the borrower and Bank.	Applicable
14	JICA Guidelines for Environmental and Social Considerations	JICA encourages host country governments, including local governments, borrowers, and project proponents, to implement the appropriate measures for environmental and social considerations when engaging in cooperation activities. At the same time, JICA provides support for and examinations of environmental and social considerations in accordance with the guidelines. The detail is available at the link below. https://www.jica.go.jp/english/our_work/social_environmental/guideline/index.html	Applicable

Source: JICA Survey Team

(2) National Highway Act and RFCTLARR

The development of national highway networks has been one of the most important and priority interests of the nation even before the independence from the British rule. In order to realize the priority of the nation, the National Highways Act (1956) (NH Act) has been one of the most powerful laws in India. NH Act is applicable for land acquisition for any national highway development. Due to the controversies on compulsory land acquisition under the outdated acts including NH Act, the Government has significantly updated legal frameworks of land acquisition in India since 2013. For the improvement of NH208, two major laws and a guideline will be applied. Those three frameworks are 1) NH Act, 2) the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCTLARR), 2013, and 3) A Manual of Guidelines on Land Acquisition for National Highways Under the National Highways Act, 1956 (MORTH).

National Highways Act (NH Act)

NH Act had maintained the exclusive powers against other laws and personal rights despite controversies for its abilities and practices to acquire land compulsorily till 2015. Due to the controversies on low compensation decided by competent authorities or compulsory land acquisition under the out dated acts in India, the Government finally replaced the land acquisition act (1894) and enforced the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (RFCTLARR) in 2013 for any project except national priority sectors such as railway and road. However after 2015, even NH Act needs to adapt the safeguard provisions defined by the Schedule I, II and III of the RFCTLARR by the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Removal of Difficulties) Order 2015 dated 28th August 2015. The order has added an altogether new dimension for compensation to not only the landowners but also non-title holders as well as inclusion of adequate resettlement and rehabilitation assistance to ensure the recovery of the living standards.

For Land Acquisition, the NH Act defines the various PAPs of the process as follows: (i) section 3A - power to acquire land; (ii) 3B - power to enter for surveys; (iii) 3C - hearing of objections; (iv) 3D - declaration of acquisition; (v) 3E - power to take possession; (vi) 3F - power to enter into the land where land has vested in the central government; (vii) 3G - determination of amount payable as compensation; and (viii) 3F - deposit and payment of amount. The Act requires that the processes must be completed within a year from 3A to 3D. The acquisition process is faster due to central government co-ordination and provision for arbitration or power of civil court for trying any LA-related dispute. Although NHIDCL Act significantly reduces the time frame for acquisition, the rules and principles of compensation are derived from the LA Act of 1894 amended from time to time. The Act covers only legal title holders and provides for: (i) market value of the land; (ii) a solarium of 30% on the market value for compulsory acquisition; (iii) additional amount for trees, crops, houses or other immovable properties; (iv) damage due to severing of land, residence, place of business; (v) compensation to sharecroppers for loss of earning; and (vi) an interest of 12% on the market value from the date of notification to award.

RFCTLARR 2013 and its Schedules Applicable for NH Act

RFCTLARR replaced the colonial era land acquisition law (1894) and generally follows the international standards of social safeguards, particularly compensation for losses with market values (fair compensation) and adequate resettlement and rehabilitation assistance as per the National Rehabilitation and Resettlement Policy, 2007. Since the process of land acquisition under the RFCTLARR takes years without any limitation of process time by the competent authorities, priority sectors such as railways and national highways have retained powers to follow their simplified process for faster land acquisition. In addition, due to broad definitions for compensatory requirements, competent authorities for land acquisition (CALA) have faced difficulties to implement RFCTLARR in reality, which has triggered enormous numbers of court cases to solve all over India.

(3) Guidelines on Land Acquisition for National Highways

Due to the broad definitions of the RFCTLARR causing difficulties to enforce the RFCTLARR's provisions by CALA for the national highway projects, MORTH decided to define such broad definitions by "A Manual of Guidelines on Land Acquisition for National Highways Under the National Highways Act, 1956 (MORTH LA Guidelines 2018)" and instructed all agencies responsible for national highway development including NHIDCL to follow the manual. Some instructions to supplement the second schedule of RFCTLARR by the MORTH LA Guidelines (2018) is given in Table 7-30.

Table 7-30: Interpretation of the Second Schedule of RFCTLARR under the National Highways Act Projects

#	Elements	RFCTLARR Entitlement/ provision	Guidelines for MoRTH/ NHAI
1	Provision of housing units in case of displacement	<p>(1) If a house is lost in rural areas, a constructed house shall be provided as per the Indira Awas Yojana specifications. If a house is lost in urban areas, a constructed house shall be provided, which will be not less than 50 sq mts in plinth area.</p> <p>(2) The benefits listed above shall also be extended to any affected family which is without homestead land and which has been residing in the area continuously for a <u>period of not less than three years</u> preceding the date of notification of the affected area and which has been involuntarily displaced from such area:</p> <p>Provided that any such family in urban areas which opts not to take the house offered, shall get a one-time financial assistance for house construction, which shall not be less than Rs 150,000:</p> <p>Provided further that if any affected family in rural areas so prefers, the equivalent cost of the house may be offered in lieu of the constructed house: Provided also that no family affected by acquisition shall be given more than one house under the provisions of this Act.</p> <p>Explanation. – The houses in urban area may, if necessary, be provided in multistoried building complexes.</p>	<p>(i) This benefit is envisaged for the "affected family" in case of displacement.</p> <p>(ii) It is an admitted position that certain residential units may come within the RoW or extended RoW in the process of Land Acquisition for a road project. The owners of such dwelling units are in any case entitled to the price of land situated under such dwelling units, as also the assessed value of the structure. In addition to the above, such land-owners would also be entitled to a constructed house, if the affected family is displaced and dislocated from the area.</p> <p>(iii) The "Indira Awas Yojana", as referred to in the Second Schedule, has been revamped as "Pradhan Mantri Gramin Awaas Yojana" now for the Rural areas.</p> <p>(iv) Similarly, the Ministry of Housing and Urban Affairs is implementing a scheme known as "Pradhan Mantri Awas Yojana-Housing for All (Urban)" for the Urban areas.</p> <p>(v) Both the above Ministries have specified the size of the dwelling units being provided to the beneficiaries and the financial limits for construction/ provision of such units under the above schemes. It is natural that the costing of such units would also get suitably adjusted from time to time.</p> <p>(vi) It is, therefore, in order that a family, whose dwelling unit is lost in the process of acquisition of land for a NH Project and is displaced and dislocated from the affected area are also paid the amount prescribed under the two schemes at such time, subject to a minimum of Rs. 1.50 Lakh, in addition to the compensation amount for the land and the structure paid to them.</p> <p>(vii) The possibility of an affected family being in unauthorized occupation of such land cannot be ruled out. In such cases, while the</p>

#	Elements	RFCTLARR Entitlement/ provision	Guidelines for MoRTH/ NHAI
			affected persons/ family would not be entitled to any compensation for the land and the assessed value of the structure (being in unauthorized occupation by way of encroachment on public land), however, the affected family, if displaced and dislocated, would still be entitled to the benefits as per para (vi) above under the Second Schedule if it has been in occupation of such place for a period of three years or more.
2	Land for land	In the case of irrigation project, as far as possible and in lieu of compensation to be paid for land acquired, each affected family owning agricultural land in the affected area and whose land has been acquired or lost, or who has, as a consequence of the acquisition or loss of land, been reduced to the status of a marginal farmer or landless, shall be allotted, in the name of each person included in the records of rights with regard to the affected family, a minimum of one acre of land in the command area of the project for which the land is acquired: Provided that in every project those persons losing land and belonging to the Scheduled Castes or the Scheduled Tribes will be provided land equivalent to land acquired or two and a one-half acres, whichever is lower.	Not attractive in the case of NH Projects
4	Choice of Annuity or Employment	<p>(a) The appropriate Government shall ensure that the affected families are provided with the following options:</p> <p>(b) where jobs are created through the project, after providing suitable training and skill development in the required field, make provision for employment at a rate not lower than the minimum wages provided for in any other law for the time being in force, to at least one member per affected family in the project or arrange for a job in such other project as may be required; Or</p> <p>(c) one time payment of Rs. 500,000 per affected family; or</p> <p>(d) annuity policies that shall pay not less than two thousand rupees per month per family for twenty years, with appropriate indexation to the Consumer Price Index for Agricultural Labourers.</p>	<p>The scheme of "Rehabilitation and Resettlement" is applicable in cases where the landowner, whose land is acquired, and the landless family whose source of livelihood is dependent upon such landowner, is dislocated and compelled to change his place of residence or business due to such acquisition. This situation normally does not occur in the case of acquisition of land for linear projects like National Highways, unless a person's entire landholding is acquired. The Second Schedule refers to Sections 31(1), 38(1), and 105(3) of the RFCTLARR Act and these sections do not contain any provision in respect of this component of "Choice of Annuity or Employment".</p> <p>Secondly, even if it is assumed that these provisions have a correlation with the overall scheme of RFCTLARR Act, 2013, this component has multiple options, which have to be specified by the appropriate government. It is beyond the Competent Authority or the Collector to make an Award in this behalf in the absence of any provision by the Appropriate Government.</p>

#	Elements	RFCTLARR Entitlement/ provision	Guidelines for MoRTH/ NHAI
5	Subsistence grant for displaced families for a period of one year	Each affected family which is displaced from the land acquired shall be given a monthly subsistence allowance equivalent to three thousand rupees per month for a period of one year from the date of award. In addition to this amount, the Scheduled Castes and the Scheduled Tribes displaced from Scheduled Areas shall receive an amount equivalent to fifty thousand rupees. In case of displacement from the Scheduled Areas, as far as possible, the affected families shall be relocated in a similar ecological zone, so as to preserve the economic opportunities, language, culture and community life of the tribal communities	This provision is attractive in the case of displaced families. This would be applicable in cases where the family whose land is acquired, or the landless family whose source of livelihood is dependent on such landowning displaced family. In each such case, an amount of Rs. 36,000 would be payable. Further, if such displacement of any family from the Scheduled Castes and the Scheduled Tribes takes place in the Scheduled Areas, an additional amount of Rs. 50,000/- would be payable.
7	Cattle shed/ Petty shops cost	Each affected family having cattle or having a petty shop shall get one-time financial assistance of such amount as the appropriate Government may, by notification, specify subject to a minimum of twenty five thousand rupees for construction of cattle shed or petty shop as the case may be.	The one-time financial assistance of Rs. 25,000/- or the amount as may be prescribed by the appropriate government, would be payable to an affected family if the land where its source of livelihood was existing (petty shop/ cattle), comes under acquisition.
8	One-time grant to artisan, small traders and certain others	Each affected family of an artisan, small trader or self-employed person or an affected family which owned non agricultural land or commercial, industrial or institutional structure in the affected area, and which has been involuntarily displaced from the affected area due to land acquisition, shall get one-time financial assistance of such amount as the appropriate Government may, by notification, specify subject to a minimum of twenty-five thousand rupees	Applicable only in cases of involuntary displacement of the affected family from the affected area due to land acquisition
10	One-time Resettlement Allowance	Each affected family shall be given a one-time Resettlement Allowance of fifty thousand rupees only.	This provision would apply only where an affected family is displaced and has to re-settle somewhere else due to acquisition of his land.
11	Stamp duty and registration fee	(1) The stamp duty and other fees payable for registration of the land or house allotted to the affected families shall be borne by the Requiring Body. (2) The land for house allotted to the affected families shall be free from all encumbrances. (3) The land or house allotted may be in the joint names of wife and husband of the affected family.	This provision would be applicable only in rare cases where an alternate residence or land is allotted to the affected family. The amount of Stamp Duty would be paid only upon submission of documentary evidence to that effect.

Reference: A Manual of Guidelines on Land Acquisition for National Highways Under the National Highways Act, 1956, MORTH (2018)

7.3.3 Gaps between JICA Guidelines and National Legal Framework on Land Acquisition, Resettlement and Rehabilitation

After the full enforcement of RFCTLARR supplemented by the MORTH LA Guidelines (2018), there are only limited gaps between JICA Guidelines for Environmental and Social Consideration and National Legal Frameworks for NH projects. NHIDCL adapts JICA Env. Guidelines for those minor gaps, such as removal of three (3) years eligibility conditions for non-title holders. Full gap analysis between JICA Env. Guidelines and National Legal Frameworks for NH Projects on Land Acquisition, Resettlement and Rehabilitation is given in the table below.

Table 7-31: Gap Analysis JICA Guidelines and Legal Frameworks for the Proposed Project on Land Acquisition, Resettlement and Rehabilitation

No.	JICA Guidelines	Highways Act 1956 & its notifications* with RTFCLARR provisions	GAP between JICA Guidelines & Laws of India	Safeguard Policy of the Proposed Project
1	Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives. (JICA GL)	MORTH Notification 2018 Determination of alignment/ route for widening of National Highways – approach reg.: In such a situation, there is every likelihood of achieving a better alternative in the form of a greenfield alignment, a few km away, to the left/ right or north/south of the existing alignment. A few test cases have shown that most of these challenges are effectively met if we take up construction of greenfield NH arteries, especially where the traffic volumes justify up-gradation of a two-lane road to higher configurations,”	No	Conduct alternative study and avoid as much as possible
2	When population displacement is unavoidable, effective measures to minimize impact and to compensate for losses should be taken. (JICA GL)	MORTH Notification 2018. Policy Guidelines for land acquisition, tree felling, utility shifting across the alignment therefor – approach reg: The policy guidelines shall be followed henceforth to minimize the requirement of additional land acquisition, optimization of utility shifting and felling of trees.	No	Effective measures to minimize impact and to compensate for losses should be taken.

No.	JICA Guidelines	Highways Act 1956 & its notifications* with RTFCLARR provisions	GAP between JICA Guidelines & Laws of India	Safeguard Policy of the Proposed Project
3	People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels. (JICA GL)	Second and Third Schedules of the RFCTLARR Reg.: Compensation provisions ensures the restoration of living standards	No	PAPs who must be resettled involuntarily and whose means of livelihood will be hindered or lost must be sufficiently compensated and supported at least restore their standard of living, income opportunities and production levels to pre-project levels
4	Compensation must be based on the full replacement cost as much as possible. (JICA GL)	MORTH Notification 2016 Acquisition of missing plots from bulk acquisition through consent- reg., (vii): The account payee cheque towards the compensation/ replacement value of land shall be given to the title-holder at the time of registry. All taxes, registration charges and other expenses like value of the stamp papers, etc. shall be borne by the Project Implementing Authority;	No	The account payee cheque towards the compensation/ replacement value of land shall be given to the title-holder at the time of registry. All taxes, registration charges and other expenses like value of the stamp papers, etc. shall be borne by the Project Implementing Authority;
5	Compensation and other kinds of assistance must be provided prior to displacement. (JICA GL)	Act: The amount of compensation shall be deposited by the government before taking possession of the land. (3H)	Yes, timing of the assistance is missing in Highways act and relevant regulations and guidelines	Compensation and other kinds of assistance must be provided prior to displacement.
6	For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. (JICA GL)	No definition	Yes, no SIA requirements as per the Highways act	For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public
7	In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. (JICA GL)	No specific provisions as per the Highways act and notifications, except the individual negotiation with land title holders	Yes, no specific requirements under the highways act	In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance.

No.	JICA Guidelines	Highways Act 1956 & its notifications* with RTFCLARR provisions	GAP between JICA Guidelines & Laws of India	Safeguard Policy of the Proposed Project
8	When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people. (JICA GL)	No specific provisions as per the Highways act and notifications, except the individual negotiation with land title holders	Yes, no specific requirements under the highways act	When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people. (JICA GL)
9	Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans. (JICA GL)	No specific provisions as per the Highways act and notifications, except the individual negotiation with land title holders	Yes, no specific requirements under the highways act	Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans
10	Appropriate and accessible grievance mechanisms must be established for the affected people and their communities. (JICA GL)	The National Highways Act, 1956 contains provisions of appointment of an Arbitrator, as also reference to the Principal Civil Court of original jurisdiction for the disposal of any such disputes. Subject to the provisions of this Act, the provisions of the Arbitration and Conciliation Act, 1996 (26 of 1996) shall apply to every arbitration under this Act.	No	Appropriate and accessible grievance mechanisms must be established for the affected people and their communities
11	Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits. (WB OP4.12 Para.6)	Affected households, land and property will be identified through site investigation (3B), no specific provisions to prevent subsequent influx	No, except the prevention measures for subsequent influx of encroachment	Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits

No.	JICA Guidelines	Highways Act 1956 & its notifications* with RTFCLARR provisions	GAP between JICA Guidelines & Laws of India	Safeguard Policy of the Proposed Project
12	Eligibility of benefits includes, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal right to the land they are occupying. (WB OP4.12 Para.15)	Schedules of the RFCTLARR Reg. ensures eligibility of formal title holders and non-title holders (who are tenants, sharecroppers and artisans, excluding squatters and encroachers), but with at least 3 years of prior evidences	No, except condition of eligibility for non-title holders for proof of 3 years of occupation, and exclusion of squatters and encroachers from the affected family	Eligibility of benefits includes, the PAPs who have formal legal rights to land (including customary and traditional land rights recognized under law), the PAPs who don't have formal legal rights to land at the time of census but have a claim to such land or assets and the PAPs who have no recognizable legal right to the land they are occupying.
13	Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based. (WB OP4.12 Para.11)	Available in the provisions of RTFCLARR (2013) <u>but excluded</u> by the MORTH manual of guidelines(2018)	Yes, preference is excluded by the MORTH LA guidelines	Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based and land is available.
14	Provide support for the transition period (between displacement and livelihood restoration). (WB OP4.12 Para.6)	Schedules of the RFCTLARR Reg. ensures the assistances during the transmission periods and the MORTH LA guidelines as well	No	Provide support for the transition period (between displacement and livelihood restoration) as per the RTFCLARR and MORTH LA guidelines
15	Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc. (WB OP4.12 Para.8)	Schedules of the RFCTLARR Reg. ensures socially vulnerable groups such as SC, ST and the MORTH LA guidelines as well	No	Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc
16	For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, abbreviated resettlement plan is to be prepared. (WB OP4.12 Para.25)	None	ARAP is not defined by the Indian frameworks.	As the proposed project affect more than 200 people, full RAP should be prepared.

* including the MORTH "A Manual of Guidelines on Land Acquisition for National Highways Under the National Highways Act, 1956

Source: JICA Survey Team

7.3.4 Special Attentions to the Tribal Area Designated by the Schedule VI of the Constitution of India

The Constitution of India pays special attentions to the tribal communities and sets special safeguards for those designated tribal peoples and special protected area for those peoples. In the case of the state of Tripura, article 244/244A and the Sixth Schedule defines the constitution of autonomous area by the designated tribal peoples. Essential parts of the constitution are extracted in the box below.

<p>PART X THE SCHEDULED AND TRIBAL AREAS 244. Administration of Scheduled Areas and tribal areas.—(1) <i>The provisions of the Fifth Schedule shall apply to the administration and control of the Scheduled Areas and Scheduled Tribes in any State other than the States of Assam, Meghalaya, Tripura and Mizoram.</i> (2) <i>The provisions of the Sixth Schedule shall apply to the administration of the tribal areas in the States of Assam, Meghalaya, Tripura and Mizoram.</i></p> <p>SIXTH SCHEDULE [Articles 244(2) and 275(1)] Provisions as to the Administration of Tribal Areas in the States of Assam, Meghalaya, Tripura and Mizoram 1. Autonomous districts and autonomous regions.—(1) <i>Subject to the provisions of this paragraph, the tribal areas in each item of Parts I, II and IIA and in Part III of the table appended to paragraph 20 of this Schedule shall be an autonomous district.</i> 2. Constitution of District Councils and Regional Councils. 3. Powers of the District Councils and Regional Councils to make laws.—(1) <i>The Regional Council for an autonomous region in respect of all areas within such region and the District Council for</i> (a) <i>the allotment, occupation or use, or the setting apart, of land, other than any land which is a reserved forest for the purposes of agriculture or grazing or for residential or other non-agricultural purposes or for any other purpose likely to promote the interests of the inhabitants of any village or town: Provided that nothing in such laws shall prevent the compulsory acquisition of any land, whether occupied or unoccupied, for public purposes by the Government of the State concerned in accordance with the law for the time being in force authorizing such acquisition;</i> (b) <i>the management of any forest not being a reserved forest;</i> (c) <i>the use of any canal or water-course for the purpose of agriculture;</i> (d) <i>the regulation of the practice of jhum or other forms of shifting cultivation;</i> (e) <i>the establishment of village or town committees or councils and their powers;</i> (f) <i>any other matter relating to village or town administration, including village or town police and public health and sanitation;</i> (g) <i>the appointment or succession of Chiefs or Headmen;</i> (h) <i>the inheritance of property;</i> (i) <i>marriage and divorce;</i> (j) <i>social customs</i> 3. Powers of the District Councils and Regional Councils to make laws... 4. Administration of justice in autonomous districts and autonomous regions... 6. Powers of the District Council to establish primary schools, etc... 20. Tribal areas... Part I... 3. The Bodoland Territorial Area District... Part II... 3. The Garo Hills District. PART IIA Tripura Tribal Areas District...</p>
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Source: The Constitution of India

As shown in the box above, the Constitutional provision under Article 244 (2) and its Sixth Schedule of the Constitution of India, the ‘Tribal Areas’ is defined and the governor of the concerned states “may, by public notification, (a) include any area in 3[any of the Parts] of the said table, (b) exclude any area from 3[any of the Parts] of the said table, (c) create a new autonomous district, (d) increase the area of any autonomous district, (e) diminish the area of any autonomous district, (f) unite two or more autonomous districts or parts thereof so as to form one autonomous district, [(ff) alter the name of any autonomous district], (g) define the boundaries of any autonomous district..” The objective behind setting up the Autonomous District Council (ADC) is to hand over certain administrative and legal authority to ADC in order that it may devote concerted attention to all aspects of cultural, social and economic improvement of the tribal people, who have been treated unequally/partially and suffering from such status and thereby could be free from practices in the majority of the population.

As shown in Figure 7-18, the alignment of NH208 in Tripura state under the Project would largely overlap with the area under control of the Tripura Tribal Areas Autonomous District Council (TTAACDC). Impacts on the Scheduled Tribe by the project is further discussed in Section 7.10, Action Plan for the Scheduled Tribe.



Source: Google Earth
<http://ttaadc.gov.in/ttaadc-map>

Figure 7-18: Project Alignment of NH208 and the Area under Jurisdiction of Tripura Tribal Areas Autonomous District Council

7.4 Alternative Analysis

(1) Comparison with without Project Scenario

In the state of Tripura, the total freight transport output is likely to be doubled every 7 to 10 years and the passenger transport is also likely to be doubled every in 7 to 10 years. The 'With' and 'without' project scenarios are analysed with this backdrop of requirement of reliable quality infrastructure for sustained growth of state's economy and consequent well-being of its citizens.

The project will have multiple benefits. The project will unlock the potential of development of the area and fast connectivity. This project will also reduce the travel time substantially and it is expected that the journey from Khowai to Sabroom. The present journey time could take 4-5 hours. In addition, this project road will provide further other benefits like:

- Fast and safe connectivity resulting in saving in fuel, travel time and Total Transportation Cost to the Society;
- Employment opportunities to people;
- Development of local industry, agriculture and handicrafts;
- Transporting, processing and marketing of agricultural products;
- Reduction in accidents;
- Reduction in pollution;
- Opening of opportunities for new occupations;
- Better approach to Medical & Educational services and quick transportation of Perishable goods like fruits, Vegetables and Dairy products; and
- Improved quality of life for people and so on

Providing better connectivity will ensure that goods and people from areas covered by the road can move in and out of the areas quicker and save time. Increased trade and commerce activity are expected. Accounting just for the savings in the Vehicle Operating Costs makes the project viable. However, there would be an increase in the vehicular pollution-air and noise, in the vicinity of the highway. Some agricultural land will have to be diverted for road use to widen and realignments planned. This construction will result in loss of private properties and loss of living.

If the project is not implemented, the area will keep the rural landscapes of the forest (62.5 %) croplands (27.1%) and waterbodies (4.5%), so this is the positive environmental effects for without project option. However, there are a lot of negative environmental effects for without-project option. There is a likelihood that the roads presently carrying the traffic between the main Road ofwill deteriorate further and rampant traffic disruptions will hinder the free flow of the traffic. In the absence of the project, the road agencies responsible for construction and maintenance of NH-208 will also find it extremely difficult to generate funds for such a massive improvement of the road infrastructure from their own resources. Increased air pollution, due to slow moving traffic and congestion, will follow suit. Noise levels in built up portions will rise due to deterioration of the pavement as well as increased honking.

Therefore, "With" project scenario, with its minor adverse impacts is more acceptable than the "Without" project scenario which would mean an aggravation of the existing problems. The potential benefits of the proposed road improvements are substantial and far-reaching both in terms of the geographical spread and time. Hence, it is clear that the implementation of the project will be a definite advantage to State of Tripura in order to achieve all-round development of its economy and progress of its people.

(2) Alternative Analysis

Similar to NH127B, NH208 is basically designed along the existing road. For densely populated residential areas, DPR has designed bypasses for seven locations that are difficult to design along existing roads, and we will consider alternatives for those locations.

For 43 curved parts that do not meet the design standard of the minimum radius, Survey Team required to the executing agency that they should meet the design standard. In case that they cannot be corrected, the survey team confirmed the reason.

It can be said that the survey team considered two alternatives: existing routes and the one conforming to design standards. The criteria for selecting the preferred Alignment based on alternative alignment study are:

- Design Speed: The proposed alignment should maintain design speed between 80-100 kmph.
- Riding Comfort: The proposed alignment is such that passengers of the vehicle feel comfort while traveling through the proposed Road.
- Land Acquisition: Minimum land to be acquired with maximum avoidance of involuntary resettlement. Try to acquire Govt. land as much as possible and minimum acquisition of existing structures has been used for fixation of proposed alignment.
- Social Impact & Severance: The proposed alignment has minimized effect upon the existing structures which minimizes the resettlement and rehabilitation impact of that locality.
- Cost Effectiveness: The Project cost consisting of Civil construction Cost, LA & resettlement and rehabilitation Utility Shifting cost of the proposed alignment has been kept minimal.
- Safety: The proposed alignment has been prepared in such a way that it requires minimum safety hazards along its entire length.
- Environment: Lost Forest land Expected Pollution. As the lost forest land represents the natural vegetation, the negative effects towards ecosystem will be seen in the forest land.

The table below shows the evaluation system (criteria) in each category.

Table 7-32 Evaluation Systems of the alternatives

S. No.	Design, Safety & other Parameters	Evaluation criteria
1	Design Speed	Faster the better
2	Total Length	Shorter the better
3	Land Acquisition (Ha)	Smaller the better
4	Description of alignment	-
5	Environment-Lost Forest land	Smaller the better
6	Environment-Expected Pollution	Smaller the better
7	Social Impact and R&R	Smaller the better
8	Affected Family	Smaller the better
9	Structures and Protective Works/	Smaller the better
10	Geometric Design	Less sharp curves the better Smoother the better

S. No.	Design, Safety & other Parameters	Evaluation criteria
11	Civil Cost	Smaller the better
12	Resettlement and Rehabilitation & LA Cost	Smaller the better
13	Total Cost Including resettlement and rehabilitation and LA	Smaller the better
14	Utility Shifting Cost	Smaller the better

Source: JICA Survey Team

(A). Alternative Alignment Option Study for Teliamura Bypass

The overview of all the seven alternatives along with features of the alternative plan is described in the following tables and figures.



Figure 7-19 GIS image of Alternative Alignment Option Study for Teliamura Bypass




Options	Symbol	Node	Length (km)
Option 1		A-D-C	3.4
Option 2		A-C	2.45
Option 3		B-C	1.3

Table 7-33 Teliamura Bypass analysis

S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option –2 (Red alignment)	Alignment Option – 3 (Yellow alignment)
1	Design Speed	60 to 80 Kmph	100 Kmph	100 Kmph
2	Total Length	3.4 km	2.45 km	1.3 km
3	Land Acquisition (ha) (of which the non-forest government land)	9.1 (6.6)	9.5 (2.0)	4.9 (2.5)
4	Description of alignment	Project road widening will not follow IRC: SP: 73-2007 and Ministry of Road Transport and Highways (MoRTH) Guidelines	This option has shortest connectivity from A to C.	Selected bypass will improve the horizontal geometry and eliminate the reverse curves, it also use existing alignment from A to B which is already two lane.
5	Environment-lost forest land (ha) and number of lost trees (of which the number of trees of private owners)	No forest land diversion. Approximately 210 number of trees to be cut. (180)	No forest land diversion. Approximately 97 number of trees to be cut. (80)	No forest land diversion. Approximately 54 number of trees to be cut. (42)
6	Environment-Expected Pollution	During Construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution maximum as the length is the longest.	During construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution medium as the length is the medium.	During construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution minimum as the length is the shortest.
7	Social Impact and R&R	Nearly 197 nos. structures are affected	Nearly 70 nos. structures are affected	Nearly 37 nos. structures are affected
8	Affected Family	Nearly 118 nos. Families are affected	Nearly 42 nos. Families are affected	Nearly 22 nos. Families are affected
9	Structures and Protective Works/	12 nos. box culverts are required.	3 nos. box culverts are required.	4 nos. box culverts are required.
10	Geometric Design	This alignment includes sharp curves.	This alignment is almost straight and has a good geometry.	Selected bypass will improve the horizontal geometry and eliminate the reverse curves.
11	Civil Cost (million rupee)	358	223	128.8
12	resettlement and rehabilitation & LA Cost (million rupee)	134.2	112	67
13	Total Cost	7.5	5.2	2.5

S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option –2 (Red alignment)	Alignment Option – 3 (Yellow alignment)
	Including resettlement and rehabilitation and LA (million rupee)			
14	Utility Shifting Cost (million rupee)	499.7	343.2	198.3
15	Result			✓
16	Comment	<ul style="list-style-type: none"> • More nos. of structures and family are affected as compare to option 2 & 3 • More nos. of trees are affected as compare to option 2 & 3 • Project road widening will not follow IRC: SP: 73-2007 and Ministry of Road Transport and Highways (MoRTH) Guidelines such as minimum radius of horizontal curves, super elevation, design speed as terrain varies from plain, rolling and hilly due to poor geometry, sharp curves etc. of existing road. 	<ul style="list-style-type: none"> • More nos. of structures and family are affected as compare to option 3 • More nos. of trees are affected as compare to option 3 • The overall length of AC is more as compared to selected option BC, therefore more resettlement and land acquisition impacts. 	<ul style="list-style-type: none"> • Area of land acquisition is the smallest, • Less nos. of structures and family are affected as compare to option 1 & 2 • Less nos. of trees are affected as compare to option 1 & 2 • The AB has already 2 lane road therefore can be used. • Selected bypass will improve the horizontal geometry and eliminate the reverse curves.

* This is under process and will be done after finalization of land acquisition plan

(B). Alternative Alignment Option Study for Taidu Bypass

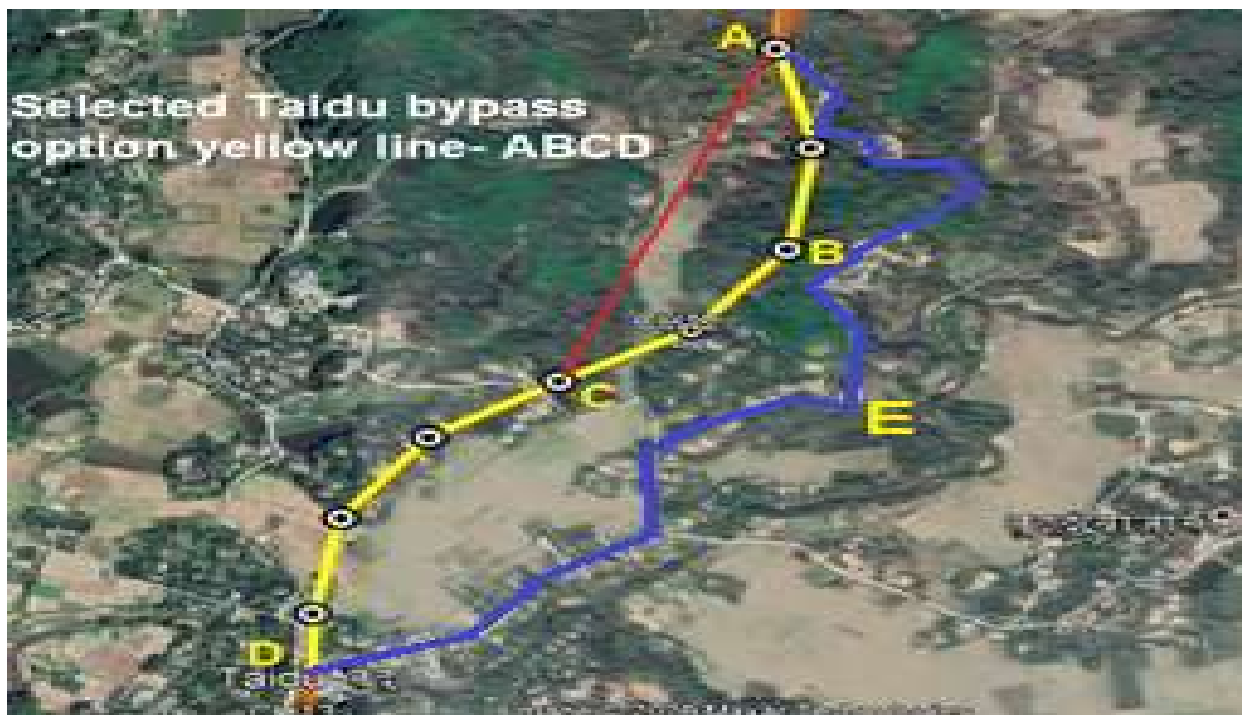


Figure 7-20 GIS image of Alternative Alignment Option Study for Taidu Bypass




Options	Symbol	Node	Length (km)
Option 1		A-E-D	2.0
Option 2		A-C-D	1.4
Option 3		A-B-C-D	1.54

Table 7-34 Taidu Bypass analysis

S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option –2 (Red alignment)	Alignment Option – 3 (Yellow alignment)
1	Design Speed	60 to 80 Kmph	100 Kmph	100 Kmph
2	Total Length	2.0 km	1.4 km	1.54 km
3	Land Acquisition (ha) (of which the non-forest government land)	7.2 (1.6)	6.3 (1.4)	6.9 (1.8)
4	Description of alignment	Project road widening will not follow IRC: SP: 73-2007 and Ministry of Road Transport and Highways (MoRTH) Guidelines	This option is initially considered due to shortest length as compared to select option ABCD	Selected bypass will improve the horizontal geometry and eliminate the reverse curves.

S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option –2 (Red alignment)	Alignment Option – 3 (Yellow alignment)
5	Environment-lost forest land (ha) and number of lost trees (of which the number of trees of private owners)	4.2 ha forest land diversion is required. Approximately 212 number of trees to be cut. (60)	3.5 ha forest land diversion is required. Approximately 146 number of trees to be cut. (28)	2.6 ha forest land diversion is required. Approximately 120 number of trees to be cut. (18)
6	Environment-Expected Pollution	During Construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution maximum as the length is the longest.	During construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution minimum as the length is the shortest. Some waterbodies for agricultural purpose will be affected.	During construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution medium as the length is the medium.
7	Social Impact and R&R	Nearly 62 nos. of structures are affected	Nearly 26 nos. of structures are affected	Nearly 20 nos. of structures are affected
8	Affected Family	Nearly 47 nos. Families are affected	Nearly 18 nos. Families are affected	Nearly 12 nos. Families are affected
9	Structures and Protective Works	9 nos. box culverts are required.	6 nos. box culverts are required.	5 nos. box culverts are required.
10	Geometric Design	This alignment includes sharp curves.	This alignment is almost straight and has a good geometry.	Selected bypass will improve the horizontal geometry and eliminate the reverse curves.
11	Civil Cost (million rupee)	203	166	158
12	resettlement and rehabilitation & LA Cost (million rupee)	64.2	38	41
13	Total Cost Including resettlement and rehabilitation and LA (million rupee)	7.8	2	2.5
14	Utility Shifting Cost (million rupee)	275	208	201.5
15	Result			✓
16	Comment	• More nos. of structures and family are affected as compare to option 2 & 3	• More nos. of structures and family are affected as compare to option 3	• Less nos. of structures and family are affected as compare to option 1 & 2


S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option –2 (Red alignment)	Alignment Option – 3 (Yellow alignment)
		<ul style="list-style-type: none"> • More nos. of trees are affected as compare to option 2 & 3 • Project road widening will not follow IRC: SP: 73-2007 and Ministry of Road Transport and Highways (MoRTH) Guidelines such as minimum radius of horizontal curves, super elevation, design speed as terrain varies from plain, rolling and hilly due to poor geometry, sharp curves etc. of existing road. 	<ul style="list-style-type: none"> • More nos. of trees are affected as compare to option 3 • This option is initially considered due to shortest length as compared to selected option ABCD but rejected due to major waterbodies (seasonal reservoir for agricultural purpose) are affected. 	<ul style="list-style-type: none"> • Less nos. of trees are affected as compare to option 1 & 2 • Selected bypass will improve the horizontal geometry and eliminate the reverse curves.

* This is under process and will be done after finalization of land acquisition plan

(C). Alternative Alignment Option Study for Ompi nagar Bypass



Figure 7-21 GIS image of Alternative Alignment Option Study for Ompi nagar Bypass

Options	Symbol	Node	Length
Option 1		A-E-D	3.9



Option 2		A-B-D	2.8
Option 3		A-C-D	2.75

Table 7-35 Ompi nagar Bypass analysis

S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option –2 (Red alignment)	Alignment Option – 3 (Yellow alignment)
1	Design Speed	60 to 80 Kmph	100 Kmph	100 Kmph
2	Total Length	3.9 km	2.8 km	2.75 km
3	Land Acquisition (ha) (of which the non-forest government land)	13.6 (2.4)	12.6 (2.2)	12.4 (2.8)
4	Description of alignment	Project road widening will not follow IRC: SP: 73-2007 and Ministry of Road Transport and Highways (MoRTH) Guidelines	Length is more as compare to selected option ACD	Selected bypass will improve the horizontal geometry and eliminate the reverse curves.
5	Environment-lost forest land (ha) and number of lost trees (of which the number of trees of private owners)	7.2 ha forest land diversion is required. Approximately 873 number of trees to be cut. (137)	6.9 ha forest land diversion is required. Approximately 690 number of trees to be cut. (77)	6.33 ha forest land diversion is required. Approximately 540 number of trees to be cut. (41)
6	Environment-Expected Pollution	During Construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution maximum as the length is the longest.	During construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution medium as the length is the medium.	During construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution minimum as the length is the shortest.
7	Social Impact and R&R	Nearly 132 nos. of structures are affected	Nearly 74 nos. of structures are affected	Nearly 38 nos. of structures are affected
8	Affected Family	Nearly 85 nos. Families are affected	Nearly 37 nos. Families are affected	Nearly 14 nos. Families are affected
9	Structures and Protective Works	4 nos. of major bridges and 10 nos. box culverts are required.	5 nos. of major bridges and 8 nos. box culverts are required.	3 nos. of major bridges and 7 nos. box culverts are required.
10	Geometric Design	This alignment includes sharp curves.	This alignment has the better geometry than Option 1.	Selected bypass will improve the horizontal geometry and eliminate the reverse curves.
11	Civil Cost (million rupee)	389	264	247

S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option –2 (Red alignment)	Alignment Option – 3 (Yellow alignment)
12	resettlement and rehabilitation & LA Cost (million rupee)	142	97	93
13	Total Cost Including resettlement and rehabilitation and LA (million rupee)	8	2	2.2
14	Utility Shifting Cost (million rupee)	539	363	342
15	Result			✓
16	Comment	<ul style="list-style-type: none"> • More nos. of structures and family are affected as compare to option 2 & 3 • More nos. of trees are affected as compare to option 2 & 3 <p>Project road widening will not follow IRC: SP: 73-2007 and Ministry of Road Transport and Highways (MoRTH) Guidelines such as minimum radius of horizontal curves, super elevation, design speed as terrain varies from plain, rolling and hilly due to poor geometry, sharp curves etc. of existing road.</p>	<ul style="list-style-type: none"> • More nos. of structures and family are affected as compare to option 3 • More nos. of trees are affected as compare to option 3 • This option is rejected as length is more as compare to selected option ACD. Village houses and one community structure is getting impacted. 	<ul style="list-style-type: none"> • Less nos. of structures and family are affected as compare to option 1 & 2 • Less nos. of trees are affected as compare to option 1 & 2 • Selected bypass will improve the horizontal geometry and eliminate the reverse curves.

* This is under process and will be done after finalization of land acquisition plan

(D). Alternative Alignment Option Study for Amarput Bypass

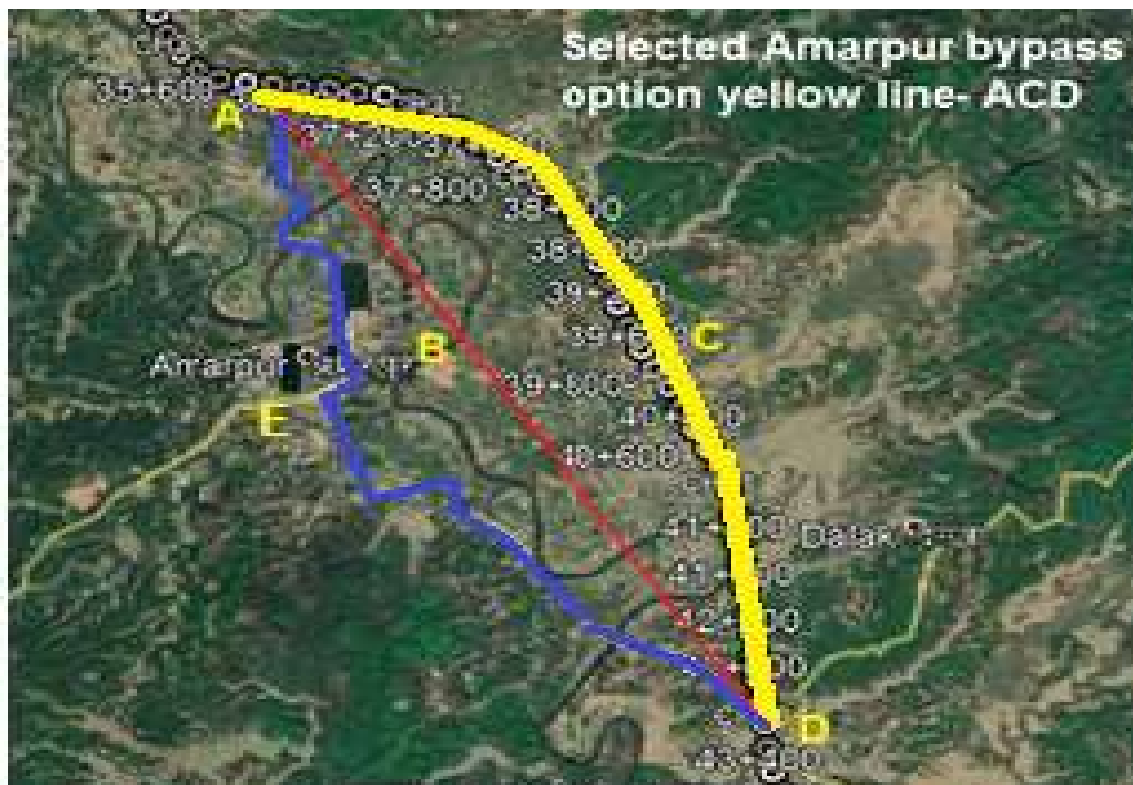


Figure 7-22 GIS image of Alternative Alignment Option Study for Amarapur Bypass




Options	Symbol	Node	Length (km)
Option 1		A-E-D	8.2
Option 2		A-B-D	6.7
Option 3		A-C-D	7.5

Table 7-36 Amarapur Bypass analysis

S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option –2 (Red alignment)	Alignment Option – 3 (Yellow alignment)
1	Design Speed	60 to 80 Kmph	100 Kmph	100 Kmph
2	Total Length	8.2 km	6.7 km	7.5 km
3	Land Acquisition (ha) (of which the non-forest government land)	28.7 (8.1)	30.2 (8.6)	33.8 (9.2)
4	Description of alignment	Project road widening will not follow IRC: SP: 73-2007 and Ministry of Road Transport and	The option ABD has shortest length and crosses river at six locations	Selected bypass will improve the horizontal geometry and eliminate the reverse curves.

S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option –2 (Red alignment)	Alignment Option – 3 (Yellow alignment)
		Highways (MoRTH) Guidelines		
5	Environment-lost forest land (ha) and number of lost trees (of which the number of trees of private owners)	No forest land diversion. Approximately 2,162 number of trees to be cut. (1518)	No forest land diversion. Approximately 1,235 number of trees to be cut. (785)	No forest land diversion. Approximately 810 number of trees to be cut. (624)
6	Environment-Expected Pollution	During Construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution maximum as the length is the longest.	During construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution minimum in air, noise, and vibration, as the length is the shortest. River crossing will make the water pollution the highest.	During construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution medium as the length is the medium.
7	Social Impact and R&R	Nearly 247 nos. of structures are affected	Nearly 210 nos. of structures are affected	Nearly 114 nos. of structures are affected
8	Affected Family	Nearly 148 nos. Families are affected	Nearly 122 nos. Families are affected	Nearly 67 nos. Families are affected
9	Structures and Protective Works	20 nos. box culverts are required	3 no. of minor bridges and 8 nos. of major bridges and 20 nos. box culverts are required.	1 no. of minor bridges and 5 nos. of major bridges and 23 nos. box culverts are required.
10	Geometric Design	This alignment includes sharp curves.	This alignment is almost straight and has a good geometry.	This option's bypass will improve the horizontal geometry and eliminate the reverse curves.
11	Civil Cost (million rupee)	817	652	746
12	resettlement and rehabilitation & LA Cost (million rupee)	273	322	316
13	Total Cost Including resettlement and rehabilitation and LA (million rupee)	21	4	6
14	Utility Shifting Cost (million rupee)	1111	978	1068

S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option –2 (Red alignment)	Alignment Option – 3 (Yellow alignment)
15	Result			✓
16	Comment	<ul style="list-style-type: none"> • More nos. of structures and family are affected as compare to option 2 & 3 • More nos. of trees are affected as compare to option 2 & 3 • Project road widening will not follow IRC: SP: 73-2007 and Ministry of Road Transport and Highways (MoRTH) Guidelines such as minimum radius of horizontal curves, super elevation, design speed as terrain varies from plain, rolling and hilly due to poor geometry, sharp curves etc. of existing road. 	<ul style="list-style-type: none"> • More nos. of structures and family are affected as compare to option 3 • More nos. of trees are affected as compare to option 3 • The option ABD is selected initially due to shortest length but rejected as it crosses river at six locations and more impact on water bodies due to construction of six bridges moreover cost will also be very high. 	<ul style="list-style-type: none"> • Less nos. of structures and family are affected as compare to option 1 & 2 • Less nos. of trees are affected as compare to option 1 & 2 • This option's bypass will improve the horizontal geometry and eliminate the reverse curves.

* This is under process and will be done after finalization of land acquisition plan

(E). Alternative Alignment Option Study for Nutan Bazar Bypass



Figure 7-23 GIS image of Alternative Alignment Option Study for Nutan Bazar Bypass




Options	Symbol	Node	Length (km)
Option 1		A-E-D	1.7
Option 2		A-B-D	1.3
Option 3		A-C-D	1.6

Table 7-37 Nutan Bazar Bypass analysis

S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option –2 (Red alignment)	Alignment Option – 3 (Yellow alignment)
1	Design Speed	60 to 80 Kmph	100 Kmph	100 Kmph
2	Total Length	1.7 km	1.3 km	1.6 km
3	Land Acquisition (ha) (of which the non-forest government land)	2.9 (0.8)	4.1 (1.7)	5.0 (2.1)
4	Description of alignment	Project road widening will not follow IRC: SP: 73-2007 and Ministry of Road Transport and Highways (MoRTH) Guidelines	The option ABD has shortest length and residential settlements is very high along this alignment.	This option's bypass will improve the horizontal geometry and eliminate the reverse curves.
5	Environment-lost forest land (ha) and number of lost trees	No forest land diversion. Approximately 190 number of trees to be cut.	No forest land diversion. Approximately 154 number of trees to be cut.	No forest land diversion. Approximately 98

S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option –2 (Red alignment)	Alignment Option – 3 (Yellow alignment)
	(of which the number of trees of private owners)	(94)	(86)	number of trees to be cut. (80)
6	Environment-Expected Pollution	During Construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution maximum as the length is the longest.	During construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution minimum as the length is the shortest.	During construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution medium as the length is the medium.
7	Social Impact and R&R	Nearly 48 nos. of structures are affected	Nearly 42 nos. of structures are affected	Nearly 30 nos. of structures are affected
8	Affected Family	Nearly 28 nos. Families are affected	Nearly 24 nos. Families are affected	Nearly 15 nos. Families are affected
9	Structures and Protective Works	7 nos. box culverts are required	1 no. of minor bridge and 4 nos. box culverts are required.	1 no. of major bridge and 5 nos. box culverts are required.
10	Geometric Design	This alignment includes sharp curves.	This alignment is almost straight and has a good geometry.	This option's bypass will improve the horizontal geometry and eliminate the reverse curves.
11	Civil Cost (million rupee)	175	122	129
12	resettlement and rehabilitation & LA Cost (million rupee)	41	52	65
13	Total Cost Including resettlement and rehabilitation and LA (million rupee)	6	2	2.3
14	Utility Shifting Cost (million rupee)	222	176	196.3
15	Result			✓
16	Comment	<ul style="list-style-type: none"> • More nos. of structures and family are affected as compare to option 2 & 3 • More nos. of trees are affected as compare to option 2 & 3 	<ul style="list-style-type: none"> • More nos. of structures and family are affected as compare to option 3 • More nos. of trees are affected as compare to option 3 	<ul style="list-style-type: none"> • Less nos. of structures and family are affected as compare to option 1 & 2 • Less nos. of trees are affected as compare to option 1 & 2


S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option –2 (Red alignment)	Alignment Option – 3 (Yellow alignment)
		<ul style="list-style-type: none"> Project road widening will not follow IRC: SP: 73-2007 and Ministry of Road Transport and Highways (MoRTH) Guidelines such as minimum radius of horizontal curves, super elevation, design speed as terrain varies from plain, rolling and hilly due to poor geometry, sharp curves etc. of existing road. 	<ul style="list-style-type: none"> This option is initially selected due to shortest length however rejected later as number of residential settlements is more along this alignment and rejected at the scoping level. 	<ul style="list-style-type: none"> This option's bypass will improve the horizontal geometry and eliminate the reverse curves.

* This is under process and will be done after finalization of land acquisition plan

(F). Alternative Alignment Option Study for Jatanbari Bypass



Figure 7-24 GIS image of Alternative Alignment Option Study for Jatanbari Bypass

Options	Symbol	Node	Length (km)
Option 1		A-E-D	4.0



Option 2		A-B-D	3.4
Option 3		A-C-D	3.7

Table 7-38 Jatanbari Bypass analysis

S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option –2 (Red alignment)	Alignment Option – 3 (Yellow alignment)
1	Design Speed	60 to 80 Kmph	100 Kmph	100 Kmph
2	Total Length	4.0 km	3.4 km	3.7 km
3	Land Acquisition (ha) (of which the non-forest government land)	14.0 (3.7)	15.3 (4.1)	16.7 (4.4)
4	Description of alignment	Project road widening will not follow IRC: SP: 73-2007 and Ministry of Road Transport and Highways (MoRTH) Guidelines	This option has shortest length and also it is very close to the existing road however there are residential and commercial settlements along the road	This option's bypass will improve the horizontal geometry and eliminate the reverse curves.
5	Environment-lost forest land (ha) and number of lost trees (of which the number of trees of private owners)	1.2 ha forest land diversion is required Approximately 1,275 number of trees to be cut. (548)	1.82 ha forest land diversion is required Approximately 1,120 number of trees to be cut. (490)	1.67 ha forest land diversion is required. Approximately 980 number of trees to be cut. (525)
6	Environment-Expected Pollution	During Construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution maximum as the length is the longest.	During construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution minimum as the length is the shortest.	During construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution medium as the length is the medium.
7	Social Impact and R&R	Nearly 134 nos. of structures are affected	Nearly 115 nos. of structures are affected. The area is extended residential and commercial settlements of Nutan Bazar and Jatanbari bypass.	Nearly 72 nos. of structures are affected
8	Affected Family	Nearly 80 nos. Families are affected	Nearly 68 nos. Families are affected	Nearly 35 nos. Families are affected
9	Structures and Protective Works	8 nos. box culverts are required	1 no. of minor bridge, 22 nos. of major bridge and 14 nos. box culverts are required.	22 nos. of major bridge and 11 nos. box culverts are required.

S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option –2 (Red alignment)	Alignment Option – 3 (Yellow alignment)
10	Geometric Design	This alignment includes sharp curves.	This alignment is almost straight and has a good geometry.	This option's bypass will improve the horizontal geometry and eliminate the reverse curves.
11	Civil Cost (million rupee)	398	375	384
12	resettlement and rehabilitation & LA Cost (million rupee)	107	125	132
13	Total Cost Including resettlement and rehabilitation and LA (million rupee)	11	4.8	5.2
14	Utility Shifting Cost (million rupee)	516	505	521
15	Result			✓
16	Comment	<ul style="list-style-type: none"> • More nos. of structures and family are affected as compare to option 2 & 3 • More nos. of trees are affected as compare to option 2 & 3 • Project road widening will not follow IRC: SP: 73-2007 and Ministry of Road Transport and Highways (MoRTH) Guidelines such as minimum radius of horizontal curves, super elevation, design speed etc. of existing road. 	<ul style="list-style-type: none"> • More nos. of structures and family are affected as compare to option 3 • More nos. of trees are affected as compare to option 3 • This option is initially selected due to shortest length and also it is very close to the existing road however due to extended residential and commercial settlements of Nutan Bazar and Jatanbari bypass, this option is not viable. 	<ul style="list-style-type: none"> • Less nos. of structures and family are affected as compare to option 1 & 2 • Less nos. of trees are affected as compare to option 1 & 2 • This option's bypass will improve the horizontal geometry and eliminate the reverse curves.

* This is under process and will be done after finalization of land acquisition plan

(G). Alternative Alignment Option Study for Karbook Bypass

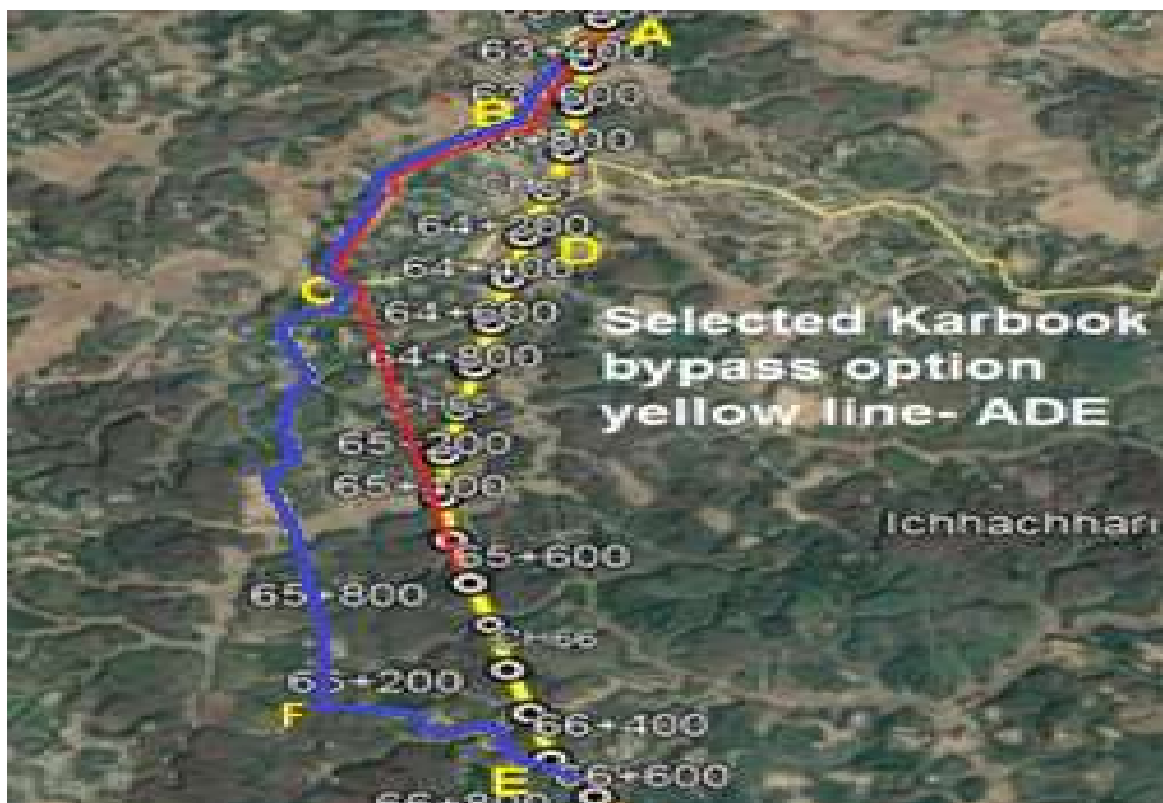


Figure 7-25 GIS image of Alternative Alignment Option Study for Karbook Bypass




Options	Symbol	Node	Length (km)
Option 1		A-B-C-F-E	4.3
Option 2		A-B-C-E	3.6
Option 3		A-D-E	3.3

Table 7-39 Karbook Bypass analysis

S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option -2 (Red alignment)	Alignment Option - 3 (Yellow alignment)
1	Design Speed	60 to 80 Kmph	100 Kmph	100 Kmph
2	Total Length	4.3 km	3.6 km	3.3 km
3	Land Acquisition (ha) (of which the non-forest government land)	14.8 (4.4)	16.2 (5.1)	15.0 (4.6)

S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option –2 (Red alignment)	Alignment Option – 3 (Yellow alignment)
4	Description of alignment	Project road widening will not follow IRC: SP: 73-2007 and Ministry of Road Transport and Highways (MoRTH) Guidelines	This option utilize existing road from point A to C	This option's bypass will improve the horizontal geometry and eliminate the reverse curves.
5	Environment-lost forest land (ha) and number of lost trees (of which the number of trees of private owners)	No forest land diversion. Approximately 1,047 number of trees to be cut. (890)	No forest land diversion. Approximately 782 number of trees to be cut. (648)	No forest land diversion. Approximately 526 number of trees to be cut. (480)
6	Environment-Expected Pollution	During Construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution maximum as the length is the longest.	During construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution medium as the length is the medium.	During construction & Operation phase both air, water, noise & vibration pollution will be a concern. Pollution minimum as the length is the shortest.
7	Social Impact and R&R	Nearly 138 nos. of structures are affected	Nearly 102 nos. of structures are affected	Nearly 57 nos. of structures are affected
8	Affected Family	Nearly 86 nos. Families are affected	Nearly 67 nos. Families are affected	Nearly 28 nos. Families are affected
9	Structures and Protective Works	4 nos. of minor bridge and 14 nos. box culverts are required.	3 nos. of minor bridge and 10 nos. box culverts are required.	3 nos. of minor bridge and 8 nos. box culverts are required.
10	Geometric Design	This alignment includes sharp curves.	This alignment is almost straight and has a good geometry.	This option's bypass will improve the horizontal geometry and eliminate the reverse curves.
11	Civil Cost (million rupee)	432	348	357
12	resettlement and rehabilitation & LA Cost (million rupee)	132	119	97
13	Total Cost Including resettlement and rehabilitation and LA (million rupee)	12	5.2	4.8
14	Utility Shifting Cost (million rupee)	576	472.2	458.8

S. No.	Design, Safety & other Parameters	Alignment Option- 1 (follows existing alignment)	Alignment Option –2 (Red alignment)	Alignment Option – 3 (Yellow alignment)
15	Result			✓
16	Comment	<ul style="list-style-type: none"> • More nos. of structures and family are affected as compare to option 2 & 3 • More nos. of trees are affected as compare to option 2 & 3 • Project road widening will not follow IRC: SP: 73-2007 and Ministry of Road Transport and Highways (MoRTH) Guidelines such as minimum radius of horizontal curves, super elevation, design speed as terrain varies from plain, rolling and hilly due to poor geometry, sharp curves etc. of existing road. 	<ul style="list-style-type: none"> • More nos. of structures and family are affected as compare to option 3 • More nos. of trees are affected as compare to option 3 • This option is selected to utilize existing road from point A to C. however finally rejected due to the following reasons: <ul style="list-style-type: none"> – The selected option ADE is having lesser length. – Nos. of sharp curves are more in option ABCE. 	<ul style="list-style-type: none"> • Less nos. of structures and family are affected as compare to option 1 & 2 • Less nos. of trees are affected as compare to option 1 & 2 • This option's bypass will improve the horizontal geometry and eliminate the reverse curves.

* This is under process and will be done after finalization of land acquisition plan
Source: EIS and DPR

(3) Conclusion

Without Plan has been ruled out as present road is not able to withstand increased traffic & safety norms. The widening option (Option 1) of existing road (163 km) was also not feasible due to its geometric design, R&R issues, socioeconomic viability, environmental & road safety aspects. The initial site visit and detailed ground reconnaissance revealed that by and large the selected alignment having less/minor effect on environmental and social components is acceptable. The new alignment (Option 3, length 134.71 km) was selected after finalization of various options.

Option 3 has a good geometric alignment, so the driving performance, congestion resistance, safety, etc. are at the high quality. Though the Option 2 sometimes possess the shorter bypasses than Option 3, Option 3 is better than Option 2 by causing less resettlement.

7.5 Scoping and Analysis of Alternatives based on Generic Concept of Hilly Road

In this section, we will do scoping to determine the extent of the environmental and social consideration items considered essential and the investigation method.

7.5.1 Scoping Matrix

The scoping matrices of social impacts for the improvement of NH208 Tripura are displayed.

Table 7-40: Scoping Matrix

Item	Scoping Analysis of the Anticipated Environmental Impacts			Rational of the Impact Assessment
	Pre-construction	Construction Stage	Operation Stage	
Pollution				
Air Pollution		✓	✓	P: No impact is expected.
				C: Some negative impacts are expected due to operation of construction equipment and vehicles. One of these is the dust incidental to earthwork especially during the dry season.
				O: Air pollution is expected to increase due to increase traffic volume on the road.
Offensive Odor				P/C/O: No impact is expected.
Water Pollution		✓	✓	P: No impact is expected.
				C: Turbid water due to the earthworks, bridge pier construction work and wastewater effluents from construction workers' camps/yards are expected to pollute the surrounding rivers/canals to some extent.
				O: Some impacts on water quality in surrounding water bodies are expected due to water discharge from road users and wastewater from maintenance activities.
Bottom Sediment Contamination		✓		P: No impact is expected.
				C: Some construction materials such as cement and sand are expected to be washed out mainly by rain.
				O: Some wastewater will be generated from maintenance activities along the road, the impact on bottom sediment from the wastewater will be negligible.
Soil Contamination		✓		P: No impact is expected.
				C: Impacts on soil from deposition of pollutants from construction materials in the construction site are expected to be small. Since there is no major industrial activity along the road, it is unlikely that soil along the road is already polluted.
				O: No impact is expected.
Ground Subsidence				P/C/O: No impact is expected.
Noise and Vibration		✓	✓	P: No impact is expected.
				C: Noise and vibrations are generated by operation of construction equipment and vehicles, although they are temporary. Construction schedule should take into account the location of schools, hospitals and religious facilities that require silence in part of the day.
				O: Noise and vibration levels are likely to increase due to greater traffic volume along the road. Specific measures may be required to minimize impacts on schools, hospitals and religious facilities.
Sunshine Obstruction				P/C/O: No impact is expected.
Wastes/ Hazardous		✓	✓	P: No impact is expected.
				C: Waste from construction workers' camps are expected to be generated. Waste generated from construction and demolition work

Item	Scoping Analysis of the Anticipated Environmental Impacts			Rational of the Impact Assessment
	Pre-construction	Construction Stage	Operation Stage	
Materials				<p>may include hazardous materials that must be treated before final disposal.</p> <p>O: Waste will be generated from road users and workers of maintenance works.</p>
Natural Environment				
Climate/ Meteorological Phenomena				<p>P: No impact is expected.</p> <p>C/O: Impact on microclimate would occur but to the extent that they are of negligible scale.</p>
Topography		✓		<p>P: No impact is expected.</p> <p>C: Changes in topographic conditions over the project area takes place due to the requirement of cutting and filling work.</p> <p>O: Topographic conditions should become stable after the completion of construction works, which include slope protection and stabilization.</p>
Geology				<p>P: No impact is expected.</p> <p>C: No impact is expected.</p> <p>O: No impact is expected.</p>
Soil Erosion		✓		<p>P: No impact is expected.</p> <p>C: Soil erosion is expected particularly during the monsoon period.</p> <p>O: The Project is expected to improve the conditions and thus reduce the risk of soil erosion as measures of slope protection and stabilization should prevent soil erosion.</p>
Hydrology		✓	✓	<p>P: No impact is expected.</p> <p>C: Construction work may cause minor and temporary impacts on hydrology because of cutting and filling.</p> <p>O: Cutting and/or filling should result in permanent changes of local hydrology.</p>
Groundwater				<p>P: No impact is expected.</p> <p>C: The project does not envision the use of groundwater. There is no tunneling works.</p> <p>O: No impact is expected during the operation and maintenance stages.</p>
Ecosystem, Flora, Fauna and Biodiversity		✓	✓	<p>P: No impact is expected.</p> <p>C: During the construction period, mountain ecosystem including local flora and fauna as well as forest/wooded areas will be damaged to some extent.</p> <p>O: Increase of traffic volume will cause negative impacts on ecosystem including fauna and flora along the road.</p>
Protected Area/ Forest Reserve				<p>P: No impact is expected.</p> <p>C: There is no protected area adversely affected in the project site.</p> <p>O: There is no protected area adversely affected in the project site.</p>
Coastal Zone				P/C/O: There is no coastal zone subject to project intervention.

Item	Scoping Analysis of the Anticipated Environmental Impacts			Rational of the Impact Assessment
	Pre-construction	Construction Stage	Operation Stage	
Landscape			✓	<p>P: No impact is expected.</p> <p>C: Changes in landscape during the construction work would cause significant landscape changes while it would be temporary to the construction period.</p> <p>O: The project should explore possibilities to develop scenic view points along the road.</p>
Natural Disaster		✓		<p>P: No impact is expected.</p> <p>C: Many areas of the project area are prone to landslide during the construction period.</p> <p>O: No impact is expected.</p>
Social Environment				
Involuntary Resettlement	✓			<p>P: When widening is carried out in an urban area with structures on both sides of the alignment, involuntary resettlement will occur. The alternative proposal, which minimizes the widening of the settlement, will minimize the scale of the resettlement.</p> <p>C/O: There is a high possibility of resettlement to adjacent areas, and it is assumed that there will be little impact after resettlement due to compensation and rehabilitation support.</p>
Land Use	✓	✓	✓	<p>P: Land acquisition and involuntary resettlement are likely to cause changes in existing land use pattern.</p> <p>C: While changes in land use associated with construction work are relatively minor at expansion section of the existing road, land usage, including cultivation, quarry and agro-forestry, might be significantly affected at bypass sections.</p> <p>O: The development due to the Project will induce a change in land use along the alignment. Greater traffic volume may affect the use of road and surrounding area by local residents.</p>
Utilization of Local Resources		✓	✓	<p>P: No impact is expected.</p> <p>C: Mass-scale use of local resources such as sand and quarrying for construction activities may obstruct the utilization by the local people for other purposes.</p> <p>O: Improvement in road infrastructure may lead to over exploitation of the environmental resources.</p>
General, Regional/City Plans			✓	<p>P: No impact is expected.</p> <p>C: No impact is expected.</p> <p>O: Better infrastructure network may trigger influx of outsiders and economic development in the region.</p>
Social Institutions and Local Decision-making Institutions	✓	✓	✓	<p>P: Land acquisition and involuntary resettlement are likely to affect social institutions such as social capital and local decision-making institutions.</p> <p>C: Social capital and local decision-making institutions will be affected by the influx of non-local population and construction workers.</p> <p>O: Social capital and local decision-making institutions will be affected by the influx of non-local population.</p>
Social Infrastructure	✓	✓	✓	<p>P: Although the area is not densely populated, land acquisition still affects many roadside public service facilities such as Panchayat offices and police stations.</p>

Item	Scoping Analysis of the Anticipated Environmental Impacts			Rational of the Impact Assessment
	Pre-construction	Construction Stage	Operation Stage	
and Services				<p>C: Access to social infrastructure and services may be temporarily affected due to construction of construction yard and accommodation for workers as well as traffic jams due to the operation of construction vehicles.</p> <p>O: The resettlement can result in prolonged disturbance in social infrastructure and services. In the long term, however, the project is expected to improve access to social infrastructure and services by providing better road network.</p>
Local Economy and Livelihood	✓	✓	✓	<p>P: Loss of income source and livelihood due to involuntary resettlement and change in land usage are expected to negatively affect the local economic and livelihood.</p> <p>C: Loss of income and livelihoods due to involuntary resettlement and land use changes are expected to adversely affect the local economy and livelihoods, especially cultivating, quarries and agroforestry. Construction work, on the other hand, has a positive impact on the local economy by creating employment and business opportunities in the project area.</p> <p>O: Over the long term, the project is expected to have positive impact on local economy as improved road network facilitates transport of cash crops and ensures more stable supply of essential goods. On the other hand, the end of construction work may cause unemployment of construction workers. The project may trigger unintended side effects on the local community, e.g. influx of non-local people and more competition in business and pressure on local natural resources.</p>
Unequal Distribution of Benefit and Damage	✓	✓	✓	<p>P: Land acquisition and involuntary resettlement will lead to unequal distribution of benefits and damages between groups who are directly affected by the project and who are not.</p> <p>C: While resettling households and households whose livelihood depends on affected lands will bear much of the damage, others may even enjoy benefits from new business opportunities created by construction work, resulting in unequal distribution of benefits and damages.</p> <p>O: People residing along the road may accrue greater benefits compared with others, potentially increasing rich-poor gap within the community.</p>
Local Conflicts of Interests	✓	✓	✓	<p>P/C/O: Unequal distribution of benefits and damages may trigger and/or intensify local conflicts of interests in the community.</p>
Water Usage, Water Rights and Communal Rights	✓	✓		<p>P: Water usage and water rights of the affected households may be curtailed due to resettlement. However, the target area has mainly rain-fed agriculture, not irrigation, and no major impact is expected.</p> <p>C: Disturbance to water usage, water rights and communal rights during construction work is expected to be minor and short-term in nature. However, communal rights and distribution should be carefully examined to avoid negative impacts.</p> <p>O: No impact is expected.</p>
Cultural and Historical	✓	✓	✓	<p>P: The road passes near major archaeological sites, cultural heritage, and / or indigenous sacred grove, and some heritage may be affected along the road.</p>

Item	Scoping Analysis of the Anticipated Environmental Impacts			Rational of the Impact Assessment
	Pre-construction	Construction Stage	Operation Stage	
Heritage				<p>O: Some heritages nearby the project road may be affected.</p> <p>O: Some heritages nearby the project road may be indirectly affected.</p>
Religious Facilities	✓	✓	✓	<p>P: Religious structures, graveyards, churches, etc. along the road have been avoided from alignment by proper adjustment of alignment and eccentric widening. There are many churches, some memorial stones and tombs along the road. The readjusted alignment avoids them carefully, but can have an indirect effect.</p> <p>C/O: Roadside religious facilities may be affected by noise and vibrations during construction and operation due to construction work and greater traffic volume.</p>
Sensitive Facilities (ex. Hospital, school, precision machine factory)	✓	✓	✓	<p>P: When widening road in a village, it may be necessary to relocate small-scale public facilities (community halls, etc.).</p> <p>C: Noise and vibrations during construction work may affect schools, public health centers and other medical facilities, but it is thought that the scale will be small.</p> <p>O: These facilities can be affected due to noise and vibrations resulting from increase in traffic volume. Also, congestion may undermine the utility of such facilities.</p>
Poor People	✓	✓	✓	<p>P: Given the limited coping capacity of the poor, it is necessary to assess their vulnerability and develop appropriate mitigation measures.</p> <p>C: The poor may bear disproportionately higher burden due to their limited coping capacity, although they can benefit from employment opportunities during construction work.</p> <p>P: Economic development achieved by the road improvement in the region is expected to benefit the poor.</p>
Ethnic Minorities/ Indigenous People	✓	✓	✓	<p>P/C/O: The alignment of NH208 in Tripura state under the Project largely overlaps with the area under control of the Tripura Tribal Areas Autonomous District Council. Preparation of RAP and Action Plan for the Scheduled Tribe, therefore, must take into account this matter.</p>
Gender	✓	✓	✓	<p>P: The Project might affect gender-related work division such as cultivation, harvest and processing of crops.</p> <p>C: General social and cultural norms need to be carefully studied to avoid gender-related conflicts. The Project can impact gender roles in cultivation, harvesting and processing.</p> <p>O: The Project might affect gender-related work division such as cultivation, harvesting, and processing of crops.</p>

Item	Scoping Analysis of the Anticipated Environmental Impacts			Rational of the Impact Assessment
	Pre-construction	Construction Stage	Operation Stage	
Children's Rights	✓		✓	P: Some children are affected by the relocation. Children in households that have lost land and livelihoods may be forced to drop out of school.
				C: Child labor is unlawful according to article 24 of Indian Constitution. Only adults are eligible for potential employment opportunity created by the project.
				O: Access to social services is expected to improve throughout the year and educational opportunities are expected to improve.
Public Health (sanitation and infectious diseases)		✓	✓	P: No impact is expected.
				C: Influx of construction workers is likely to increase health risks, particularly that of STD/STI, HIV/AIDS, coronavirus, etc. The risk of malaria should be properly managed during construction in areas where malaria is prevalent.
				O: An increase in traffic volume and road users may have negative impact on public health.
Occupational Health and Safety (OHS)		✓	✓	P: No impact is expected.
				C: Occupational health and safety of construction work should be properly managed through adequate Environment Management Plan.
				O: Maintenance and repair work should take into account the occupational health and safety of the workers.
Others				
Accidents		✓	✓	P: No impact is expected.
				C: An increase in the risk of accidents caused by the operation of construction machinery and the running of construction vehicles is expected.
				O: Increased traffic volume and increased risk of accidents due to speeding up are expected. On the other hand, it is considered that the accident risk can be reduced by rehabilitating the route and implementing accident prevention measures (such as installing a reflector on the curve).
Climate Change		✓	✓	P: No impact is expected.
				C: Although the impact is temporary and small, greenhouse gases (GHGs) are emitted by the operation of construction machinery and the running of construction vehicles.
				O: GHGs emission is expected to increase due to the increase in traffic volume. In addition, adaptation measures will be implemented by considering the effects of climate change (increase in precipitation, etc.) when considering measures for landslides and soil erosion.

Source: JICA Survey Team

Note: P: Pre-Construction; C: Construction; and O: Operation^[1]Period

7.5.2 Survey TOR

Table 7-41: Survey TOR

Impact item	Prediction and evaluation method
Soil	Predict the impact based on the results of the field survey, literature and similar cases reviews, and road design (scale of cuts and fills)
Soil erosion	Predict the impact based on the results of the field survey, literature and similar cases reviews, and road design (scale of cuts and fills)
Hydrology /hydrology	Predict the impact based on the results of the field surveys and the results of hydraulic and hydrological surveys, and plan the appropriate placement of culverts.
Ecosystem	Investigate the general condition of ecosystems and flora (villages, slash-and-burn, natural forests, plantations) that characterize the areas along the NH208 line, and their relationships with other ecosystems. Select ecologically important areas, including areas near protected areas in two seasons(the dry and rainy seasons): field surveys at least one season and one from secondary source Confirm the existence of valuable species around the NH208 line through field surveys and interviews with related organizations and neighboring residents . Check the type, size, and distribution of the main row of trees. Study on literature and similar cases reviews to predict the impacts.
Protected area	Confirm the condition of the natural environment in the vicinity of the project alignment through site surveys and interviews with related organizations and residents around the project alignment . Study on literature and similar cases reviews to predict the impacts.
Landscape	Consider the potential of the entire route along the project alignment and tourism potentials through site surveys and interviews with related organizations and residents around the project alignment . The connectivity of the original landscapes.
Natural disasters	Areas with a high risk of disaster will be selected through field surveys and interviews with relevant organizations and residents around the project alignment. Study on literature and similar cases reviews to predict the impacts.
Air quality	Measure roadside NO ₂ and PM _{2.5} PM ₁₀ . The survey method conforms to the environmental standards of India.
Water quality	Measure the water quality (pH , BOD , COD , SS , coliforms) of the river that crosses the project alignment . Study on literature and similar cases reviews to predict the impacts.
Soil pollution	Study on literature and similar cases reviews to predict the impacts.
Noise / vibration	Predict roadside equivalent noise level. The survey method conforms to Indian or international standards. Study on literature and similar cases reviews to predict the impacts.
Waste / hazardous materials	Investigate the collection/disposal status of waste along the road and the status of illegal dumping (location, amount and type of waste, etc.). Study on literature and similar cases reviews to predict the impacts.
Involuntary Relocation of residents	Census survey predicts the number of involuntary resettlement due to widening work. Conduct surveys on affected residents and compensation details.
Land use	Predict impact based on field survey results and literature reviews and similar cases
Utilization of local resources	Predict impact based on field survey results and literature reviews and similar cases
Basic plan, regional / city plan	Predict impact based on field survey results and literature reviews and similar cases
General, Regional/City Plans	Predict impact based on field survey results and literature reviews and similar cases

Impact item	Prediction and evaluation method
Social organizations and local decision-making organizations	Predict impact based on field survey results and literature reviews and similar cases Consideration on the impact on fishermen and fishery.
Social infrastructure and services	Study on literature and similar cases reviews to predict the impacts. Confirm the buried objects such as telephone poles, water pipes, optical cables, etc. in the road site by conducting field surveys and collecting information by related organizations.
Local economy and livelihood	Predict impact based on field survey results and literature reviews and similar cases
Unequal distribution of benefit and damage	Predict impact based on field survey results and literature and similar cases reviews
Local conflict of interest	Predict impact based on field survey results and literature and similar cases reviews
Water usage, water rights and communal rights	Predict impact based on field survey results and literature and similar cases reviews
Cultural and historical heritage	Confirm the location, scale and importance of cultural heritage along the road. Study on literature and similar cases reviews to predict the impacts.
Religious facilities	Check the location and scale of religious facilities such as graveyards and churches along the road. Study on literature and similar cases reviews to predict the impacts.
Sensitive Facilities (ex. hospital, school, precision machine factory)	Check the locations of roadside hospitals, schools, nurseries, recreational facilities, and religious facilities that require special consideration. Predict impact based on field survey results and literature reviews and similar cases
Poor people	Predict the impact based on the survey results of affected residents and literature reviews and similar cases.
Ethnic Minorities/ Indigenous People	Predict the impact based on the results of field surveys and literature reviews such as demographics and similar cases.
Gender	Study on literature and similar cases reviews to predict the impacts.
Children's rights	Study on literature and similar cases reviews to predict the impacts.
Public Health (sanitation and infectious diseases)	Study on literature and similar cases reviews to predict the impacts.
Occupational safety and health (OHS)	Study on literature and similar cases reviews to predict the impacts.
Accidents	Study on literature and similar cases reviews to predict the impacts.
Climate change	Literature and similar cases reviews and consider adaptation measures that should be included in road design.

Source: JICA Survey Team

7.6 Anticipated Environmental Impacts

7.6.1 Impacts on the Living Environment

(1) Ambient Air

I. Present condition

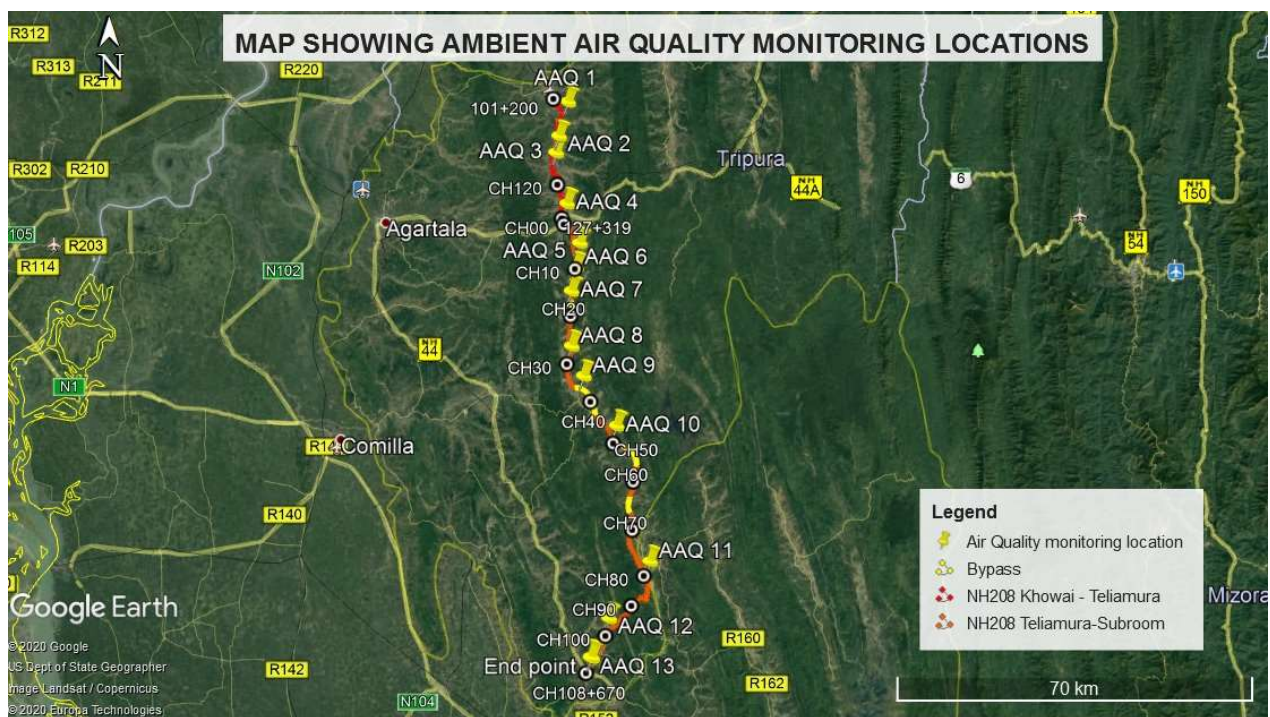
SPM, PM10 and PM2.5 have been estimated by gravimetric method. Modified West and Gaeke Method have been adopted for estimation of SO₂. Jacobs - Hochheiser Method has been adopted for the estimation of NO_x.

Particulate matter (PM10) ranges from 23 µg/m³ to 48 µg/m³ and Particulate matter (PM2.5) ranges from 10 µg/m³ to 18 µg/m³ in the project area. While SO₂ & NO_x are also within the prescribed limit in the project area in all the thirteen monitored locations for ambient air quality. Hence ambient air quality levels conform to the prescribed National Ambient Air Quality Standards (NAAQS) appended as **Annexure -4** at all the thirteen monitoring sites. Particulate matter found after analysis mostly due to dust flying in the air. Ambient Air Quality monitoring locations and results in the Project Road have been given in the tables below. Ambient air quality monitoring locations and photographs have been presented in the following figures respectively.

Table 7-42 Ambient air quality monitoring locations

S. No.	Locations	Latitude	Longitude
AAQ1	Mahadevtala/Chebri village	24° 1'9.24"N	91°37'49.04"E
AAQ2	Dwarikapur	23°57'32.34"N	91°36'45.78"E
AAQ3	Kalyanpur	23°55'48.00"N	91°36'24.71"E
AAQ4	Teliamura (NH44)	23°50'24.46"N	91°37'40.05"E
AAQ5	BSF camp area	23°46'15.45"N	91°39'06.88"E
AAQ6	Taidu	23°43'40.73"N	91°38'38.50"E
AAQ7	Jantana Pada	23°41'11.55"N	91°38'08.14"E
AAQ8	Tingharia	23°35'24.57"N	91°38'07.26"E
AAQ9	Rangamati	23°32'14.75"N	91°39'29.69"E
AAQ10	Chelagangmung	23°26'59.14"N	91°43'15.00"E
AAQ11	Suknachari	23°12'41.96"N	91°47'1.61"E
AAQ12	Rupachari	23° 6'40.35"N	91°42'18.67"E
AAQ13	Harina	23°02'25.68"N	91°40'13.09"E

Source: JICA Survey Team



Source: JICA Survey Team

Figure 7-26: Ambient air quality monitoring locations

Table 7-43: Ambient Air Quality in the Project Road

S. No.	Locations	Parameters (ug/m ³)				Category
		PM10	PM2.5	SO2	Nox	
1	Mahadevtila	23	10	7.4	12.2	Sensitive
2	Dwarikapur	25	10	7.2	12.1	Residential
3	Kalyanpur	30	14	7.1	11.7	Residential
4	Teliamura	32	14	7.1	11.3	Commercial
5	BSF camp area	31	13	6.8	11.0	Sensitive
6	Taidu	45	17	7.9	13.7	Commercial
7	Jantana Pada	37	15	7.4	13.2	Residential
8	Tingharia	32	13	6.9	11.1	Sensitive
9	Rangamati	46	18	8.3	14.2	Commercial
10	Chelagangmun	36	14	7.2	12.7	Residential
11	Suknachari	37	15	6.6	12.4	Residential
12	Rupachari	47	17	8.1	13.9	Commercial
13	Harina	48	18	8.5	14.4	Commercial
CBCP Central Pollution Control Board Standard for industrial, resi-dential, and other rural areas		100	60	80	80	Standards

S. No.	Locations	Parameters (ug/m ³)				Category
		PM10	PM2.5	SO2	Nox	
	International Standards (WHO)24hr average	50	25	20	40	Standards

Source: JICA Survey Team

The potential sources of air emission during the construction phase of the project are: (i) dust from earth works (during site preparation), (ii) emissions from the operation of equipment, machines and vehicles for construction, (iii) fugitive emissions during the transport of construction materials, (v) air emissions other than dust arise from combustion of hydrocarbons particularly from the hot mix plants and process of heating bitumen and (vi) dust generated due to rock cutting and blasting. Most of the emissions will be in the form of coarse particulate matter which will settle down in close vicinity of construction site.

The stone aggregate will be sourced from licensed quarries. The project implementation unit is not going to establish new quarries for the project. The pollution related aspects to these quarries are independently compiled by the quarry owners. The aggregate will be transported in the tarpaulin covered trucks.

II. Amount of emissions change calculated from traffic volumes and vehicle speed

Using the HDM4 model with the parameters of the prospected transport volumes and speeds, the analysis for the gaseous emissions has been calculated from 2022-2041. The calculated emissions are hydrocarbon-HC, carbon monoxide-CO, Nitrogen oxides-NOx, sulfur dioxides-SO₂, Particulate Matters-PM, and lead-Pb.

The result has shown that all the with emissions are less than without scenario all in HC, CO, NOx, SO₂, PM and Pb. We can conclude that “with scenario” will contribute to the better environmental conditions of the area than “without scenario”.

Table 7-44 Gaseous emissions in 2022 -2041 (tonnes)

	WITHOUT PROJECT (UNIT: Tonnes)							WITH PROJECT (UNIT: Tonnes)							Difference (With-Without) (UNIT: Tonnes)							
	Hydrocarbon	Carbon	Nitrous oxide	Sulphur dioxide	Carbon dioxide	Particulates	Lead	Hydrocarbon	Carbon	Nitrous oxide	Sulphur dioxide	Carbon dioxide	Particulates	Lead	Hydrocarbon	Carbon	Nitrous oxide	Sulphur dioxide	Carbon dioxide	Particulates	Lead	
	HC	nonoxide CO	NOx	SO2	dioxide CO2	Par	Pb	HC	nonoxide CO	NOx	SO2	dioxide CO2	Par	Pb	HC	nonoxide CO	NOx	SO2	dioxide CO2	Par	Pb	
2022	87.32	265.38	87.84	5.37	8196.92	17.61	0.48	87.32	265.38	87.84	5.37	8196.92	17.61	0.48	0	0	0	0	0	0	0	0
2023	94.7	285.03	94.39	5.88	8830.64	19.23	0.51	75.56	227.47	75.3	4.69	7047.17	15.33	0.4	- 19.14	- 57.56	- 19.09	- 1.19	- 1,783.47	- 3.90	- 0.11	
2024	102.97	306.84	101.68	6.45	9536.57	21.06	0.53	75.14	233.1	80.86	4.3	6911.41	14.19	0.43	- 27.83	- 73.74	- 20.82	- 2.15	- 2,625.16	- 6.87	- 0.10	
2025	587.14	1296.83	435.44	44.8	44678.57	141.1	0.64	403.93	907.84	309	30.26	30777.01	95.43	0.53	- 183.21	- 388.99	- 126.41	- 14.54	- 13,901.56	- 45.67	- 0.11	
2026	692.93	1522.62	511.47	53.02	52562.29	166.9	0.72	468.96	1047.96	356.6	35.25	35620.38	111.1	0.58	- 223.97	- 474.66	- 154.89	- 17.77	- 16,941.91	- 55.75	- 0.14	
2027	834.32	1824.1	612.91	64.01	63098.88	201.4	0.81	545.49	1212.08	412.3	41.14	41305.88	129.6	0.63	- 288.83	- 612.02	- 200.64	- 22.87	- 21,793.00	- 71.75	- 0.18	
2028	981.99	2134.76	717.45	75.55	74004.78	237.6	0.9	635.4	1404.04	477.4	48.08	47969.51	151.5	0.7	- 346.59	- 730.72	- 240.08	- 27.47	- 26,035.27	- 86.16	- 0.20	
2029	1151.41	2493.57	838.14	88.76	86575.56	279.1	1	740.92	1628.52	553.5	56.25	55775.61	177.1	0.77	- 410.49	- 865.05	- 284.64	- 32.51	- 30,799.95	- 101.96	- 0.23	
2030	1381.09	2973.11	999.55	106.76	103466	335.6	1.11	865.26	1891.9	642.8	65.88	64952.72	207.3	0.83	- 515.83	-1,081.21	- 356.77	- 40.88	- 38,513.24	- 128.22	- 0.28	
2031	1450.28	3124.5	1050.36	112.08	108707	352.3	1.19	908.85	1987.24	675.2	69.21	68225.4	217.8	0.89	- 541.43	-1,137.26	- 375.18	- 42.87	- 40,481.55	- 134.50	- 0.30	
2032	1550.67	3336.84	1121.78	119.92	116149.6	376.9	1.24	954.7	2087.54	709.3	72.69	71668.53	228.8	0.92	- 595.97	-1,249.30	- 412.51	- 47.23	- 44,481.04	- 148.08	- 0.32	
2033	1647.2	3543.76	1191.32	127.39	123367.8	400.4	1.32	1002.9	2192.93	745.1	76.37	75286.25	240.3	0.99	- 644.30	-1,350.83	- 446.24	- 51.02	- 48,081.56	- 160.03	- 0.33	
2034	1794.3	3853.24	1295.38	138.9	134239.3	436.5	1.39	1053.61	2303.83	782.8	80.23	79093.5	252.5	1.03	- 740.69	-1,549.41	- 512.61	- 58.67	- 55,145.80	- 183.97	- 0.36	
2035	1944.68	4166.94	1400.9	150.71	145292.7	473.5	1.46	1107.05	2420.71	822.5	84.3	83105.77	265.3	1.1	- 837.63	-1,746.23	- 578.41	- 66.41	- 62,186.88	- 208.17	- 0.36	
2036	2143.83	4581.83	1540.48	166.36	159921.5	522.5	1.54	1167.8	2552.76	867.4	88.95	87651.7	279.9	1.14	- 976.03	-2,029.07	- 673.11	- 77.41	- 72,269.81	- 242.62	- 0.40	
2037	2370.24	5052.82	1698.88	184.16	176537.6	578.3	1.66	1217.91	2663.84	905.1	92.73	91444.81	291.8	1.21	-1,152.33	-2,388.98	- 793.76	- 91.43	- 85,092.83	- 286.49	- 0.45	
2038	2657.03	5643.84	1898	206.81	197466.8	649.2	1.73	1299.95	2840.41	965.2	99.04	97549.59	311.6	1.26	-1,357.08	-2,803.43	- 932.85	- 107.77	- 99,917.25	- 337.60	- 0.47	
2039	3088.05	6528.08	2196.05	240.92	228833.9	756	1.85	1366.66	2984.62	1014	104.18	102560.8	327.8	1.32	-1,721.39	-3,543.46	-1,182.11	- 136.74	- 126,273.11	- 428.20	- 0.53	
2040	3199.84	6773.8	2278.79	249.49	237336.5	783	1.97	1436.55	3139.34	1067	109.45	107823.2	344.4	1.4	-1,763.29	-3,634.46	-1,211.97	- 140.04	- 129,513.30	- 438.59	- 0.57	
2041	3256.39	6907.11	2323.61	253.67	241840.1	796.3	2.07	1507.36	3294.3	1119	114.84	113143.4	361.4	1.47	-1,749.03	-3,612.81	-1,204.13	- 138.83	- 128,696.67	- 434.92	- 0.60	

Source: JICA Study Team

II. Change in Ambient air and GLC (maximum ground level concentration)

The air pollution impact of excavation in ordinary earth and boulders and rock is directly dependent upon construction methodology, annual rate of excavation, mode of transport within the construction site, mode of screening and method of crushing. The air pollution sources at the proposed project site can be broadly classified into three categories, viz. area source, line source and instantaneous point source.

Excavation by various activities in project area is construed as an area source which includes excavation pit(s) and activities happening in the excavation area like digging, dozing, hauling and loading/unloading. The dust emission from these areas will be fugitive in nature. The excavator operations, loading/unloading operations will also cause dust emission though it will be confined to the area of operation of the machinery. The gaseous emission from their operation shall be minimal and limited within the project.

Transportation of excavated material from the project site to dumping sites area categorized as line source. Since the dumper movement on haul road will be within the project area, no adverse impact shall be felt in the settlement area.

(a) Dust Dispersion Modeling during Excavation

In the present study, United States Environmental Protection Agency (USEPA-42 series) approved mathematical equations have been used to predict concentrations for different operations in project including the material transportation. To predict the particulate emissions, Envitran AERMODCloud. (Air Dispersion Modeling Software) an interface based on ISCST3 – was used to predict changes in air quality i.e., maximum ground level concentration (GLC's) of Particulate Matter. Short term model options were opted for uniform emissions rates. The concentration of other gaseous pollutants i.e. SO₂ and NO_x was found to be much lower than the threshold limit (80 µg/m³), the air modeling was restricted to determination of PM₁₀ and PM_{2.5} in the present case for the monitoring locations where respective maximum value was identified. The emission factors adopted for various project operations are mentioned below:

Emission Factor for Excavation and Material Loading/unloading.

For excavation and material handling the emission factor for PM₁₀ has been adopted as per USEPA – 42 series.

For Dozing Operation:

$$EF_{PM_{10}} \text{ (kg/hr)} = 0.34 \times S^{1.5} / M^{1.4}$$

Where,

EF_{PM₁₀} (kg/hr) = emission factor in kg/hr

S = silt contents in percentage by weight

M = moisture content in percentage by weight

For Material Loading/unloading:

$$EF_{PM_{10}} \text{ (kg/hr)} = 0.34 [0.119 / M^{0.9}]$$

Where,

EF_{PM₁₀} (kg/hr) = emission factor in kg/ton

M = moisture content in percentage by weight.

Emission Factor for Material Haulage within Project:

The emission rate is dependent on several factors which include soil properties, climatic conditions, vehicular traffic, wind forces and machinery operation. The Empirical equation for calculation of emission rate is as under.

$$E = k \cdot (1.7)^s \cdot (S/48) \cdot (W/2.7)^{0.7} \cdot (w/4)^{0.5} \cdot (365-p/365) \text{ g/VKT}$$

Where,

E=Emission Rate

K = Particle size multiplier

s=Silt Content of the Road surface material

S= Mean Vehicle Speed (km/hr)

W=Mean Vehicle Weight (tons)

w=Mean number of wheels

p= Number of days with at least 0.254mm of precipitation per year

Note: The emission factor for PM_{2.5} has been considered 60% of PM₁₀.

The Isoleth developed for PM₁₀ and PM_{2.5} along the road alignment where monitored values are highest in receptor villages and is shown in the next Figures (Figure 7-27, Figure 7-28) for PM₁₀ and PM_{2.5} respectively. The maximum GLC due to excavation, loading & unloading activities for PM₁₀ and PM_{2.5} were found to be 5.7 µg/m³ and 3.5 µg/m³ respectively and has been shown in the next Table.

Table 7-45:-Maximum Concentration at receptors

Location	Pollutants	N-Cord.	E-Cord.	GLC (µg/m ³)
Harina	PM ₁₀	23° 2'25.46"N	91°40'12.95"E	5.7
Harina	PM _{2.5}	23° 2'25.46"N	91°40'12.95"E	3.5

Source: JICA Survey Team

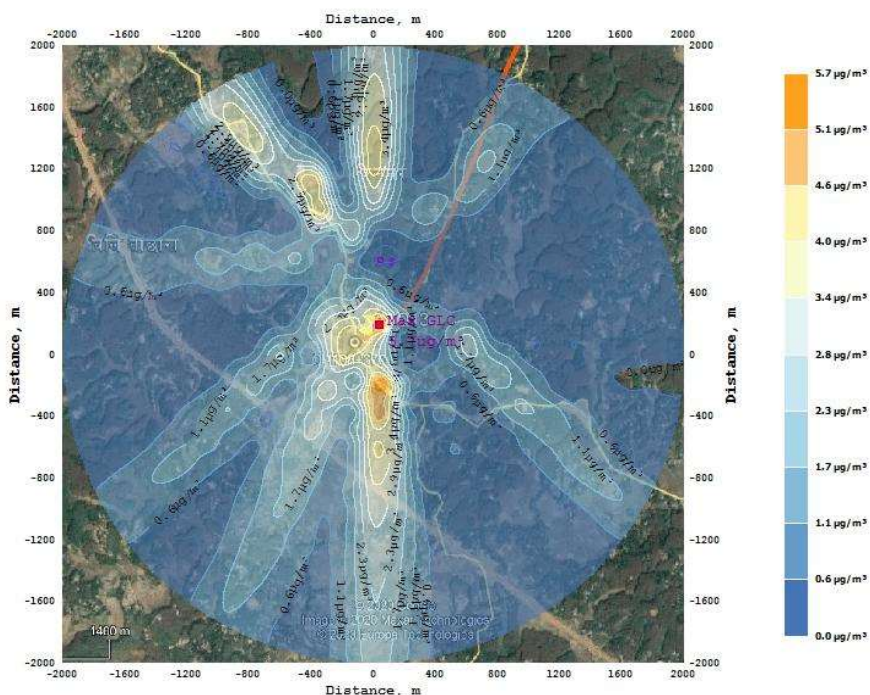


Figure 7-27: Isopleth of Maximum Predicted 24 hourly Ground – Level Concentrations for PM₁₀

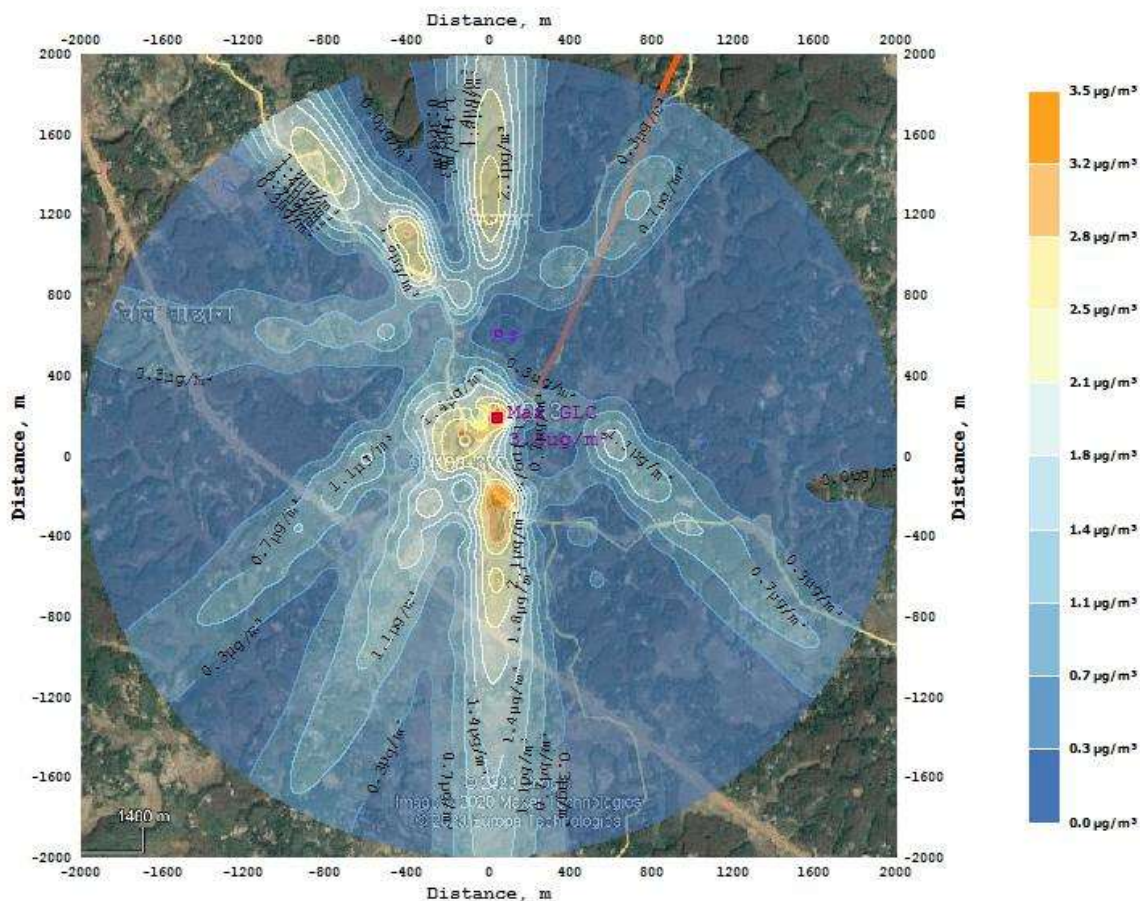


Figure 7-28: Isopleth of Maximum Predicted 24 hourly Ground – Level Concentrations for PM_{2.5}

Source: JICA Survey Team

(b) Resultant Impact

The resultant impact due to construction activities (excavation and crushing) on the ambient air quality for PM₁₀ and PM_{2.5} at monitoring station Harina (about 250 m from the south endpoint of the alignment) is presented in **Table below** which shows that, the resultant concentration level is within the NAAQS whereas **Table below** shows the resultant levels due to excavation and construction activities after taking Mitigation Measures (MM) as per EMP.

Table 7-46 Resultant levels due to excavation and construction activities

S	Pol	M	Pr	Resul	N
t	lut	a	edi	tant	A
a	ant	x.	cte	conce	A
ti	s	C	d	nrati	Q

Station Name		Conc. ($\mu\text{g}/\text{m}^3$)	GLC ($\mu\text{g}/\text{m}^3$)	Conc. ($\mu\text{g}/\text{m}^3$)	S ($\mu\text{g}/\text{m}^3$)
Harina	PM 10	48	5.7	53.7	100
Harina	PM 2.5	18	3.5	21.5	60

Source: JICA Survey Team

Table 7-47 Resultant levels due to excavation and construction activities after taking Mitigation Measures (MM) as per EMP

Station Name	Pollutants	Max. Conc. ($\mu\text{g}/\text{m}^3$)	Predicted GLC ($\mu\text{g}/\text{m}^3$)	GLC after taking MM as per EMP ($\mu\text{g}/\text{m}^3$)	Resultant concentration taking MM as per EMP ($\mu\text{g}/\text{m}^3$)	NAAQS ($\mu\text{g}/\text{m}^3$)
Teliamura (NH44)	PM 10	48	5.7	11.4	49.14	100

Teliamura (NH44)	P M 2. 5	1 8	3.5	0 7	18.0 7	6 0
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Source: JICA Survey Team

(c) NOx and SOx prospected emissions

The highest observed value for SOx and NOx are 8.5 ug/m³ and 14.4 ug/m³ respectively. There is no significant source for SOx and NOx concentration will be added along the alignment except vehicular traffic.

The emission of these parameters in vehicles are controlled by fuel used and engine technology. Since stringent new Bharat Stage VI norms has already enforced to control these parameters, impacts on ambient air quality due to these parameters is not significant and controlled by new norms.

(2) Noise and Vibration

I Vibration

Vibration is the periodic back-and-forth motion of the particles of an elastic body or medium, commonly resulting when almost any physical system is displaced from its equilibrium condition and allowed to respond to the forces that tend to restore equilibrium. Vibration along the highway is mainly due to heavy trucks passing at relatively high speed on a road with an uneven surface profile. Interaction between wheels and road surface causes a dynamic excitation which generates waves propagating in the soil and impinging on the foundations of nearby structures.

Source of Vibration

- Increase in noise levels due to running of heavy construction equipment.
- Frequent vibration impact due to demolition (existing pavement, road surfaces, etc.), piling, and compaction work.
- Noise propagation due to plying of heavy construction vehicles at the sites
- Blasting operation (if any) may lead to temporary ground borne vibration
- Noise generated from the running of trucks and other heavy vehicles during operation
- Construction activities can result in varying degrees of ground vibration, depending on the equipment and methods employed.
- Operation of construction equipment causes ground vibration which spread throughout the ground and diminished in strength with distance.

Table 7-48 Magnitude of Impact of Vibration Annoyance

Vibration Level, mm/sec	Effect	Magnitude of Impact
10	Vibration is likely to be intolerable for more than a very brief exposure to this level	Major
1.0	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if	moderate

	prior warning and explanation has been given to residents	
0.3	Vibration might be just perceptible in residential environments	Minor
0.14	Vibration might be just perceptible in most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.	Negligible/ No change

Parameters for Vibration Level monitoring

Parameters for vibration level is L_{max} (mm/s)

Vibration Monitoring Methodology

The vibration level monitored using ISO certified R-tek vibration meter which can measure vibration level in L_{max} (mm/s).

Vibration Standards

There are no specific standards for vibration levels in India for highway projects. However, there are Director General of Mines and Safety (DGMS) standards available for vibration for evaluating the potential impacts for building damage and also the human response.

Table 7-49 Permissible PPV (mm/s) as per DGMS (Tech) Circular No. 7 of 1997

Type of structure	Dominant excitation frequency, Hz		
	< 8 Hz	8 – 25 Hz	> 25 Hz
<i>A) Buildings/ structures not belonging to the owner</i>			
Domestic houses/ structures (Kuchha brick and cement)	5	10	15
Industrial Buildings (RCC and framed structures)	10	20	25
Objects of historical importance and sensitive structures	2	5	10
<i>B. Buildings belonging to owner with limited span of life</i>			
Domestic houses/ structures (Kuchha brick and cement)	10	15	25
Industrial buildings (RCC & framed structures)	15	25	50

Baseline Vibration along NH 208

The vibration values in L_{max} mm/s at a distance of 30m from the road is recorded less than

0.1mm/s (which is the least count of the equipment). This level is less than 0.14mm/s, and vibration might be just perceptible in most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people will not perceive the vibration.

Impact of Vibration due to Road Construction and Operation

Construction vibration impact may be assessed in cases where there is a significant potential for impact from construction activities. Such activities include blasting, pile driving, demolition and drilling or excavation in close to sensitive structures.

Ground-borne vibration can be a concern for nearby habitation and sensitive receptors along the transit system route or maintenance facility, causing buildings to shake and rumbling sounds to be heard. Ground-borne vibration is not a common environmental issue as compare to noise. It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads.

Many construction activities related to road infrastructure give rise to ground-borne vibration that may cause damage to structures or be perceptible to occupants in adjacent buildings and, therefore, give rise to complaints.

These vibrations are produced by the varying forces between tyres and road surfaces and can become perceptible in buildings if heavy vehicles pass over irregularities in the road near the properties. Both compression and shear waves are produced and their amplitudes and attenuation with distance depend on a number of factors including the soil composition and the nature of the geological strata.

We conclude these vibration will be alleviated to the negligible level with the following mitigation measures.

Mitigation Measures

Mitigation of construction vibration requires consideration of equipment location and processes, as follows:

1. *Design considerations and project layout:*
 - Route heavily loaded trucks away from residential streets, if possible. Select streets with fewest homes, if no alternatives are available.
 - Operate earthmoving equipment on the construction lot as far away from vibration-sensitive sites if any as possible.
2. *Sequence of operations:*
 - Phase demolition, earthmoving and ground-impacting operations so as not to occur in the same time period. Unlike noise, the total vibration level produced could be significantly less when each vibration source operates separately.
 - Avoid nighttime activities. People are more aware of vibration in their homes during the nighttime hours.
3. *Alternative construction methods:*

- Avoid impact pile driving where possible in vibration-sensitive areas. Drilled piles or the use of a sonic or vibratory pile driver causes lower vibration levels where the geological conditions permit their use.
- Select demolition methods not involving impact, where possible. For example, sawing bridge decks into sections that can be loaded onto trucks results in lower vibration levels than impact demolition by pavement breakers, and milling generates lower vibration levels than excavation using clam shell or chisel drops.
- Avoid vibratory rollers and packers near sensitive areas.

Vibration Management

There are several measures to curtail the vibration levels:

- Reroute truck traffic away from the residential areas, if possible select streets with fewer homes if no alternative route is available;
- Site equipment to be placed away from the residential location and sensitive areas;
- Construct walled enclosures around especially noisy activities or clusters of noise generating equipment;
- All plant equipment and vehicles being fitted with appropriate noise suppression equipment to reduce noise and vibration levels as far as possible;
- All equipment should be operating in good condition. Use of equipment having inbuilt enclosed air compressor and mufflers on all engines;
- Avoid pile driving work where possible in sensitive areas by quieter alternatives where geological conditions permit their use;

II Noise: Present Condition

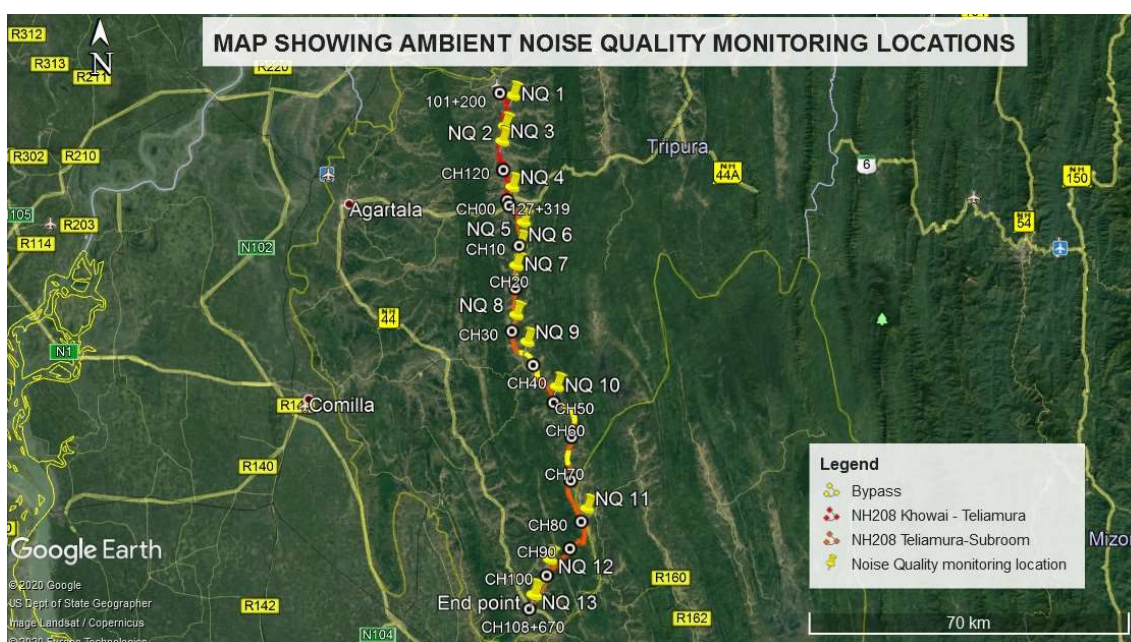
The physical description of sound concerns its loudness as a function of frequency. Noise in general is unwanted/un-desired sound, which is composed of frequencies of different loudness distributed over the audible frequency range. Various noise scales have been introduced to describe, in a single number, the response of an average human to a complex sound made up of various frequencies at different loudness levels. The most common and universally accepted scale is the A weighted scale which 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. Ambient noise quality monitoring locations, map and photographs have been presented in the following Table and Figures respectively.

Table 7-50: Sampling Location Details

S. No.	Locations	Latitude	Longitude
NQ1	Mahadevtala/Chebri village	24° 1'9.24"N	91°37'49.04"E
NQ 2	Dwarikapur	23°57'32.34"N	91°36'45.78"E
NQ 3	Kalyanpur	23°55'48.00"N	91°36'24.71"E
NQ 4	Teliamura (NH44)	23°50'24.46"N	91°37'40.05"E

NQ 5	BSF camp area	23°46'15.45"N	91°39'06.88"E
NQ 6	Taidu	23°43'40.73"N	91°38'38.50"E
NQ 7	Jantana Pada	23°41'11.55"N	91°38'08.14"E
NQ 8	Tingharia	23°35'24.57"N	91°38'07.26"E
NQ 9	Rangamati	23°32'14.75"N	91°39'29.69"E
NQ 10	Chelagangmung	23°26'59.14"N	91°43'15.00"E
NQ11	Suknachari	23°21'21.42"N	91°47'11.73"E
NQ12	Rupachari	23° 6'40.35"N	91°42'18.67"E
NQ 13	Harina	23°02'25.68"N	91°40'13.09"E

Source: JICA Survey Team



Source: JICA Survey Team made from google map

Figure 7-29: Noise Monitoring Locations along the Project Road

EHS standards also have the same range for residential one in India. Compared to Indian standard, at the maximum level, only 3 locations are below limit during daytime.

These ambient noise levels conform to the prescribed limit for all landuse categories monitored. Noise level is comparatively high at Teliamura due to higher traffic load of NH-44. Comparatively high noise level recorded in Teliamura, Kalyanpur & Harina due to heavy vehicular load in the existing road junction. The noise levels during both day and night time are within the prescribed limits. The table below presents noise level in dB(A) along the Project Road.

Table 7-51: Analysis of Noise Monitoring in All Locations

Location	Results	CPCB Limits Leq dB(A)
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	Leq Day dB(A)	Leq Night dB(A)	Day*	Night*
Mahadevtila	53	42	50	40
Dwarikapur	50	40	55	45
Kalyanpur	54	45	55	45
Teliamura (NH44)	56	44	65	55
BSF camp area	41.2	37.8	50	40
Taidu	54.8	42.5	65	55
Jantana Pada	51.3	41.8	55	45
Tingharia	45.2	38.3	50	40
Rangamati	53.9	42.3	65	55
Chelagangmung	52	41	55	45
Suknachari	51.8	39	55	45
Rupachari	52.5	41.7	65	55
Harina	54.3	43.9	65	55

Source: JICA Survey Team

Receptor	Day 07:00-22:00	Night 22:00-07:00
Residential, institutional, educational area	55	45
Industrial, commercial area	70	70

Source: IFC/EHS General Guidelines

III. Prediction of Noise Impact on Noise level for Section I

A noise propagation modeling study has been conducted to find out the impact from the noise generated because of the estimated total traffic flow as well as the significance of these impacts. The noise modeling has taken into account the design speed at various stretches. The stretches with restricted speeds have also been considered. DhvaniPRO is a computer program developed to undertake construction, industrial and traffic noise propagation studies for noise assessment.

The Traffic data has been collected at four locations along the project road as per the next tables. Different operative speeds have been used for various horizon years in the design life to get a realistic picture of the noise levels. No of cars are converted into Passenger Car Unit (PCU).

Table 7-52: Projected Traffic for section I

Year	Homogeneous Section (KM 85.500-KM 118.000)	
	Length- 32.500 km	
	No	PCU
2020	9,576	9,624

2025	12,221	12,283
2030	15,598	15,676
2033	18,057	18,147

Source: DPR

DhwaniPRO model is used for noise modeling and predicted noise levels are presented in the following Tables.

Table 7-53: Noise level predictions for the receptors at the homogenous intersections

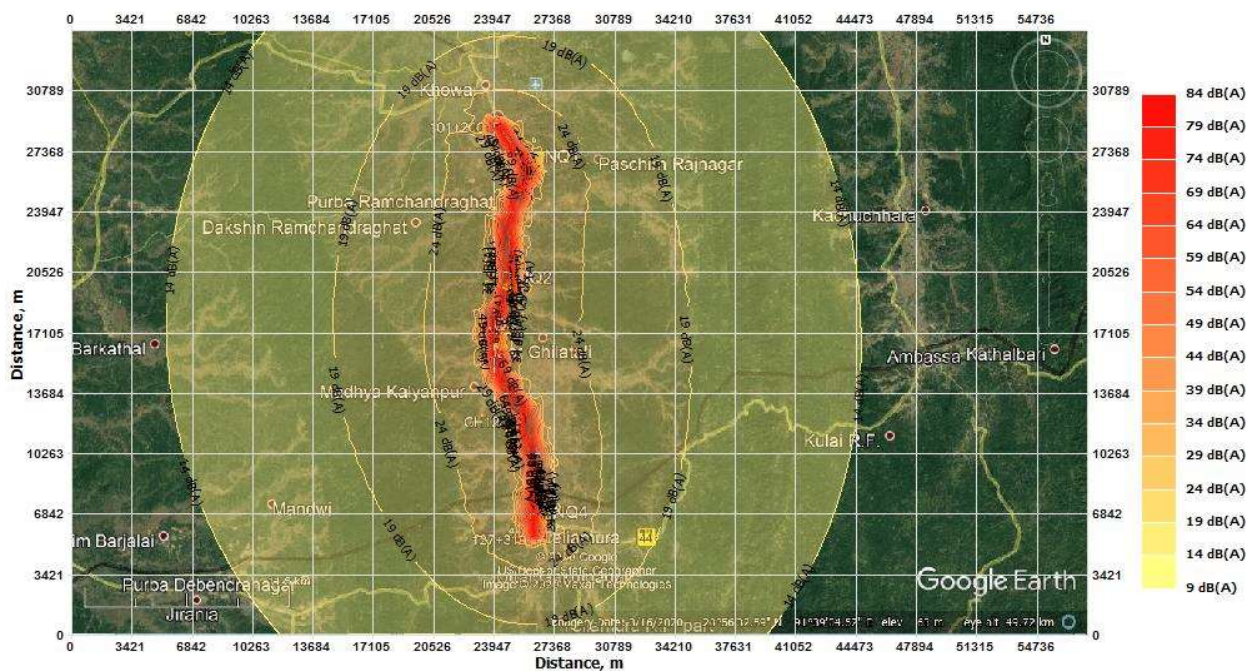
Unit: dB(A)

S.No.	Locations	2020	2025	2030	2033
1	Maha devtila/Chebri village	31	32	33	34
2	Dwarikapur	40	41	42	43
3	Kalyanpur	35	36	37	38
4	Teliamura (NH44)	48	49	50	52

Source: JICA Survey Team

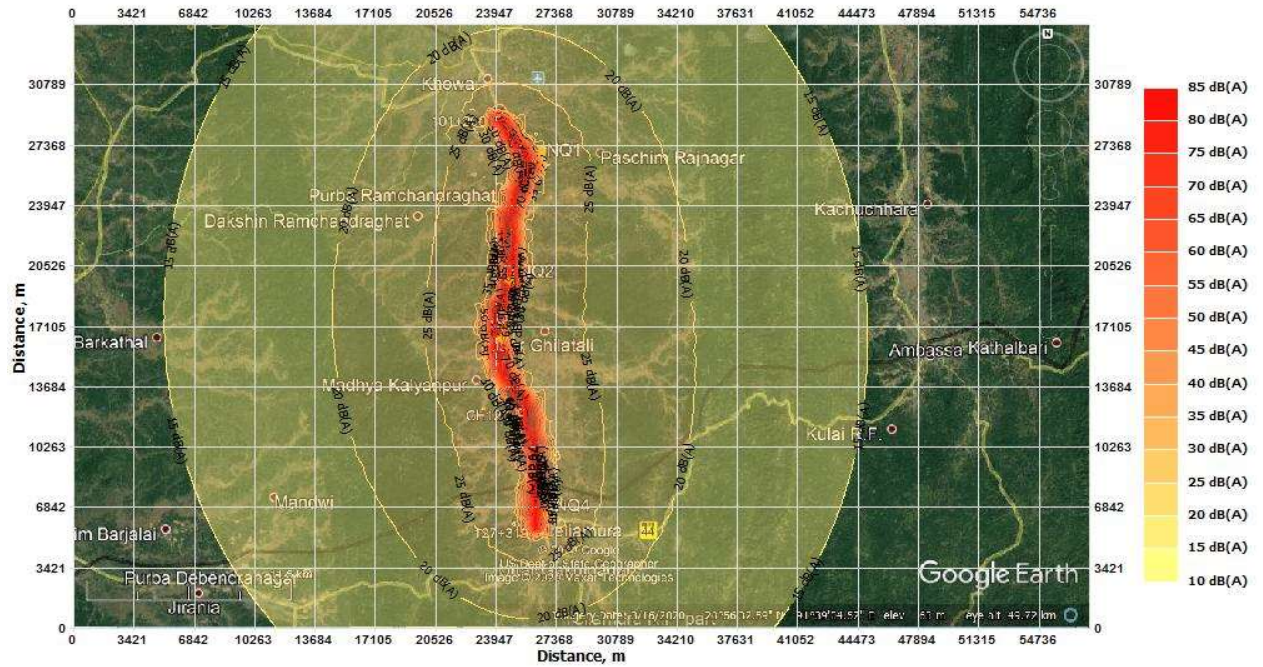
IV. Outcome of the Noise level Modelling Section I

The outcome of the noise modeling is as follows: The predicted noise levels during both daytime and nighttime are within limit upto the end of design life of the project for all the land uses (namely, commercial, residential/rural and sensitive). The Contour map showing noise levels due to total traffic outcome at the homogenous intersections from the period of 2020 – 2033 has been shown in the next Figures.



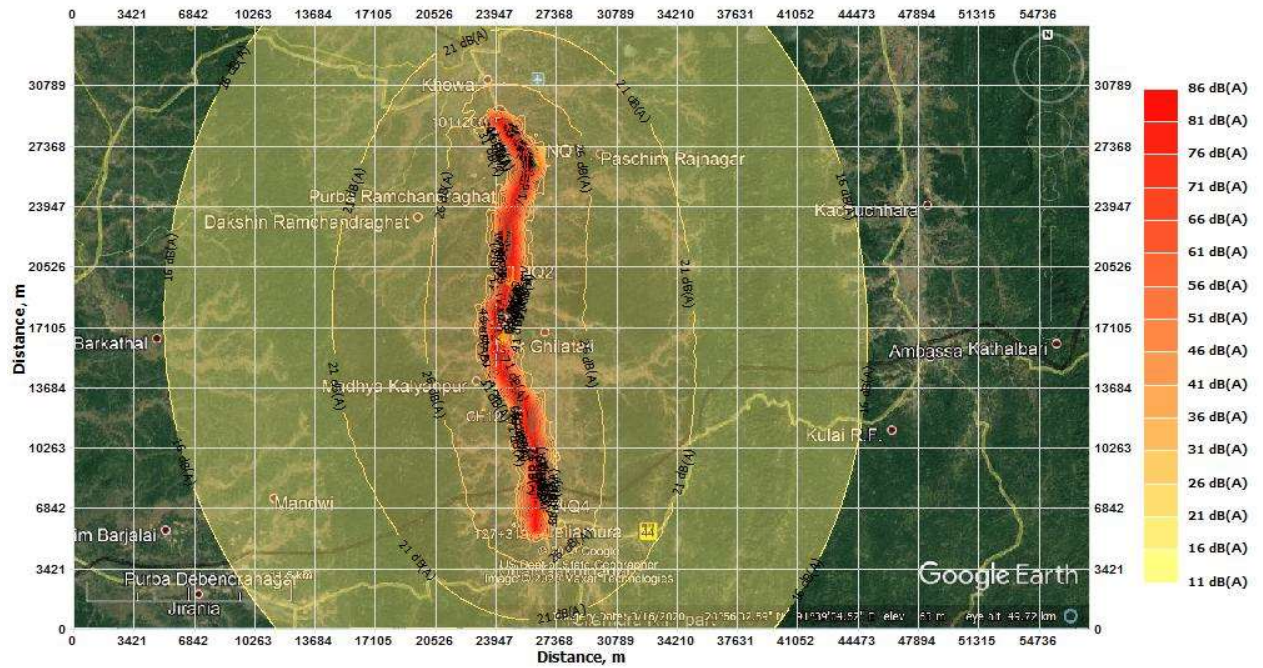
Source: JICA Survey Team

Figure 7-30 Contour map showing noise levels due to total traffic outcome at the homogenous intersections of 2020 year



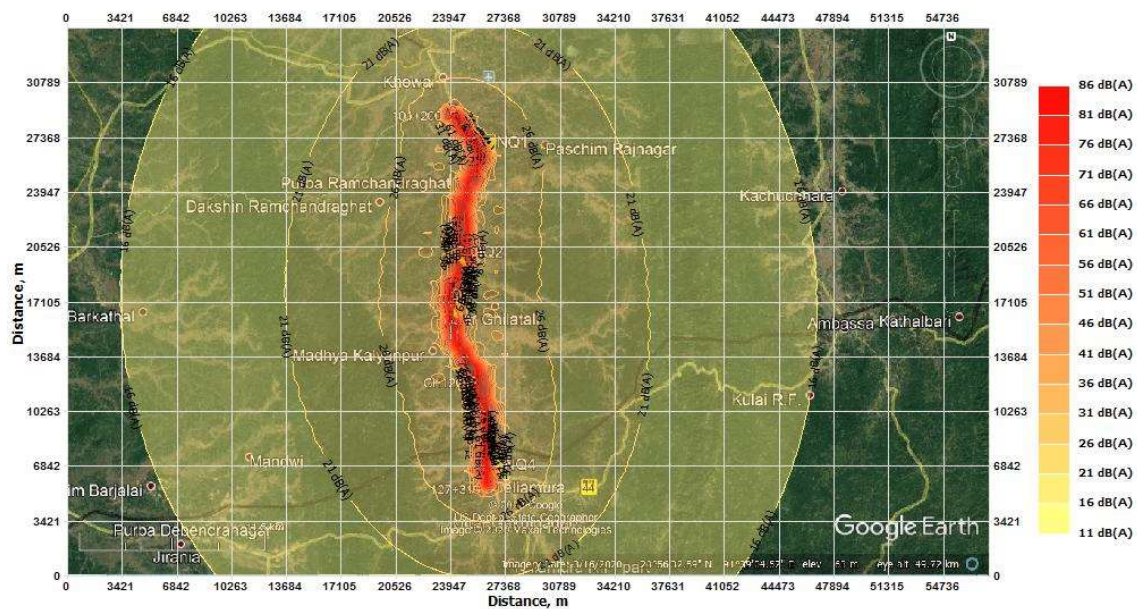
Source: JICA Survey Team

Figure 7-31 Contour map showing noise levels due to total traffic outcome at the homogenous intersections of 2025 year



Source: JICA Survey Team

Figure 7-32 Contour map showing noise levels due to total traffic outcome at the homogenous intersections of 2030 year



Source: JICA Survey Team

Figure 7-33 Contour map showing noise levels due to total traffic outcome at the homogenous intersections of 2033 year

V. Prediction of Noise Impact on Noise level for Section II

Table 7-54: Projected Traffic for section II

Year	Homogenous sections		
	PCU at km 42.30 (Near Rangamati)	PCU at km 88.00 (Near Ailmara)	PCU at km 132.80 (Near Harina)
2020	2,162	299	334
2025	2,750	368	423
2030	3,500	451	532
2035	4,457	559	666
2040	5,673	696	854

Source: DPR

DhwaniPRO model is used for noise modeling and predicted noise levels are presented in the next Table and **Figures**.

Table 7-55: Noise level predictions for the receptors at the homogenous intersections

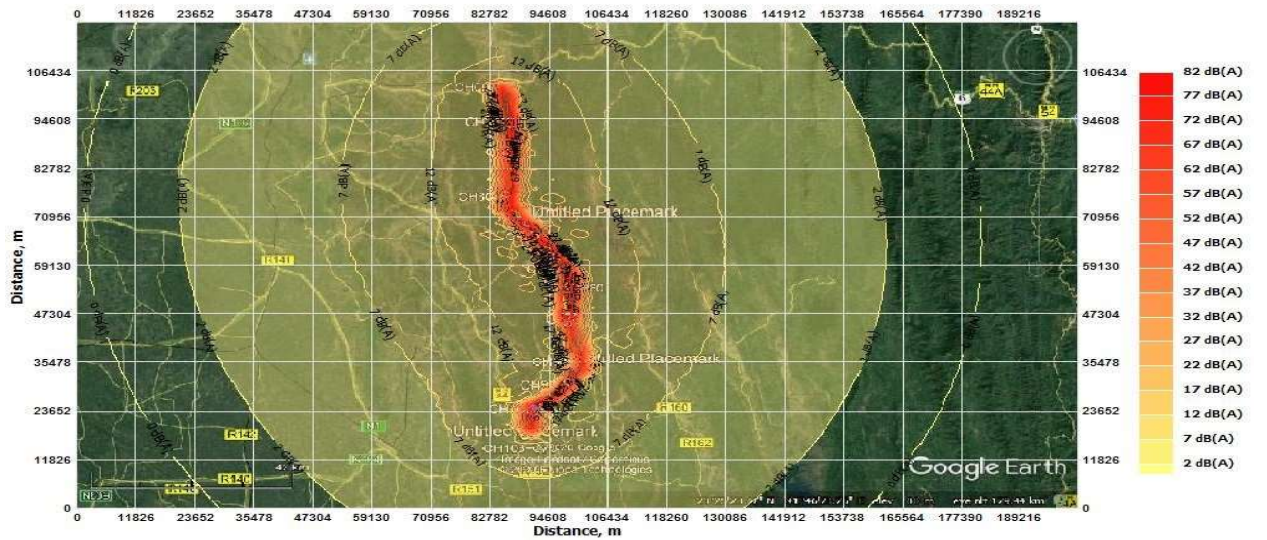
Unit: dB(A)

S.No.	Locations	2020	2025	2030	2035	2040
1	BSF camp area	31	32	33	34	35
2	Taidu	35	36	37	38	39
3	Jantrana Para	32	33	34	35	36
4	Tingharia	30	31	32	33	34
5	Rangamati	36	37	38	39	40
6	Chelagangmung	31	32	33	34	35
7	Suknachari	29	30	31	32	33
8	Rupachari	30	31	32	33	34
9	Harina	32	33	34	35	36

Source: JICA Survey Team

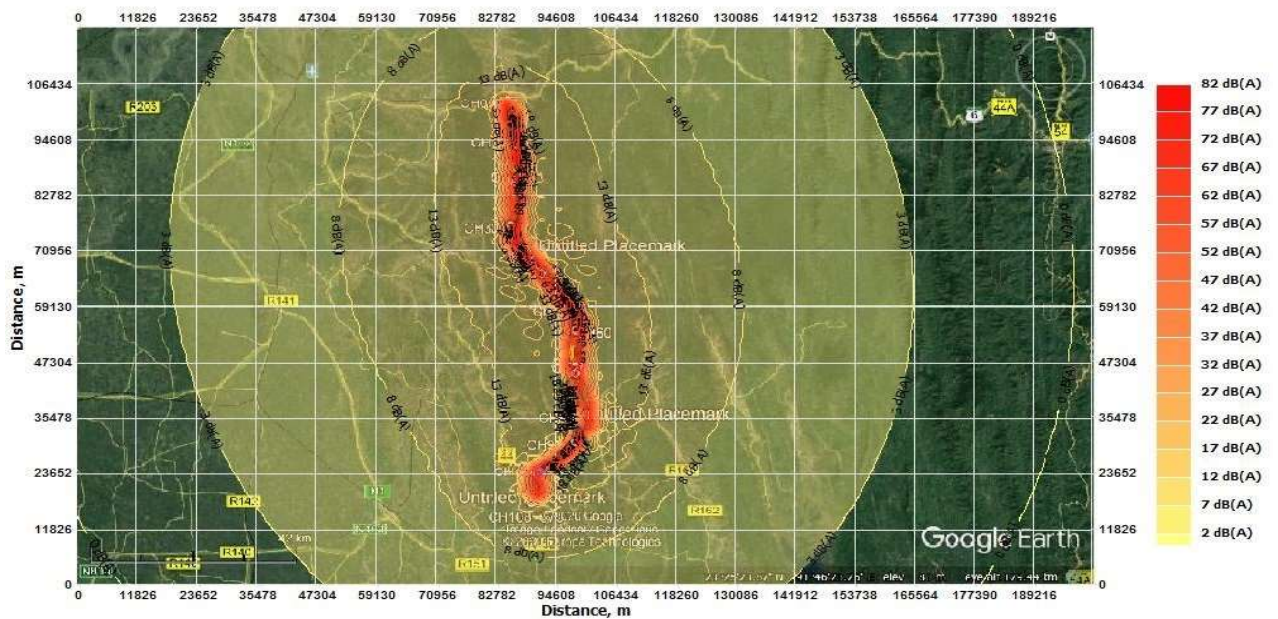
VI. Outcome of the Noise level Modelling for Section II

The outcome of the noise modeling is as follows: The predicted noise levels during both daytime and nighttime are within limit upto the end of design life of the project for all the land uses i.e., commercial, residential/rural and sensitive. The Contour map showing noise levels due to total traffic outcome at the homogenous intersections from the period of 2020 – 2040 has been shown in the following **Figures**.



Source: JICA Survey Team

Figure 7-34 Contour map showing noise levels due to total traffic outcome at the homogenous intersections of 2020 year



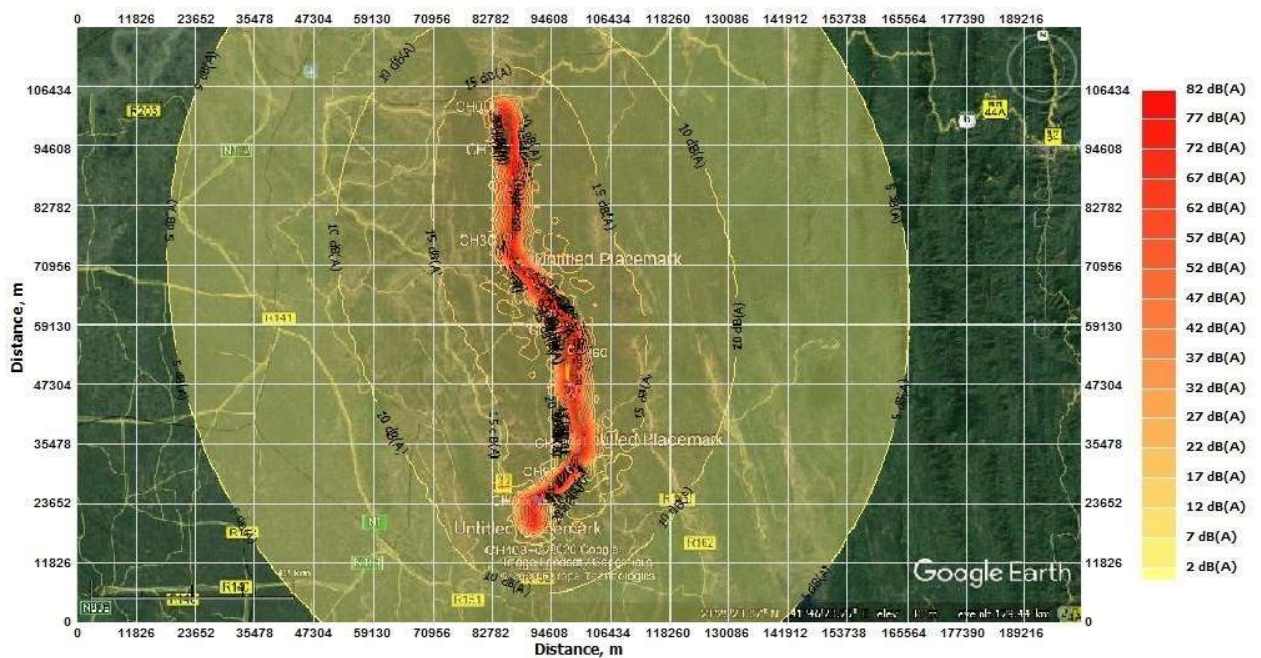
Source: JICA Survey Team

Figure 7-35 Contour map showing noise levels due to total traffic outcome at the homogenous intersections of 2025 year



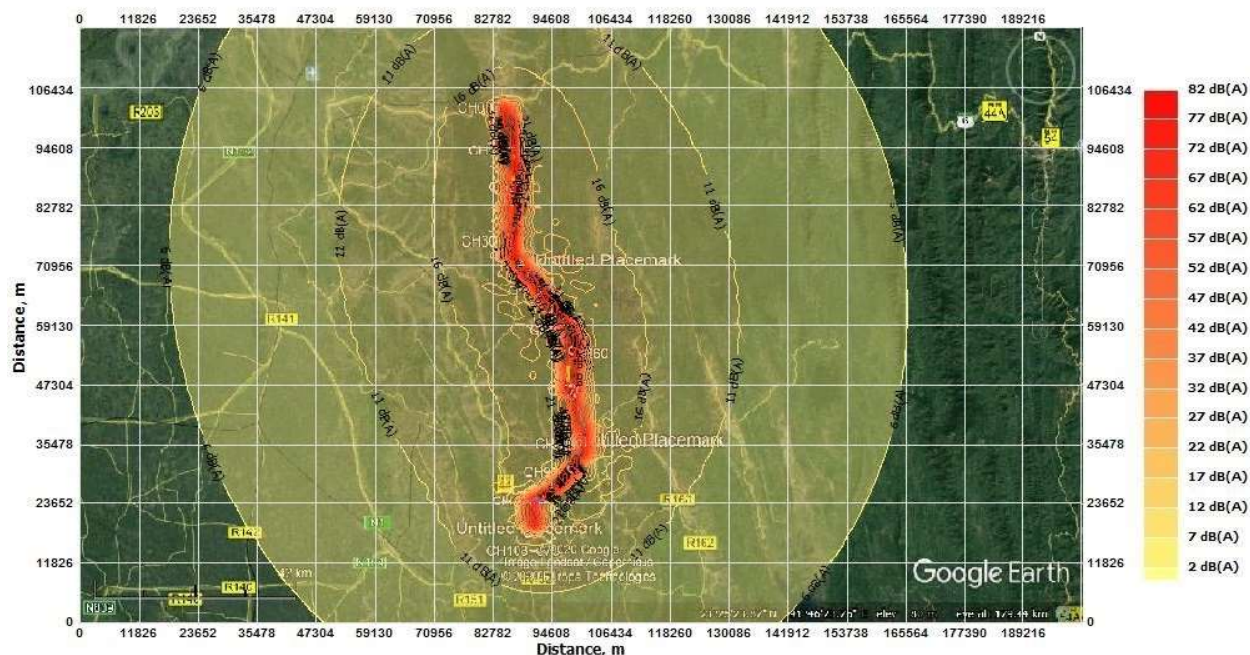
Source: JICA Survey Team

Figure 7-36 Contour map showing noise levels due to total traffic outcome at the homogenous intersections of 2030 year



Source: JICA Survey Team

Figure 7-37 Contour map showing noise levels due to total traffic outcome at the homogenous intersections of 2035 year



Source: JICA Survey Team

Figure 7-38 Contour map showing noise levels due to total traffic outcome at the homogenous intersections of 2040 year

VII. Mitigation measures to reduce Noise levels

The following are the mitigation measures to reduce noise pollution:

- Noise standards will be strictly enforced for all vehicles, plants, equipment, and construction machinery. All construction equipment used for an 8-hour shift will conform to a standard of less than 90dB (A). If required, high noise producing generators such as concrete mixers, generators, graders, etc. must be provided with noise shields.
- Machinery and vehicles will be maintained regularly, with particular attention to silencers and mufflers, to keep construction noise levels to minimum.
- Workers in the vicinity of high noise levels will be provided earplugs, helmets and will be engaged in diversified activities to prevent prolonged exposure to noise levels of more than 90dB(A) per 8 hour shift.
- During construction vibratory compactors will be used sparingly within the urban areas. In case of complaints from roadside residents, the engineer will ask the site engineer to take suitable steps of restricting the work hours even further or use an alternative roller.
- Proposed tree and shrub plantations planned for avenue plantation especially close to settlements, may form an effective sound buffer during the operation stage.

(3) Water Resource and Hydrology

Water Quality Category

CPCB and MOEF&CC has shown the surface water into 5 different categories namely A, B, C, D and E (Ref: <http://cpcb.nic.in/water-quality-criteria/>) as presented in the next figure. Surface water samples taken from the Khowai and Gumti River, and also from ponds adjacent to project road located & have been compared with the standards prescribed by Central Pollution Control Board (CPCB) for Irrigation- Class E and propagation of wildlife and fisheries -Class-D. As per the categorization the surface water along the project road can be classified as Category D. We will discuss the water quality according to this table.

Table 7-56: Categorization of Surface Water by CPCB and MOEF&CC

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	<ul style="list-style-type: none"> Total Coliforms Organism MPN/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20C 2mg/l or less
Outdoor bathing (Organised)	B	<ul style="list-style-type: none"> Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	<ul style="list-style-type: none"> Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Propagation of Wild life and Fisheries	D	<ul style="list-style-type: none"> pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	<ul style="list-style-type: none"> pH between 6.0 to 8.5 Electrical Conductivity at 25C micro mhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l

Source: JICA Survey Team

Surface Water

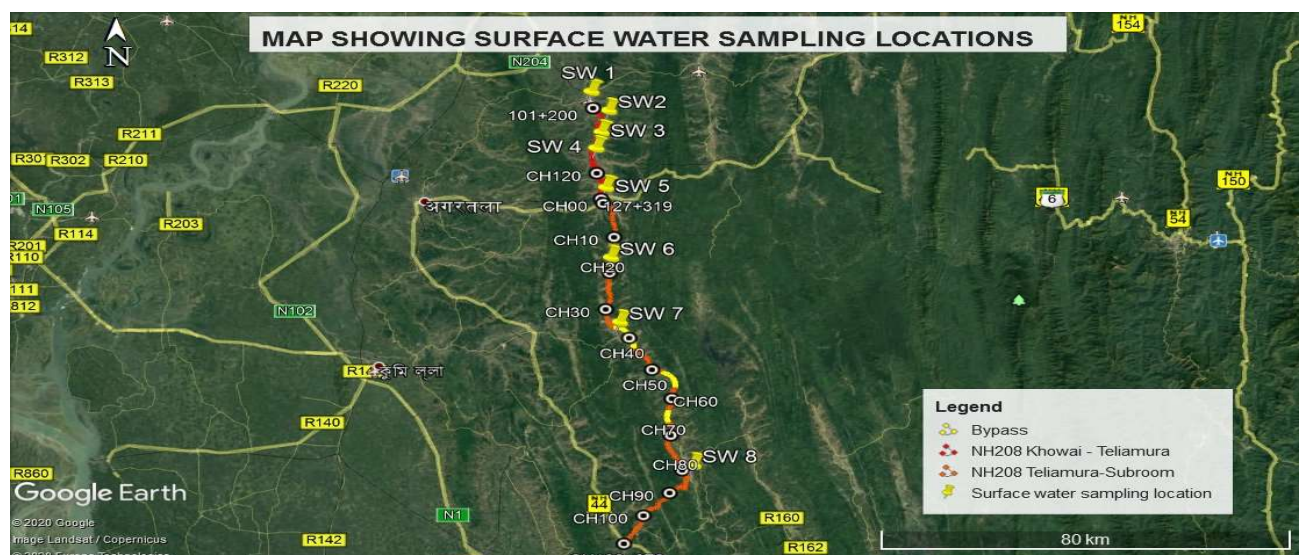
Surface water includes drainage channels (eg. rivers, streams, and canals) and stagnant water bodies (eg. lakes, ponds, tanks and other impounded water bodies). A highway project can significantly alter the hydrological setting of the project area by acting as an impediment to the natural drainage system of the region. It is, therefore, essential that all surface water resources and their characteristics be identified and examined along the project road.

The results of the samples confirm their suitability for both these purposes. Surface water quality sampling locations and map have been presented in the table and the figure below.

Table 7-57: Sampling Location Details of Surface Water

SI No.	Source	Location	Latitude	Longitude
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SW1	Khowai River	Khowai	24° 3'44.84"N	91°35'55.40"E
SW 2	Pond	Mahadevtala/ Chebri village	24° 1'6.61"N	91°37'55.13"E
SW 3	Pond	Dwarikapur	23°58'6.02"N	91°37'4.10"E
SW 4	Pond	Kalyanpur	23°55'53.12"N	91°36'28.12"E
SW 5	Pond	Teliamura	23°50'23.98"N	91°37'35.18"E
SW 6	River	Near Tingharia	23.677856°	91.635847°
SW 7	Gumti river	Near Rangamati bridge	23.528601°	91.652791°
SW 8	Pond	Near Sukhnachari	23.197497°	91.792533°



Source: JICA Survey Team made from google map

Figure 7-39: Surface water Monitoring Locations

Results of the surface water quality in the project area have been summarized in the next table.

Table 7-58: Analytical Result of Surface Water Quality⁵⁴ along the Project Road

Parameters	Locations					Standards Limit as per IS:2296 Class 'C'	
	Pond at Teliamura	Pond at Kalyanpu r	Pond at Dwarikap ur	Pond at Mahadevt ila	Khowai River	Limit as per IS:2296 Class 'C'	WHO standards*1
Physical							
pH	6.9	6.8	6.9	6.8	6.7	6.5-8.5	6.5-8.5
Temperature	24.5	25.5	25	24.5	25.5	*	-
Colour, HU	3	3	3	3	4	300	
Turbidity (NTU)	26	24	24	22	32	*	
Total Suspended Solids	28	33	32	30	42		
Total Dissolved Solids	431	396	414	412	467	1500	
P- Alkalinity as CaCO ₃	Nil	Nil	Nil	Nil	Nil	*	
Total Alkalinity as CaCO ₃	152	142	147	157	182	*	
Chloride as Cl	18	21	19	24	12	600	250
Sulphate as SO ₄	197	186	191	182	168	400	250
Nitrate as NO ₃	0.8	0.9	1.1	0.9	0.2	50	50
Fluride as F	<0.4	<0.5	<0.5	<0.4	<0.3	1.5	1.5
Total Hardness as CaCO ₃	98	90	94	94	106	*	
Calcium Hardness as CaCO ₃	54	50	52	56	66	*	100

⁵⁴Disclaimer: Although MoEF/CPCB does not recommend conduct of environmental monitoring during 15th June to 30th September in India. However this particular project is being developed in accordance with the JICA requirement, Terms of Reference for which require collection and compilation of baseline environmental status during this project (July 2020). Accordingly this collected baseline data is not prescribed to be used for compliane against Indian statutory requirement

Magnesium Hardness as CaCO ₃	44	40	42	38	40	*	50
Dissolve Oxygen	5.4	5.8	5.6	5.6	6.8	4	
COD	18	20	16	18	14	*	
BOD (3days at 27°C)	4.2	4.8	4.6	4.8	5.8	3	-
Total Kjeldahl Nitrogen as N	2.3	2.8	1.9	2.1	1.7	*	-
Sodium as Na	15	12	13	13	24	*	50
Potassium as K	2	2	2	2	3	*	20
Silica as SiO ₂	12	12	11	12	16	*	
Heavy Metals							
Iron as Fe	0.9	0.8	0.8	0.8	1.1	5	0.3-1.0
Manganese as Mn	<0.07	<0.07	<0.08	<0.07	<0.05	*	0.1-0.5
Total Chromium as Cr	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	
Lead as Pb	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	0.01
Zinc as Zn	0.1	0.1	0.1	0.1	0.2	15	0.01-3
Cadmium as Cd	<0.001	<0.001	<0.001	<0.001	<0.001		0.003
Copper as Cu	<0.01	<0.01	<0.01	<0.01	<0.01		2
Nickel as Ni	<0.01	<0.01	<0.01	<0.01	<0.01		0.07
Arsenic as As	<0.001	<0.001	<0.001	<0.001	<0.001	0.2	0.01
Selenium as Se	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	
Cyanide as CN	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	
Mercury as Hg	<0.001	<0.001	<0.001	<0.001	<0.001		
Others							
Oil & Grease	<0.01	<0.01	<0.01	<0.01	<0.01	0.1	
Phenolic Compound as C ₆ H ₆ OH	<0.01	<0.01	<0.01	<0.01	<0.01	0.005	
Coliform Organisms (MPL/100ml)	2.2X90	2.2X90	2.2X90	2.2X90	2.2X120	5000	

Parameters	Location			Standards	
	Local River Near Tingharia Village	Pond water Near Sukhnachari	Gomti river near Rangamati bridge	Limit as per IS:2296 Class 'C'	WHO standards*1
Physical					
pH	7.58	7.42	7.55	6.5-8.5	
Temperature	25.2	26.4	25.5	*	
Colour, HU	4.2	5.0	2.2	300	
Odour					
Turbidity (NTU)	5	6	4	*	
Total Suspended Solids	18	20	17		
Total Dissolved Solids	381	384	375	1500	
Chemical					
P-Alkalinity as CaCO ₃	Nil	Nil	Nil	*	
Total Alkalinity as CaCO ₃	118	120	117	*	
Chloride as Cl	16.2	18.5	14.6	600	250
Sulphate as SO ₄	186	188	184	400	250
Nitrate as NO ₃	0.02	0.03	0.02	50	50
Fluoride as F	<0.6	<0.8	<0.5	1.5	1.5
Total Hardness as CaCO ₃	289	282	266	*	
Calcium Hardness as CaCO ₃	50	55	48	*	100
Magnesium Hardness as CaCO ₃	40	42	36	*	50
Dissolve Oxygen	6.0	5.5	6.45	4	
COD	12	15	14	*	
BOD (3days at 27°C)	3.2	4.5	3.0	3	
Total Kjeldahl Nitrogen as N	2.8	3.0	2.5	*	

Sodium as Na	16	18	15	*	50
Potassium as K	2.8	3.0	2.4	*	20
Silica as SiO ₂	10	12	9.8	*	
Heavy Metals					<0.01
Iron as Fe	0.8	0.9	0.6	5	0.3-1.0
Manganese as Mn	<0.06	<0.07	<0.05	*	0.1-0.5
Total Chromium as Cr	<0.01	<0.01	<0.01	0.05	
Lead as Pb	<0.01	<0.01	<0.01	0.1	0.01
Zinc as Zn	0.2	0.3	0.2	15	0.01-3
Cadmium as Cd	<0.001	<0.001	<0.001		0.003
Copper as Cu	<0.01	<0.01	<0.01		2
Nickel as Ni	<0.01	<0.01	<0.01		0.07
Arsenic as As	<0.001	<0.001	<0.001	0.2	0.01
Selenium as Se	<0.01	<0.01	<0.01	0.05	
Cyanide as CN	<0.01	<0.01	<0.01	0.05	
Mercury as Hg	<0.001	<0.001	<0.001		
Others					
Oil & Grease	<0.01	<0.01	<0.01	0.1	
Phenolic Compound as C ₆ H ₆ OH	<0.01	<0.01	<0.01	0.005	
Total Coliform (MPL/100ml)	234	345	228	5000	

Source: JICA Survey team

Note: *1 WHO Guidelines for drinking water 2017

Ground Water

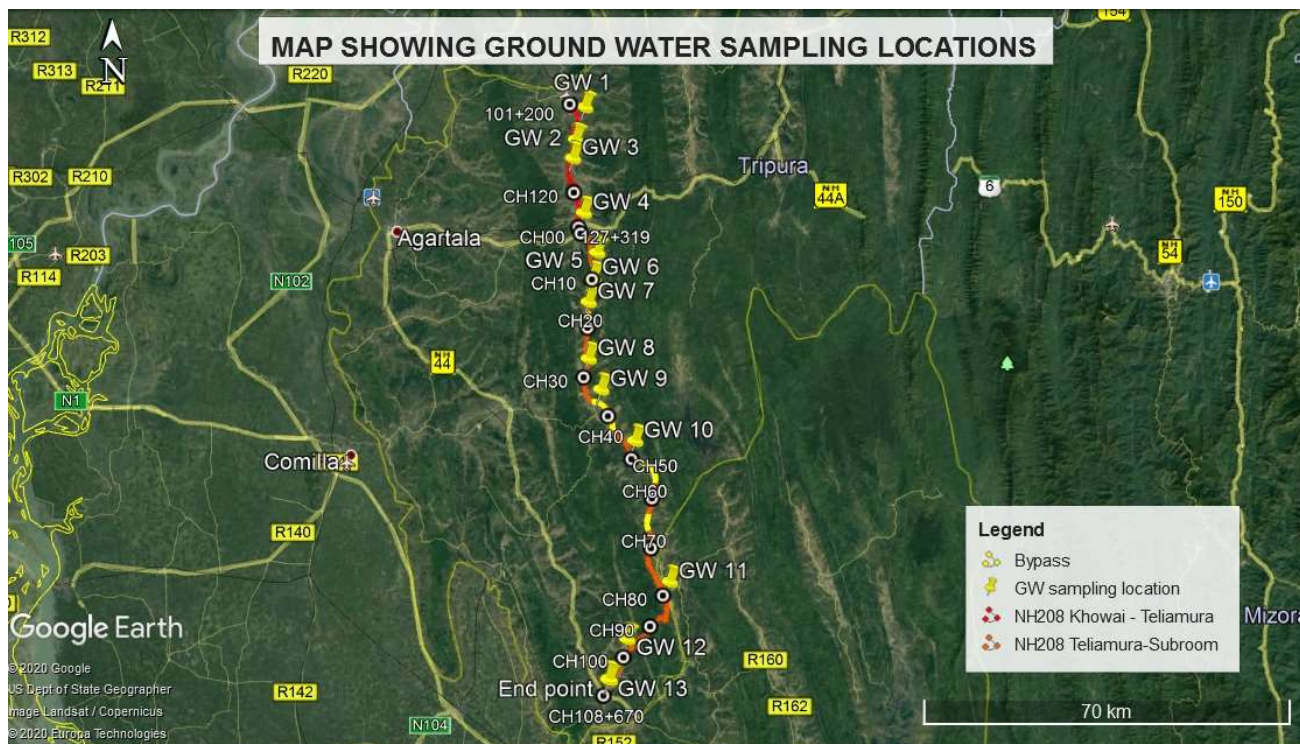
In shallow aquifer ground water occurs under unconfined and semi-confined to confined conditions. In major part of the area ground water occurs under unconfined condition in shallow depth. Ground water occurs under confined condition within shallow depths in small isolated zones, e.g., in central and eastern part of Matabari block, in central part of Kakraban block, in northern part (Rajapur - Kanchannagar area) of Bagafa block, in Srirampur area of Rajnagar block, in the southern part (Jalefa - Harina area) of Satchand block. In deeper aquifers ground water occurs under semi-confined to confined conditions. Ground water occurs under artesian condition in Teliamura, Dhuptali, Rajnagar, Muhuripur, Charakbai, East Pipariakhola, Fulkumari and Satchand area.

In the study area hand pump and bore well have been made to trap underground water. Ground water samples have been collected from thirteen locations to assess drinking water quality of the project area. Table 7-59 shows the sampling locations. All the thirteen samples confirm (Table 7-60) suitability of the ground water for drinking purpose.

Table 7-59 Groundwater quality sampling locations

Sl. No.	Location	Latitude	Longitude
GW1	Mahadevtala/Chebri village	24° 1'9.24"N	91°37'49.04"E
GW 2	Dwarikapur	23°57'49.93"N	91°36'46.77"E
GW 3	Kalyanpur	23°55'55.46"N	91°36'26.43"E
GW 4	Teliamura	23°50'19.71"N	91°37'38.26"E
GW 5	BSF camp area	23°46'15.45"N	91°39'06.88"E
GW 6	Taidu	23°43'40.73"N	91°38'38.50"E
GW 7	Jantana Pada	23°41'11.55"N	91°38'08.14"E
GW 8	Tingharia	23°35'24.57"N	91°38'07.26"E
GW 9	Rangamati	23°32'14.75"N	91°39'29.69"E
GW 10	Chelagangmung	23°26'59.14"N	91°43'15.00"E
GW 11	Suknachari	23°21'21.42"N	91°47'11.73"E
GW 12	Rupachari	23° 6'40.35"N	91°42'18.67"E
GW 13	Harina	23°02'25.68"N	91°40'13.09"E

Source: JICA Survey Team



Source: JICA Survey Team

Figure 7-40 Groundwater quality sampling locations

Table 7-60 Ground Water Quality of the Project Area

Sl. No.	Location	Source	EC	HCO ₃	Cl	Ca	Mg	TH as CaCO ₃	Na	K
	Unit		1/4S/cm 25°C	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
1	Mahadevtala	Hand	222	59	17	43	28	71	37	4.6
2	Dwarikapur	Hand pump	204	57	19	46	27	73	34	4.2
3	Kalyanpur	Hand pump	240	58	20	45	29	74	40	4.4
4	Teliamura	Hand pump	234	60	17	42	28	70	39	4.6
5	BSF camp area	Bore well	308	44	42	28	16	168	14	2.1
6	Taidu	Bore well	312	48	38	32	17	145	16	3.2
7	Jantana Pada	Hand pump	309	46	40	30	18	155	17	2.5
8	Tingharia	Bore well	318	42	36	34	16	147	18	3.0
9	Rangamati	Bore well	308	45	39	36	17	156	16	2.6
10	Chelagangmung	Bore well	312	40	35	32	15	142	17	2.4
11	Suknachari	Bore well	316	44	38	35	14	166	15	2.8
12	Rupachari	Hand pump	310	40	16	38	22	167	18	2.6
13	Harina	Hand pump	306	41	15	40	18	158	16	3.2
	Limit as per IS:2296 Class 'C'				1000 max	200 max	100 max		-	-
	WHO guideline				250	100	50		50	20

Source: JICA Survey Team

Note: WHO guidelines for drinking water 2017/

Impacts expected during the construction and operation time

Siltation and Deterioration in Surface Water Quality:

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.

Extraction of sand from the riverbed will increase turbidity and affect propagation of fishes and other aquatic life mainly benthic organisms. The macro-benthic life which remains attached to the riverbed material may get dislodged and carried away downstream by turbulent flow. Mining and dredging activities, poorly planned stockpiling and uncontrolled dumping of overburden, and chemical/fuel spills from equipment's and machinery involved in dredging may cause deterioration of water quality for downstream users, and poisoning of aquatic life.

As for surface water, raised roads have a weir-like effect, so turbidity is expected during rainfall. As a concrete mitigation measure, fencing (provided before the start of earthwork and installed until the slope stabilizes) is proposed during the construction period.

In addition to these, in order not to dam the water, installing the box culverts is pursued during construction and in service.

(4) Hydrology

Alteration of Surface Water Hydrology/Drainage: Alteration of Surface Water Hydrology/Drainage: Diversion of major streams due to construction is expected.

In section I, total 15 bridges exist on project alignment, 13 existing minor bridges, 01 major bridge is proposed for reconstruction and 1 existing bridges is retained due to realignment. Total 32 existing culverts are proposed for reconstruction and 14 new culverts are proposed in entire length.

In section II, total 32 bridges exist on project alignment in which 1 existing bridge is proposed for reconstruction, 31 existing bridges are retained due to realignment and 59 additional new bridges are proposed on the realignment & bypass. Total 258 culverts exist on project alignment in which 28 culverts are proposed for reconstruction. 230 culverts are retained due to proposal of realignments /bypasses. 306 new culverts are proposed in entire length as balancing culverts.

The change in distribution, movement, balance will occur due to the construction of the culverts.

(5) Soil

The soil type of the state of Tripura can be classified in five major groups. They are reddish yellow brown sandy soils, red loam and sandy loam soils, older alluvial soils, younger alluvial soils and lateritic soils. Among these soil categories, reddish yellow brown sandy soil covers approximately 33 percent of the total geographic area and distributed along north-south axis of Tripura. Red loam and sandy loam soil covers 43.07 percent of total soil cover in state of Tripura. This soil type is associated with forest ecosystem and rich in nutrients. Older alluvial soil type

covers 10 percent of total soil cover in Tripura and found mainly in river terraces and in high plains. Approximately 9 percent of the state's soil cover is constituted by younger alluvial soil. This type of soil is confined to the flood plains of river such as Khowai, Gumti etc. This nutrient rich soil type is composed of clay loam and loam. Soil quality sampling locations have been provided in table below.

Table 7-61 Soil quality sampling locations

S. No.	Locations	Latitude	Longitude
SQ1	Dwarikapur	23°57'32.34"N	91°36'45.78"E
SQ 2	Kalyanpur	23°55'48.00"N	91°36'24.71"E
SQ 3	Teliamura (NH44)	23°50'24.46"N	91°37'40.05"E
SQ 4	BSF camp area	23°46'15.45"N	91°39'06.88"E
SQ 5	Taidu	23°43'40.73"N	91°38'38.50"E
SQ 6	Jantana Pada	23°41'11.55"N	91°38'08.14"E
SQ 7	Tingharia	23°35'24.57"N	91°38'07.26"E
SQ 8	Rangamati	23°32'14.75"N	91°39'29.69"E
SQ 9	Chelagangmung	23°26'59.14"N	91°43'15.00"E
SQ 10	Suknachari	23°21'21.42"N	91°47'11.73"E
SQ 11	Rupachari	23° 6'40.35"N	91°42'18.67"E
SQ 12	Harina	23°02'25.68"N	91°40'13.09"E

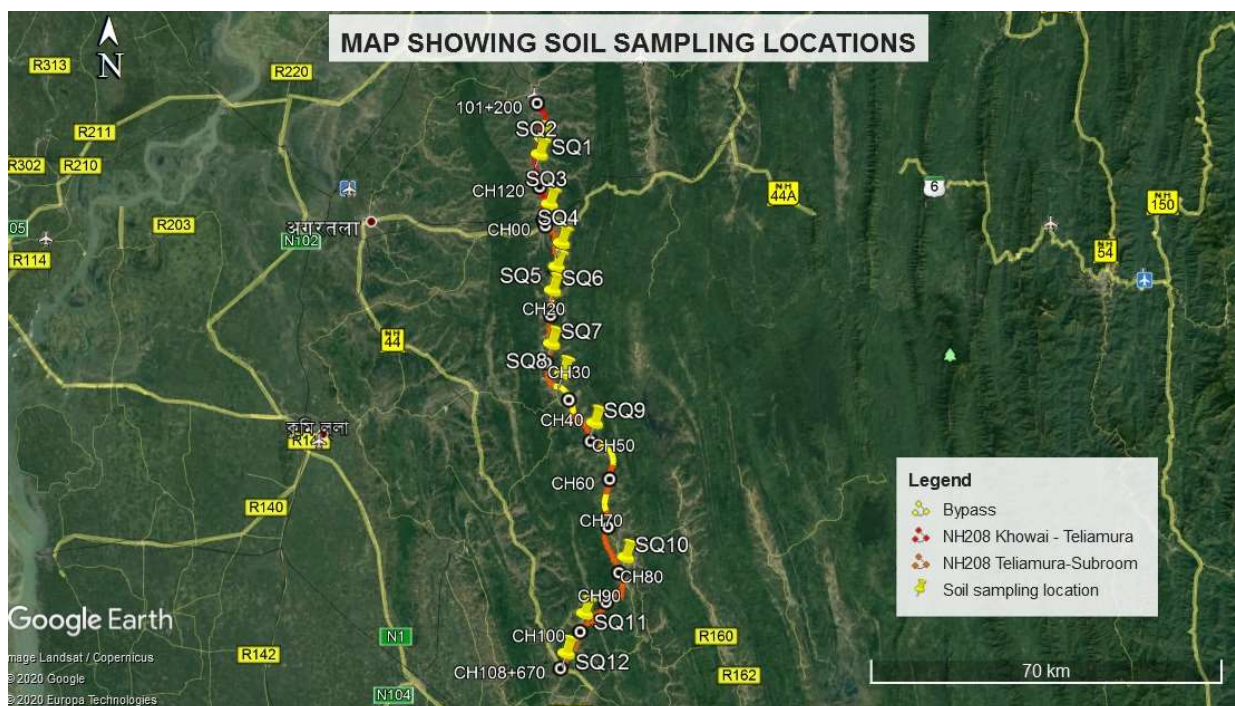


Figure 7-41 Soil quality sampling locations

Table below presents Physical-Chemical Characteristics of Soil at various locations. Approximately 5 percent of the state's total soil cover comes under "lateritic soil" which is very poor in nutrient content. This can be recognized along the western boundary of the state of Tripura. Soils of Tripura have been grouped into five soil reaction classes viz. extremely acidic (<4.5 pH)-10%, very strongly acidic (4.6-5.0)-26%, strongly acidic (5.1-5.5) - 54% and medium (5.6-6.0)-8% and slightly acidic (6.1-6.5)-2%. The results are given in table below. It is observed from the soil analysis result that the soil quality of project road meets the requirement of ICAR for agriculture purposes.

Table 7-62 Physical-Chemical Characteristics of Soil

Sl.	Parameters	Dwarikapur	Kalyanpur	Teliamura	BSF	Taidu	Jantana	Tingharia	Rangamati	Chelagangmung	Suknachari	Rupachari	Hrina
1	Soil Texture	Sandy Loam	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy	Sandy Loam	Sandy	Sandy	Sandy
	Grain Size (%)	100	100	100									
	a) Sand	41	44	46	40	48	40	41	47	44	45	42	43
	b) Silt Content	40	35	36	36	32	33	35	33	35	35	34	36
2	c) Clay Content	19	21	18	24	20	27	24	20	21	20	24	21
3	Porosity (%)	20	21	26	22	23	20	22	24	21	22	23	21
4	Bulk Density (g/cm ³)	1.49	1.5	1.48	1.42	1.36	1.44	1.36	1.38	1.32	1.45	1.42	1.48
5	pH	5.5	4.7	5.8	5.8	6.0	5.9	5.8	6.2	5.8	5.6	5.8	6.7
6	Elect. Conductivity (m-	0.34	0.35	0.35	0.36	0.38	0.35	0.36	0.37	0.38	0.35	0.36	0.38
7	Water Holding Capacity	39	42	39	42	38	40	41	35	40	42	39	41
8	Liquid Limit (%)	25.6	24.6	21.6	21.2	21.4	20.3	21.5	21.4	20.6	21.2	21.8	21.4
9	Plastic Limit (%)	13.2	13.1	13.5	13.0	11.8	14.6	13.0	12.7	13.0	12.8	12.0	11.8
10	Infiltration Rate (%)	2.7	2.7	2.8	2.6	2.9	2.8	2.6	2.4	2.5	2.8	2.7	2.6
11	Field Capacity (%)	8.2	8.2	8.3	8.2	8.4	8.2	8.0	8.2	8.3	7.4	8.5	8.6
12	Wilting Co-efficient (%)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
13	Available Magnesium	16	15	17	20	18	17	20	22	19	20	22	17
14	Organic Carbon (%)	0.39	0.49	0.38	0.38	0.26	0.44	0.39	0.27	0.42	0.45	0.44	0.42
15	Sodium Absorption	0.33	0.34	0.38	0.34	0.35	0.32	0.33	0.32	0.36	0.35	0.34	0.38
16	Carbon Exchange	6.7	6.5	7.2	7.0	7.5	7.4	7.0	7.2	7.0	7.6	7.5	7.8
17	Nitrogen as N (kg/Ha)	219	221	245	230	232	236	237	234	235	238	235	238
18	Phosphorous as P ₂ O ₅	7.1	6.7	7.1	7.4	7.8	7.5	7.5	7.6	7.4	7.8	7.5	7.6
19	Potash as K ₂ O (kg/ha)	109.5	122.5	125.5	102.8	105.2	106.7	103.4	102.3	105.5	103.4	104.2	105.6

Source: JICA Survey Team

Loss of Productive Soil and Change in Land use:

Proposed project road shall be passing through agriculture and forest land in realignment and bypass portion. This will lead to acquisition of substantial quantity of land. Hence, agricultural yield of the area is likely to be affected.

Mitigation Measures

- The top soil from the productive land if required shall be preserved and reused for plantation purposes. It shall also be used as top cover of embankment slope for growing vegetation to protect soil erosion.
- It shall be ensured that the land taken on lease for access road, borrow areas, construction camp is restored back to its original land use.

Soil Erosion/Silt Runoff: Soil erosion may take place near cutting areas, at steep and uncompact embankment slope, and wherever vegetation is cleared. Soil erosion may have cumulative effect viz. siltation, embankment damage, drainage problem etc. Loss of soil due to run off from earth stock-piles may also lead to siltation.

(6) Construction Debris and Waste

Muck/Debris is likely to be generated since dismantling of existing pavement is involved. The muck will also be generated during construction of road section. According to DPR, 3,051,447 m³ of muck will be generated in the project. The disposal locations have not been identified till date and are under process. All the muck generated will be disposed as per Construction and Debris Waste Management rule 2016.

Table 7-63 Quantity of Earthwork (Borrow area earth / Muck Disposal) (m3)

To Km Cut Qty

Packages	From Km			Fill Qty	Borrow Earth	Muck Disposal
1	1.0	18.0	424,706	248,452	0	176,254
2	18.0	36.0	837,955	905,139	67,184	0
3	36.0	54.0	476,171	914,552	438,380	0
4	54.0	72.0	819,282	658,689	0	160,593
5	72.0	90.0	1,351,520	566,986	0	784,534
6	90.0	108.0	2,563,787	633,721	0	1,930,066
	Total Quantity....		6,473,422	3,927,539	505,564	3,051,447
	Earth fill from Road cut				3,421,975	
	Disposed Qty					3,051,447

Source: JICA Study Team

(7) Topography and Geology

Topography and aesthetics: Activities like (i) Clearing of vegetation (ii) Cutting of highland (iii) Waste/Debris disposal and (iv) Establishment of labour camps change the topography and appearance of the landscape will damage the present scenery.

Following mitigation measures to overcome the issue.

- Cut materials should be used in road embankment or disposed-off in environmentally acceptable manner.
- Cut slopes should be re-vegetated immediately after widening activities
- Borrow areas, if required should be rehabilitated and brought back as far as possible to their previous appearance. Some borrows shall be converted into ponds to compensate loss of water bodies. This will also enhance the local aesthetics
- Cut off material should be used to widen the road or disposed of at proper disposal sites
- Provision and allocation of proper waste disposal bins and sites are required. Supply of cooking gas should be provided by the contractor to eliminate the use of firewood.

Loss of Productive Soil and Change in Land use: Proposed project road shall be passing through agriculture and forest land in realignment and bypass portion. This will lead to acquisition of substantial quantity of land. Hence, agricultural yield of the area is likely to be affected.

Mitigation Measures

- The top soil from the productive land if required shall be preserved and reused for plantation purposes. It shall also be used as top cover of embankment slope for growing vegetation to protect soil erosion.
- It shall be ensured that the land taken on lease for access road, borrow areas, construction camp is restored back to its original land use.
- Land slide and land erosion area will be corrected to fit the standard of the safety and it might change the topography slightly.

7.6.2 Natural Environment

(1) Ecosystem

Representative examples of usages of biodiversity by the inhabitants in the project area are illustrated in the next Figures. The taxonomic details of floral and faunal biodiversity in land-based and water-based ecosystems in the project site are enumerated in the next Tables. The economic importance of major species is detailed in the next Table.





Figure 7-42 Biodiversity usages for human consumption in the project site



Figure 7-43 Biodiversity in wild landscape (from top to bottom-wild flora along the rural road, interaction about local use of wild biodiversity with the local person, biodiversity along NH208)

Source: EIS

(2) Sensitive Area

No sensitive ecological habitats or ecosystems i.e Wildlife Sanctuary, National park, Ramsar Site, Important Bird Area, Wildlife Corridor, Tiger reserve, in the indirect influence area (above 10km buffer zone).

(3) Flora and Fauna Survey methodology

Field Survey

A phased and consultative approach was followed to carry out the ecological and biodiversity assessment during monsoon season in August-September, 2020. The successive phases include: (i) reconnaissance survey, (ii) on-site primary data collection for flora and fauna using standardised ecological methods, and (iii) secondary data collection through review of available literature (published and memiographic, and electronic media). Wherever necessary, the desired information was collected/substantiated through formal and informal interactions/discussions with the field staff of the line department, revenue authorities at village level, local inhabitants and natural resource users.

The vegetation of terrestrial ecosystem was classified following Champion and Seth (1968) for forest types and Dabadghao and Shankarnarayana (1973) for grassland types.

The floristic composition (floral biodiversity) of terrestrial ecosystem was studied through field visits and using quadrat method as per need. Both the angiospermic and non-angiospermic flora were recorded using random sampling and identified following published taxonomic literature and by consulting the professionals of relevant study area. The phytosociological attributes could not be studied on account of very dense growth of vegetation with complete cover of the ground. For aquatic ecosystems, the phytoplanktons, zooplanktons and macrophytes were studied upto species level.

For biodiversity analysis of fauna, transect method was followed. The timing is during August-September, 2020, which is the wet and humid season. The dry season data were based on the additional information for fish species, avifauna and mammals which was collected from local people, local market and working plan of the Forest Department. The status of the plant and animal species, such as, endemic, rare, endangered and threatened, etc., is reported following IUCN Red list of RET species, Red Data Book of BSI, Wildlife (Protection) Act, 1972 and as per local availability.

In order to understand the composition of vegetation, most of the plant species were identified in the field itself whereas in case of the species that could not be identified at the site, a herbarium specimen of the same was collected without uprooting the plant, and additionally their photographs were also taken wherever necessary for identification later with the help of available published literature and flora of the region.

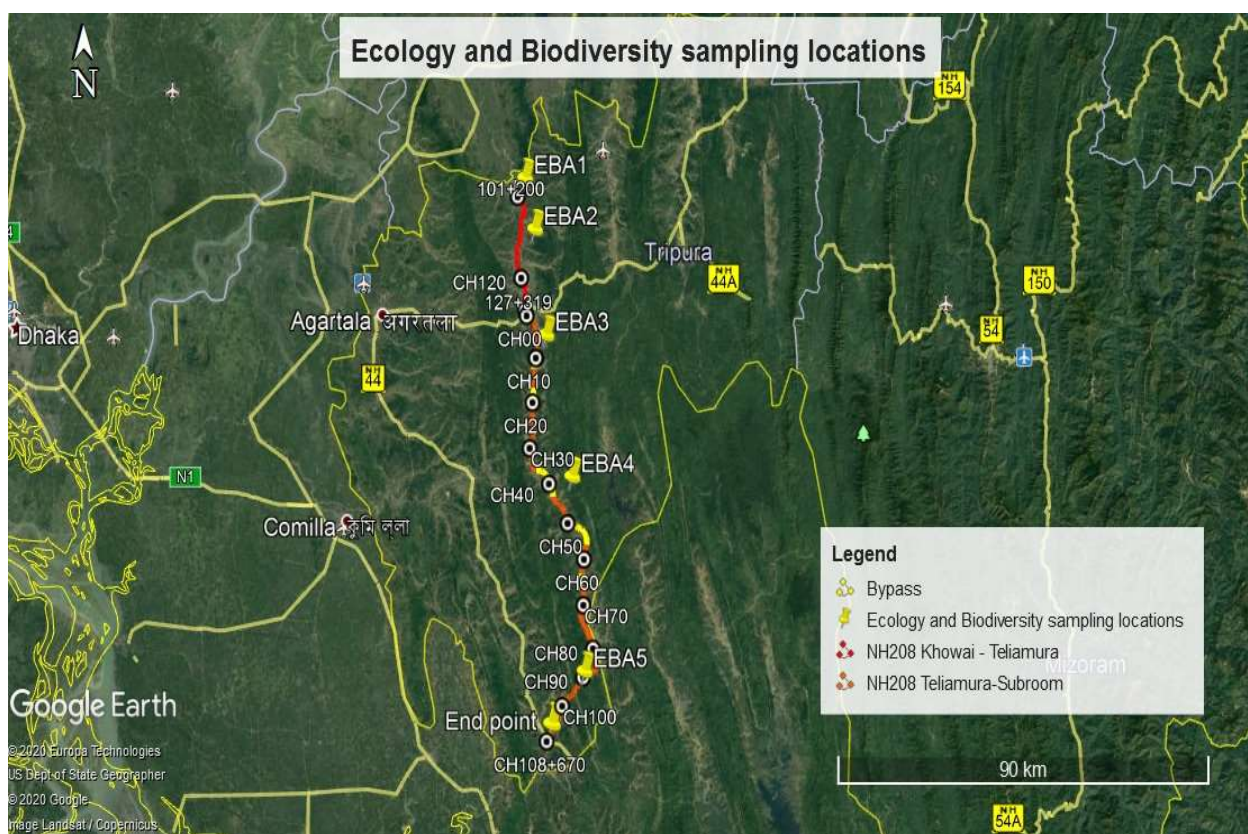
Analysis of existing flora and fauna (as described hereunder) indicates almost negligible presence of threatened and endangered species of plants and animals. Local availability (based on field visits and interactions with the inhabitants) for each species of plant and animal has been indicated in each checklist which is an indicative of abundance and dominance of the existing species.

Sampling locations are as below in the next table and the Map showing ecology and biodiversity sampling locations in the next figure.

Table 7-64 Ecology and Biodiversity sampling locations

S.No.	Names	Latitude	Longitude
EBA1	Near Khowai	24° 3'16.11"N	91°37'4.22"E
EBA2	Durgapur	23°57'34.47"N	91°38'24.07"E
EBA3	Jambuk Chhara	23°45'47.41"N	91°39'54.90"E
EBA4	Dalak	23°30'2.19"N	91°43'24.95"E
EBA5	Bishnupur	23° 8'8.70"N	91°45'26.54"E

Source : JICA Survey Team



Source : JICA Survey Team

Figure 7-44 Map showing ecology and biodiversity sampling locations

Literature Review

On top of the field survey, the literature review in the area of 10 km radius has been done to supplement the study.

Expert Interview

During the field survey, local expert interviews are pursued to supplement the study.

(4) Flora in Study Area

The non-flowering plant species found in the study area are having availability common and very common in nature except *Marchantia* spp. which has a rare availability in the study area. However, project activities have no significant impact on this species.

Table 7-65: Major non-flowering plant species in the Project Site

S. NO.	SCIENTIFIC NAME	LOCAL/ENGLISH NAME	FAMILY	LOCAL AVAILABILITY	IUCN CATEGORY
(A) BRYOPHYTES					
1	<i>Funaria spp.</i>	?	Funariaceae	Common	-
2	<i>Marchantia spp.</i>	?	Marchantiaceae	Rare	-
3	<i>Plagiochasma spp.</i>	?	Plagiochasmaceae	Common	-
4	<i>Riccia spp.</i>	?	Ricciaceae	Common	-
(B) PTERIDOPHYTES					
1	<i>Adiantum sp.</i>	?	Adiantaceae	Common	-
2	<i>Pleopeltis sp.</i>	?	Pleopeltaceae	Common	-
3	<i>Pteris sp.</i>	?	Pteridaceae	Common	-
4	<i>Pteridium spp.</i>	?	Pteridiaceae	Very common	-
(C) GYMNOSPERMS					
Not recorded					

Source : JICA Survey Team

Rare=<20% of the total population, *Common*=20-50% of the total population, *Abundant*=50-70% of the total population, *Very abundant*= >70% of the total population.

During the site visit, the type and details of Tree species (angiospermic) present in the project area has been provided in the table below. During the site visit, the survey team found that there were no trees which is of serious concern in terms of scarcity in the project area. There are 60 nos. of common, 11 nos. of very common, 3 nos. of rare and 6 nos. of abundant species of Trees in the project area.

Table 7-66: Tree species (angiospermic) recorded in the project area

S.No.	SCIENTIFIC NAME	LOCAL / ENGLISH NAME	FAMILY	LOCAL AVAILABILITY	IUCN CATEGORY
1	<i>Acacia auriculiformis</i>	?	Mimosaceae	Common	NA
2	<i>Acacia leucophloea</i>	Reonjha	Mimosaceae	Abundant	NA
3	<i>Acacia nilotica</i>	Babul	Mimosaceae	Abundant	NA
4	<i>Adina cordifolia</i>	Haldu	Rubiaceae	Common	NA
5	<i>Aegle marmelos</i>	Bel	Rutaceae	Very common	NA
6	<i>Ailanthus excelsa</i>	Maharukh	Simarubiaceae	Abundant	NA
7	<i>Albizia lebbeck</i>	Shirish	Mimosaceae	Common	NA
8	<i>Albizia lucida</i>	Sikaria	Mimosaceae	Common	NA
9	<i>Albizia procera</i>	Karai	Mimosaceae	Common	NA

10	Albizia stipulata	Harish	Mimosaceae	Common	NA
11	Alstonia scholaris	Chaitwan /Chhatni	Apocynaceae	Common	NA
12	Anthocephalus chinensis	Kadam	Rubiaceae	Common	NA
13	Anogeissus pendula	Kardhai	Combretaceae	Abundant	NA
14	Artocarpus heterophyllus	Dehua Chamal	Moraceae	Common	
15	Artocarpus lacucha	Kathal	Moraceae	Common	NA
16	Azadirachta indica	Neem	Meliaceae	Very common	NA
17	Barringtonia acutangula	Hijal	Lecythidaceae	Common	NA
18	Bauhinia purpurea	Kanchan	Caesalpiniaceae	Common	NA
19	Bauhinia racemosa	Asto	Caesalpiniaceae	Common	NA
20	Bombax ceiba	Simul	Malvaceae	Common	NA
21	Butea monosperma	Dhak; palas	Papilionaceae	Very common	NA
22	Calamus tenuis	Jalibet/Chachi bet	Arecaceae	Common	NA
23	Canarium strictum	Dhup	Burseraceae	Common	NA
24	Careya arborea	Kumbhi	Lecythidaceae	Common	NA
25	Caryota urens	Tad	Arecaceae	Common	NA
26	Cassia fistula	Sonal/Shonalu	Caesalpiniaceae	Common	NA
27	Callicarpa arborea	Banmala	Verbenaceae	Common	NA
28	Cinnamomum tamala	Tejpata	Lauraceae	Common	NA
29	Dalbergia sissoo	Shisham	Papilionaceae	Very common	NA
30	Dillenia indica	Chalta	Dilleniaceae	Common	NA
31	Dillenia pentagyna	Hargaja	Dilleniaceae	Common	NA
32	Diospyros peregrina	Kendu	Ebenaceae	Common	NA
33	Dipterocarpus turbinatus	Garjan	Dipterocarpaceae	Common	NA
34	Duabanga grandiflora	Ramdala	Sonneratiaceae	Common	NA
35	Emblica officinalis	Amla	Euphorbiaceae	Abundant	NA
36	Erythrina suberosa	Pangra	Papilionaceae	Very common	NA
37	Eucalyptus tereticornis	Neelgiri	Myrtaceae	Common	NA
38	Ficus bengalensis	Bar	Moraceae	Rare	NA
39	Ficus glomerata	Gular	Moraceae	Common	NA
40	Ficus hispida	Dumur	Moraceae	Rare	NA
41	Ficus religiosa	Aswatwa	Moraceae	Common	NA
42	Ficus tomentosa	Son pakar	Moraceae	Common	NA
43	Flacourtia indica	Kakai	Salicaceae	Common	NA
44	Garuga pinnata	Kekar	Burseraceae	Rare	NA
45	Gmelina arborea	Gamar	Verbenaceae	Common	NA
46	Grewia microcos	Pichla	Tiliaceae	Common	NA
47	Gossypium arboreum	Karpash	Malvaceae	Common	NA
48	Holarrhena antidysenterica	Sarpa Gandha	Apocynaceae	Common	NA
49	Hydnocarpus kurzii	Chalmugra	Achariaceae	Common	NA

50	Lagerstroemia parviflora	Ledi	Lythraceae	Abundant	NA
51	Lawsonia inermis	Mehandi	Lythraceae	Common	NA
52	Leucaena leucocephala	Babul	Fabeaceae	Common	NA
53	Licuala peltata	Kuruj Pat	Arecaceae	Common	NA
54	Litsea glutinosa	Garpur	Lauraceae	Common	NA
55	Mangifera indica	Aam	Anacardiaceae	Common	NA
56	Mesua ferrea	Nageswar	Guttiferae	Common	NA
57	Michelia champaca	Champa	Magnoliaceae	Common	NA
58	Machilus gamblei	Shum	Magnoliaceae	Common	NA
59	Parkia javonica	Pukya tetui	Mimosaceae	Common	NA
60	Polyalthia longifolia	Debdaru	Annonaceae	Common	NA
61	Samanea saman	Raintree	Mimosaceae	Common	NA
62	Schima wallichii	Kanak	Theaceae	Common	NA
63	Schleichera trijuga	Kusum	Sapindaceae	Very common	NA
64	Schumannianthus dichotomus	Mukta	marantaceae	Common	NA
65	Shorea robusta	Shal (Sal)	Dipterocarpaceae	Common	NA
66	Spondias pinnata	Amra	Anacardiaceae	Common	NA
67	Sterculia alata	Gorak Nerial	Sterculiaceae	Common	NA
68	Sterculia villosa	Udal	Sterculiaceae	Common	NA
69	Stereospermum personatum	Chari awal/Dharm ara	Bignoniaceae	Common	NA
70	Syzygium cumini	Kalajam	Myrtaceae	Very common	NA
71	Syzygium fruticosum	Banjam	Myrtaceae	Very common	NA
72	Tectona grandis	Sagaun	Verbenaceae	Very Common	NA
73	Terminalia arjuna	Koha	Combretaceae	Very common	NA
74	Terminalia belerica	Bahera	Combretaceae	Common	NA
75	Terminalia chebula	Harra	Combretaceae	Very common	NA
76	Terminalia myriocarpa	?	Combretaceae	Common	NA
77	Terminalia tomentosa	Saja	Combretaceae	Common	NA
78	Tetrameles nudiflora	Chandul	Passifloraceae	Common	NA
79	Ziziphus mauritiana	Kulbarai	Rhamnaceae	Common	NA
80	Ziziphus oenoplia	Bambarai	Rhamnaceae	Common	NA

Source : JICA Survey Team

Rare=<20% of the total population, Common=20-50% of the total population, Abundant=50-70% of the total population, Very abundant=>70% of the total population.

NA= not assessed yet for IUCN red list

Source: 1. <https://avibase.bsc-eoc.org/avibase.jsp>

2. <http://asbb.gov.in/>

During the site visit, the type and details of Shrubs species present in the project area has been provided in the table below. During the site visit, the survey team found that there was no shrub species which is of serious concern in terms of scarcity in the project area. There are 16 nos. of common, 04 nos. of very common and 03 nos. of abundant species in the study area.

Table 7-67 Shrub species (Angiosperms) recorded in the project area

Sl. No.	SCIENTIFIC NAME	LOCAL/ ENGLISH NAME	FAMILY	LOCAL AVAILABILITY	IUCN STATUS
1.	<i>Acacia concinna</i>	Banritha	Mimosaceae	Common	NA
2.	<i>Adhatoda vasica</i>	Adusa	Acanthaceae	Abundant	NA
3.	<i>Calotropis procera</i>	Madar	Apocynaceae	Very common	NA
4.	<i>Cassia fistula</i>	Sonal/Shonalu	Caesalpiniaceae	Common	NA
5.	<i>Cassia tora</i>	Banar	Caesalpiniaceae	Abundant	NA
6.	<i>Cissampelos pareira</i>	Akandi	Menispermaceae	Common	NA
7.	<i>Clerodendron glandulosum</i>	Banabhait	Verbenaceae	Common	NA
8.	<i>Clerodendron viscosum</i>	Bhait	Verbenaceae	Common	NA
9.	<i>Colebrookea oppositifolia</i>	Ameda	Apocynaceae	Very common	NA
10.	<i>Glycosmis arborea</i>	Kawathuti	Rutaceae	Common	NA
	<i>Jatropha curcas</i>	Ratan jyoti	Euphorbiaceae	Common	NA
11.	<i>Lagerstroemia speciosa</i>	Jarul/Gang	Lythraceae	Common	NA
12.	<i>Lantana camara</i>	Kuri	Verbenaceae	Abundant	NA
13.	<i>Melastoma malabathricum</i>	Phutki	Melastomataceae	Common	NA
14.	<i>Murraya paniculate</i>	Madhukamani	Rutaceae	Common	NA
15.	<i>Nyctanthes arbor-tristis</i>	Parijat	Nyctaginaceae	Very common	NA
16.	<i>Prosopis juliflora</i>	Kikar	Mimosaceae	Common	NA
17.	<i>Premna latifolia</i>	Jinary/Gandhapatra	Verbenaceae	Common	NA
18.	<i>Tamarix dioica</i>	Bhayo	Tamaricaceae	Very common	NA
19.	<i>Tinospora cordifolia</i>	Gulanca	Menispermaceae	Common	NA
20.	<i>Vitex negundo</i>	Nirgudi	Verbenaceae	Common	NA

Sl. No.	SCIENTIFIC NAME	LOCAL/ ENGLISH NAME	FAMILY	LOCAL AVAILABILITY	IUCN STATUS
21.	<i>Zanthoxylum limonella</i>	Bazna/Bajrang	Rutaceae	Common	NA
22.	<i>Zizyphus jujuba</i>	Ber	Rhamanaceae	Common	NA

Source : JICA Survey Team

Rare=<20% of the total population, *Common*=20-50% of the total population, *Abundant*=50-70% of the total population, *Very abundant*= >70% of the total population.

NA= not assessed yet for IUCN red list

Note: The above listed species are not included in any schedule of Wild Life (Protection) Act, 1972.

During the site visit, the type and details of Herb species present in the project area has been provided in the table below. During the site visit, the survey team found that there was no Herb species which is of serious concern in terms of scarcity in the project area. There are 12 nos. of common, 10 nos. of very common, 08 nos. of rare and 05 nos. of abundant species in the study area. However project activities do not have any significant impacts on these species as these are not found in ROW along the project alignment.

Table 7-68: Herb species (angiosperms) recorded in the project area

Sl. No.	SCIENTIFIC NAME	LOCAL/ ENGLISH NAME	FAMILY	LOCAL AVAILABILITY	IUCN STATUS
1.	<i>Achyranthus aspera</i>	Latjeera	Amaranthaceae	Abundant	NA
2.	<i>Acorus calamus</i>	Bach	Acoraceae	Very common	NA
3.	<i>Ageratum conyzoides</i>	?	Asteraceae	Very common	NA
4.	<i>Ageratum houstonianum</i>	?	Asteraceae	Abundant	NA
5.	<i>Aquilaria agallocha</i>	Agar	Thymelaeaceae	Common	NA
6.	<i>Argemone mexicana</i>	Siparkata	Papaveraceae	Common	NA
7.	<i>Asparagus filicinis</i>	Satavar	Liliaceae	Rare	NA
8.	<i>Astragalus sp.</i>	?	Caesalpiniaceae	Common	-
9.	<i>Centilla asiatica</i>	Brahmi	Apiaceae	Rare	NA
10.	<i>Curcuma angustifolia</i>	Tikhur	Zingiberaceae	Common	NA

Sl. No.	SCIENTIFIC NAME	LOCAL/ ENGLISH NAME	FAMILY	LOCAL AVAILABILITY	IUCN STATUSES
11.	<i>Cyperus rotundus</i>	Motha	Cyperaceae	Very common	NA
12.	<i>Datura metel</i>	Datura	Solanaceae	Rare	NA
13.	<i>Datura stramonium</i>	Datura	Solanaceae	Rare	NA
14.	<i>Desmodium pulchellum</i>	Chipati	Papilionaceae	Abundant	NA
15.	<i>Dicliptera bupleuroides</i>	?	Acanthaceae	Very common	NA
16.	<i>Euphorbia emodi</i>	?	Euphorbiaceae	Common	NA
17.	<i>Euphorbia hirta</i>	?	Euphorbiaceae	Common	NA
18.	<i>Fimbristylis dichotoma</i>	?	Cyperaceae	Very common	NA
19.	<i>Gloriosa superba</i>	Karihari	Liliaceae	Rare	NA
20.	<i>Medicago spp.</i>	?	Papilionaceae	Common	-
21.	<i>Mimosa pudica</i>	Chhui mui	Mimosaceae	Common	LC
22.	<i>Musa spt.</i>	Kela	Musaceae	Very common	-
23.	<i>Nyctanthes arbor-tristis</i>	Parijati	Oleaceae	Rare	NA
24.	<i>Ocimum sanctum</i>	Bantulsi	Lamiaceae	Common	NA
25.	<i>Oxalis corniculata</i>	?	Oxalidaceae	Very common	NA
26.	<i>Parthenium hysterophorus</i>	Gajar ghas	Asteraceae	Abundant	NA
27.	<i>Picirus spp.</i>	?	Cyperaceae	Common	-
28.	<i>Plumbago zeylanica</i>	Chitawar	Plumbaginaceae	Very common	NA
29.	<i>Sida acuta</i>	Kareta	Malvaceae	Common	NA
30.	<i>Solanum nigrum</i>	Bhatkatya	Solanaceae	Very common	NA
31.	<i>Sonchus asper</i>	?	Asteraceae	Very common	NA
32.	<i>Thespesia lampas</i>	Ban kapas	Malvaceae	Common	NA

Sl. No.	SCIENTIFIC NAME	LOCAL/ ENGLISH NAME	FAMILY	LOCAL AVAILABILITY	IUCN STATUSES
33.	<i>Tournefortia roxburghii</i>	?	Scrophulariaceae	Rare	NA
34.	<i>Vanda parviflora</i>	Arkind	Orchidaceae	Rare	NA
35.	<i>Xanthium strumarium</i>	Godhru	Asteraceae	Abundant	NA

Source : JICA Survey Team

NA=Not Assessed; NF=Not Found in the IUCN catalogue; LC= Least Concern;

Rare=<20% of the total population, Common=20-50% of the total population, Abundant=50-70% of the total population, Very abundant=>70% of the total population.

NA= not assessed yet for IUCN red list

Note: The above listed species are not included in any schedule of Wild Life (Protection) Act, 1972

During the site visit, the type and details of Climber species present in the project area has been provided in the next table. During the site visit, the survey team found that there was no Climber species which is of serious concern in terms of scarcity in the project area. There are 11 nos. of common, 01 very common and 02 nos. of rare species in the study area. However project activities do not have any significant impacts on rare species.

Table 7-69: Climber species (angiosperms) recorded in the project area

Sl. No.	SCIENTIFIC NAME	LOCAL/ ENGLISH NAME	FAMILY	LOCAL AVAILABILITY	IUCN STATUSES
1.	<i>Abrus precatorius</i>	Ratti	Papilionaceae	Common	NA NF
2.	<i>Asparagus racemosus</i>	Satwar	Liliaceae	Common	NA
3.	<i>Cocculus hirsutus</i>	Huyer	Menispermaceae	Common	NA
4.	<i>Clematis triloba</i>	Morbel	Ranunculaceae	Common	NA
5.	<i>Cryptolepis buchmania</i>	Nagbel	Combretaceae	Rare	NA NF
6.	<i>Dioscorea bulbifera</i>	Kand	Papilionaceae	Common	NA NF
7.	<i>Dioscorea danoda</i>	Bechaadi	Papilionaceae	Common	NA NF
8.	<i>Jasminum arborescens</i>	Chameli	Oleaceae	Very common	NA
9.	<i>Pueraria tuberosa</i>	?	Leguminosae	Common	NA
10.	<i>Smilax zeylanica</i>	Ramdaton	Vitaceae	Common	NA NF

11.	<i>Smilax aspera</i>	?	Vitaceae	Common	NA NF
12.	<i>Tinospora cordifolia</i>	Giloi	Menispermaceae	Common	NA
13.	<i>Ventilago aciculata</i>	Qyuti	Rhamnaceae	Rare	NA NF
14.	<i>Vitex negundo</i>	?	Lamiaceae	Common	NA

Source : JICA Survey Team

Rare=<20% of the total population, Common=20-50% of the total population, Abundant=50-70% of the total population, Very abundant=>70% of the total population

NA= not assessed yet for IUCN red list; NF= not found in the catalogue of IUCN

Note: The above listed species are not included in any schedule of Wild Life (Protection) Act, 1972.

During the site visit, the type and details of the grass species present in the project area has been provided in the next table. During the site visit, the survey team found that there was no Grass species which is of serious concern in terms of scarcity in the project area. There are 23 nos. of common, 09 nos. of very common, 02 nos. of rare and 03 nos. of abundant species in the study area.

Table 7-70: Grass species (angiosperms) recorded in the project area

Sl. No.	SCIENTIFIC NAME	LOCAL/ ENGLISH NAME	FAMILY	LOCAL AVAILABILITY	IUCN STATUS
1.	<i>Agrostis spp.</i>	?	Poaceae	Very common	-
2.	<i>Apluda mutica</i>	Phuli	Poaceae	Common	NA
3.	<i>Aristida setacea</i>	Thani	Poaceae	Rare	NA
4.	<i>Arundinella bengalensis</i>	?	Poaceae	Common	NA
5.	<i>Arundinella setosa</i>	Fulbahari	Poaceae	Common	NA
6.	<i>Bambusa Balcoa</i>	Bans	Poaceae	Common	NA
7.	<i>Bambusa nutans</i>	Kali Bans	Poaceae	Common	NA
8.	<i>Bambusa affinis</i>	Kanak-Kaich	Poaceae	Common	NA
9.	<i>Bambusa pallida</i>	Makal	Poaceae	Common	NA
10.	<i>Bambusa teres</i>	Powra	Poaceae	Common	NA
11.	<i>Bothriochloa intermedia</i>	?	Poaceae	Abundant	NA
12.	<i>Bothriochloa pertusa</i>	?	Poaceae	Common	NA
13.	<i>Calamus garbna</i>	Sundibet	Poaceae	Common	NA
14.	<i>Calamus viminalis</i>	Pannabet	Poaceae	Common	NA
15.	<i>Calamus tenuis</i>	Chachibet	Poaceae	Common	NA
16.	<i>Chrysopogon fulvus</i>	Ghoriya	Poaceae	Common	NA

Sl. No.	SCIENTIFIC NAME	LOCAL/ ENGLISH NAME	FAMILY	LOCAL AVAILABILITY	IUCN STATUS
17.	<i>Cynodon dactylon</i>	Dub	Poaceae	Abundant	NA
18.	<i>Dactyloctenium aegyptium</i>	?	Poaceae	Very common	NA
19.	<i>Dendrocalamus hamiltonii</i>	Ponch bans	Poaceae	Common	NA
20.	<i>Dendrocalamus strictus</i>	Baans	Poaceae	Very common	NA
21.	<i>Dichanthium annulatum</i>	Kel	Poaceae	Very common	NA
22.	<i>Digitaria spp.</i>	?	Poaceae	Very common	-
23.	<i>Elusine indica</i>	?	Poaceae	Common	NA
24.	<i>Eragrostis interrupta</i>	?	Poaceae	Very common	NA
25.	<i>Eragrostis tenella</i>	Bhurbhuli	Poaceae	Very common	NA
26.	<i>Eulaliopsis binata</i>	Sabai/Bhabar	Poaceae	Common	NA
27.	<i>Heteropogon contortus</i>	Kumariya	Poaceae	Abundant	NA
28.	<i>Imperata cylindrica</i>	Chhir	Poaceae	Very common	NA
29.	<i>Iseilema laxum</i>	Mushan	Poaceae	Common	NA
30.	<i>Melocanna bambusoides</i>	Mul	Poaceae	Common	NA
31.	<i>Panicum spp.</i>	?	Poaceae	Common	-
32.	<i>Paspalum scrobiculatum</i>	?	Poaceae	Common	NA
33.	<i>Phragmites karka</i>	Nal	Poaceae	Common	NA
34.	<i>Saccharum spontaneum</i>	Kans	Poaceae	Very Common	NA
35.	<i>Setaria glauca</i>	?	Poaceae	Common	NA
36.	<i>Themeda quadrivalvis</i>	?	Poaceae	Common	NA
37.	<i>Thysanolaena maxima</i>	Phulbahari	Poaceae	Rare	NA

Source : JICA Survey Team

Rare=<20% of the total population, Common=20-50% of the total population, Abundant=50-70% of the total population, Very abundant=>70% of the total population

NA= not assessed yet for IUCN red list

Note: The above listed species are not included in any schedule of Wild Life (Protection) Act, 1972.

During the site visit, the type and details of parasitic angiosperms present in the project area has been provided in the next table. During the site visit, the survey team found that there was no

parasitic angiosperms species which is of serious concern in terms of scarcity in the project area. There are 02 nos. of common and 01 rare species of parasitic angiosperms in the study area.

Table 7-71: Parasitic angiosperms recorded in the project area

Sl. No.	SCIENTIFIC NAME	LOCAL/ ENGLISH NAME	FAMILY	LOCAL AVAILABILITY	IUCN STATUS
1.	<i>Cuscuta reflexa</i>	Amarbel	Convolvulaceae	Common	NA
2.	<i>Dendrophthoe falcata</i>	Banda	Loranthaceae	Rare	NF
3.	<i>Viscum articulatum</i>	Banda	Viscaceae	Common	NA

Source : JICA Survey Team

Rare=<20% of the total population, *Common*=20-50% of the total population, *Abundant*=50-70% of the total population, *Very abundant*= >70% of the total population

NA= not assessed yet for IUCN red list; *NF*= not found in the catalogue of IUCN

Note: The above listed species are not included in any schedule of Wild Life (Protection) Act, 1972

Economically-Important Tree Species (Terrestrial)

Forests in Tripura are valuable sources of commercial timber and non-timber or non-Wood forest products (NTFP or NWFP). Forest products play an important role in the livelihood of the local people and socio-economic development of the State. In addition to meeting the bonafide needs of the villagers residing in and around the forest areas, sale of forest products contributes appreciably to the State exchequer. During the field survey, numbers of plant species which are of economic importance in the area were recorded. These plant species are used by local people for various purposes in their day to day life. These species include timber, firewood, fruits-yielding, fodder, oil-yielding, medicinal and multiple usages.

A total of 38 major species of economically-important plants were recorded in the project area. These include 19 tree species, 08 herbaceous species, 10 shrub species and 01 species of climber.

Table 7-72: Major economically-important plant species recorded in the project area during the study period

Sl. No.	SCIENTIFIC NAME	LOCAL/ENGLISH NAME	FAMILY	ECONOMIC USE**
(A) TREE SPECIES				
	Acacia catechu	Khair	Papilionaceae	FW
	A. leucophloea	Ronjh	Fabaceae	FW
	A. nilotica	Babul	Fabaceae	T, FW
	Ailanthus excelsa	Maharukh	Simaroubaceae	FO
	Angle marmelos	Bel	Rutaceae	R, Me, FrE
	Anogeissus pendula	Kardhai	Combretaceae	FW

	Azadirachta indica	Neem	Meliaceae	MP
	Bauhinia purpurea	Kanchan	Caesalpiniaceae	FO
	Butea monosperma	Dhak	Fabaceae	FW, LP
	Emblica officinale	Amla	Euphorbiaceae	FrE, Me
	Saraca asoca	Sita Ashok	Fabaceae	Me
	Syzygium cumini	Jamun	Myrtaceae	FrE, T
	Tectona grandis	Sagwan	Verbenaceae	T
	Vitex negabdo	?	Verbenaceae	Me
	Vitex peduncularis	Awal	Verbenaceae	Me
	Terminalia belerica	Imli	Caesalpiniaceae	MP
	Ficus bengalensis	Bat	Moraceae	Me
	Terminalia arjuna	Arjun	Combretaceae	Me
	Terminalia chebula	Harra	Combretaceae	Me
(B) SHURB SPECIES				
	Adhatoda vasica	Adhusa	Acanthaceae	Me
	Andrographis paniculata	Green Chiretta	Acanthaceae	Me
	Hemidesmus indicus	Anantmul	Apocynaceae	Me
	Holorrhena pubescens	Kutaja	Apocynaceae	Me
	Calotropis procera	Aak	Apocynaceae	R
	Clerodendron serratum	Mamri	Celastraceae	Me
	Justica adhatoda	Malabar Nut	Acanthaceae	Me
	Marsilea minuta	Susnisak	Acanthaceae	Me
	Phlogacanthus thyrsoiflorus	Titaphool	Acanthaceae	Me
	Zizyphus jujuba	Ber	Rhamnaceae	MP
(C) CLIMBER SPECIES				
	Tinospora cordifolia	Gurj	Menispermaceae	Me
(D) HERBACEOUS SPECIES				
	Asparagus filicinis	Satavari	Liliaceae	Me
	Achyranthus aspera	Gathiya	Amranthaceae	Me
	Acorus calamus	Bach	Acoraceae	Me
	Bamboosa spp. (03)	Bans	Poaceae	MP
	Curcuma angustifolia	Tikhur	Zingiberaceae	Me

	Dendrocalamus spp.(02)	Bans	Poaceae	MP
	Gloriosa superba	Karihari	Liliaceae	Me
	Saccharum spontaneum	Sarkanda	Poaceae	MP

Source : JICA Survey Team and *Forest working plan*

****Economic Use:** FW= Firewood, T=Timber, FO=Fodder, R= Religious, Me=Medicinal, FrE= Fruit edible, MP=Multi-purpose, O=Oil-

(5) Fauna in Study Area

During the site visit, the type and details of butterflies present in the project area has been provided in the next table. The butterflies recorded in the project are common in nature and no rare species are found in the project area.

Table 7-73 Butterflies recorded in the project area

Sl. No.	SCIENTIFIC NAME	LOCAL AVAILABILITY	IUCN STATUS
1.	<i>Antheraea mylitta</i>	Common	NA
2.	<i>Belenois aurota</i>	Common	NA
3.	<i>Curetis theitis</i>	Common	NF
4.	<i>Goladenia indrani</i>	Common	LC
5.	<i>Graohium nomius</i>	Abundant	NF
6.	<i>Prosotas dubiosa indica</i>	Common	NF
7.	<i>Talicada nyseus</i>	Common	NA

Source : JICA Survey Team

Rare=<20% of the total population, Common=20-50% of the total population, Abundant=50-70% of the total population, Very abundant=>70% of the total population
NA= not assessed yet for IUCN red list; LC=Least concern; NF= not found in the catalogue of IUCN
Note: The above listed species are not included in any schedule of Wild Life (Protection) Act, 1972.

During the site visit, the types and details of major insects present in the project area has been provided in the next table.

The survey team found that Scorpion is having somewhat rare availability. However, the project is away from its habitat and do not cause significant impacts to endanger the habitats of this species.

Table 7-74: Major Insect fauna recorded in the project area

Sl. No.	LOCAL/ ENGLISH NAME	SCIENTIFIC NAME	LOCAL AVAILABILITY	IUCN STATUS
1.	Trumpet tail	<i>Aisoma panorpoids</i>	Common	NA
2.	Giant honeybee	<i>Apis dorseta</i>	Common	NA
3.	Honey bee	<i>Apis indica</i>	Common	NA
4.	Ant	<i>Camponotus sp.</i>	Abundant	NA
5.	Blister beetle	<i>Mylabris pustulata</i>	Common	NA

6.	Scorpion	<i>Typhlochactus mitchelli</i>	Rare	NA
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Source : JICA Survey Team

Rare=<20% of the total population, *Common*=20-50% of the total population, *Abundant*=50-70% of the total population, *Very abundant*= >70% of the total population

NA= not assessed yet for IUCN red list

Note: The above listed species are not included in any schedule of Wild Life (Protection) Act, 1972.

The type and details of major amphibians and reptiles present in the project area has been provided in the table below. There were two schedule I and one schedule II species of reptile reported in the project area based on secondary data. According to the local interviews, and Forest Working plan of the project districts, they may exist in Gumti WLS which is within approx. 4.7 km from the project boundary at the closest, but they are not seen in the project alignment area.

Table 7-75: Major amphibians and reptiles recorded in the project area

Sl. No.	SCIENTIFIC NAME	LOCAL/ENGLISH NAME	LOCAL AVAILABILITY	WLA SCHEDULE ⁵⁵	IUCN STATUSES
(A) AMPHIBIANS					
1.	Toad	<i>Duttaphrynus melanostictus</i>	Abundant	IV	LC
2.	Frog	<i>Rana tigrina</i>	Common	IV	LC
(B) REPTILES					
1.	Krait	<i>Bangarus caeruleus</i>	Common	IV	NA
2.	Girgit	<i>Kelotes versicolor</i>	Common	IV	NA
3.	Cobra	<i>Naja naja</i>	Common	II	VU
4.	Lizard	<i>Agama tuberculata</i>	Abundant	IV	NA
5.	Ajgar	<i>Python molurus</i>	Rare	I	NA
6.	Dhaman	<i>Tiyas mucosus</i>	Abundant	IV	NA
7.	Pit viper	<i>Trimeresurus gramineus</i>	Rare	IV	LC
8.	Monitor lizard	<i>Varanus benghalensis</i>	Common	I	LC
9.	Russel viper	<i>Vipera russelli</i>	Rare	IV	LC

Source : JICA Survey Team

NA=Not Assessed; *NF*=Not Found in the IUCN catalogue; *LC*= Least Concern; *VU*=Vulnerable; *EN*=Endangered
Rare=<20% of the total population, *Common*=20-50% of the total population, *Abundant*=50-70% of the total population, *Very abundant*= >70% of the total population.

⁵⁵ WLA schedule: Indian Wildlife Act 1972 categorization of species. Indian Wildlife Act Classification according to the Indian Wildlife Act (1972). There are 6 categories in Attached Tables I to VI. I-IV are protected. Compared to I and II, III and IV have lighter penalties for violations. V is a vermin and is allowed to hunt. VI is an endemic plant species and is prohibited from growing and planting.

During the site visit, the type and details of Avifauna (bird species) present in the project area has been provided in the next table. Most of the avifauna species are commonly found in the study area and mostly fall in LC (least concern category) as per IUCN status.

Table 7-76: Avifauna (bird species) recorded in the project area

Sl. No.	LOCAL/ ENGLISH NAME	SCIENTIFIC NAME	LOCAL AVAILIBILITY	WLA SCHE DULE	IUCN STATUS	Migratory Status
	Myna	Acridotheres tristis	Common	IV	LC	Resident
	Purple Heron	Ardea purpurea	Common	IV	LC	Resident
	Indian Pond Heron	Ardeola grayii	Rare	IV	LC	Resident
	Common Kingfisher	Alcedo atthis	Rare	-	LC	Resident
	Anjan	Ardea cinerea	Common	-	LC	Resident
	Golden-fronted leafbird / Green Bulbul	Chloropsis aurifrons	Common	IV	LC	Resident
	Jerdon's Leafbird	Chloropsis jerdoni	Common	IV	LC	Resident
	Roller / Blue Jay	Coracias benghalensis	Common	IV	LC	Resident
	Crow	Corvus splendens	Common	IV	LC	Resident
	Bater	Coturnix coturnix	Abundant	IV	LC	Resident
	Racket-tailed drongo	Dicrurus paradiseus	Common	IV	LC	Resident
	Kathphora	Dinopium bengalense	Rare	IV	LC	Resident
	Goldenbacked Woodpecker	Dinopium benghalense	Common	-	LC	Resident
	Bagula	Egretta garzetta	Common	IV	LC	Resident
	Koyal	Eudynamis scolopacea	Rare	IV	LC	Resident
	Titar	Francoeleus pondicerianus	Rare	IV	LC	Resident
	Jal murgi	Gallinula chloropus	Common	IV	LC	Resident
	Red Jungle fowl	Gallus gallus	Common	IV	LC	Resident
	Common crane	Grus virgo	Rare	IV	LC	Winter migratory
	White-backed Vulture	Gyps bengalensis	Rare	-	LC	Migration
	Common Hawk-Cuckoo	Hierococcyx varius	Rare	IV	NA	Resident

	Purple-rumped Sunbird	Leptocoma zeylonica	Common	IV	LC	Resident
	White-rumped munia	Lonchura striata	Common	IV	LC	Resident
	Small Green Bee-eater	merops orientalis	Common	-	LC	Resident
	White Wagtail	Motacilla alba	Common	IV	LC	Resident
	Cheel	Milvus migrans	Rare	IV	LC	Resident
	Black crown night Heron	Nycticorax nycticorax	Rare	IV	LC	Resident
	Indian Grey Hornbill	Ocyrceros birostris	Common	-	LC	Resident
	Common Tailorbird	Orthotomus sutorius	Common	-	LC	Resident
	Spotted Scops owl	Otus spilocephalus	Rare	?	LC	Resident
	Sparrow	Passer domesticus	Common	IV	LC	Resident
	Small Minivet	Pericrocotus cinnamomeus	Common	-	LC	Resident
	Great Cormorant	Phalacrocorax carbo	Common	-	LC	Resident
	Little Cormorant	Phalacrocorax niger	Common	-	LC	Resident
	Baya weaver	Ploceus philippinus	Common	IV	LC	Resident
	Black headed myna	Pogodarum sturnus	Common	-	NA NF	Resident
	Parrot	Psittacula krameri manillensis	Common	I	LC	Resident
	Black heded Bulbul	Pycnonotus atriceps	Common	-	NA	Resident
	Little Grebe	Tachybaptus ruficollis	Rare	-	NA	Resident
	Common green shank	Tringa nebularia	Common	-	NA	Resident
	Common Babbler	Turdoides caudata	Common	IV	LC	Resident
	Common bustard Quale	Turnix suscitator	Common	-	NA	Resident

Source : JICA Survey Team and Forest working plan

NA=Not Assessed; NF=Not Found in the IUCN catalogue; LC= Least Concern;

Rare=<20% of the total population, Common=20-50% of the total population, Abundant=50-70% of the total population, Very abundant=>70% of the total population.

The type and details of Mammal species present in the project area has been provided in the table below. There were nine schedule I and twelve schedule II species of mammal in the project area as per secondary published data. these species have not seen by the survey team and According

to the local interviews, and Forest Working plan of the project districts, they may exist in Gumti WLS which is within approx. 4.7 km from the project boundary at the closest, but they are not seen in the project alignment area.

Table 7-77: Mammal species recorded in the project area

Sl. No.	LOCAL/ ENGLISH NAME	SCIENTIFIC NAME	LOCAL AVAILABILITY	WLA Schedule	IUCN STATUS
1.	?	<i>Axis axis</i>	Rare	-	NA
2.	Gaur / Indian Bison	<i>Bos gaurus</i>	Rare	I	VU
3.	Neelgai	<i>Boselaphus tragocatelus</i>	Common	III	NA
4.	Jackal	<i>Canis aureus</i>	Common	II	LC
5.	Sambhar	<i>Cervus unicolor</i>	Rare	III	VU
6.	Indian Wild Dog	<i>Cuon alpinus</i>	Rare	II	EN
7.	Asian Elephant	<i>Elephas maximus</i>	Rare	I	EN
8.	Jungle Cat	<i>Felis chaus</i>	Common	II	LC
9.	Nevla/Common mongoose	<i>Herpestus edwardsii</i>	Common	II	NA
10.	Western Hoolock Gibbon	<i>Hoolock hoolock</i>	Rare	I	EN
11.	Porcupine	<i>Hystrix indica</i>	Common	IV	NA
12.	Indian Hare	<i>Lepus nigricollis</i>	Common	IV	LC
13.	Common Otter	<i>Lutra lutra</i>	Rare	II	NT
14.	Monkey	<i>Maccaca mulata</i>	Common	II	NA
15.	Indian Pangolin	<i>Manis crassicaudata</i>	Rare	I	EN
16.	Sloth Bear	<i>Melursus ursinus</i>	Rare	I	VU
17.	Bherki/barking deer	<i>Muntiacus muntjac</i>	Common	III	LC
18.	Slow Loris	<i>Nycticebus bengalensis</i>	Rare	I	EN
19.	Leopard	<i>Panthera pardus</i>	Rare	I	VU
20.	Common Palm Civet	<i>Paradoxurus hermaphroditus</i>	Common	II	LC
21.	Phayre's Leaf-monkey	<i>Trachypithecus phayrei</i>	Rare	I	EN
22.	Indian Flying Fox	<i>Pteropus giganteus</i>	Common	IV	LC
23.	Indian Giant Squirrel	<i>Ratufa indica</i>	Common	II	LC
24.	Fulvous fruit bat	<i>Rousettus leschenaulti</i>	Common	IV	LC
25.	Rat	<i>Rattus rattus</i>	Common	V	NA

26.	Bat	<i>Skotophilus heathi</i>	Common	-	NA
27.	Langur	<i>Somnopithecus entellus</i>	Rare	II	NA
28.	Chhuchhunder	<i>Suncus murinus</i>	Common	-	LC
29.	Wild boar	<i>Sus scrofa</i>	common	III	LC
30.	Small Indian Civet	<i>Viverricula indica</i>	Common	II	LC
31.	Large Indian Civet	<i>Viverra zibetha</i>	Common	II	LC
32.	Indian Fox	<i>Vulpes bengalensis</i>	Common	II	LC
33.					
34.	Golden Cat	<i>Catopuma temminckii</i>	Rare	I	NT

Source : JICA Survey Team and Forest working plan

NA=Not Assessed; LC= Least Concern; VU=Vulnerbale; EN=Endangered; NT= Near Threatened; CR = Critically Endangered

Rare=<20% of the total population, Common=20-50% of the total population, Abundant=50-70% of the total population, Very abundant=>70% of the total population

During the site visit, the type and details of aquatic phytoplankton & other plant species diversity present in the project area has been provided in the next table. During the site visit, the survey team found that there was no aquatic flora and fauna species which is of serious concern in terms of scarcity in the project area.

Table 7-78 Aquatic phytoplankton and other plant species diversity in the project area

(A) AQUATIC FLORAL AND FAUNAL DIVERSITY

Sl. No.	PHYTOPLANKTON SPECIES
1.	<i>Anabaena spp.</i>
2.	<i>Anacyustis spp.</i>
3.	<i>Arthrspiora spp.</i>
4.	<i>Chara spp.</i>
5.	<i>Chlorella spp.</i>
6.	<i>Chlorococcum spp.</i>
7.	<i>Desmidium spp.</i>
8.	<i>Euglena spp.</i>
9.	<i>Fragilaria spp.</i>
10.	<i>Nostoc spp.</i>
11.	<i>Oscillatoria spp.</i>
12.	<i>Ulothrix spp.</i>
13.	<i>Volvox spp.</i>

Sl. No.	HIGHER PLANT SPECIES	LOCAL AVAILABILITY
1.	<i>Acorus calamus</i>	Common
2.	<i>Arundo donax</i>	Common
3.	<i>Azolla sp.</i>	Common
4.	<i>Ceratophyllum sp.</i>	Very Common
5.	<i>Cyperus spt.</i>	Very common
6.	<i>Eragrostielis nordoides</i>	Abundent
7.	<i>Hydrilla sp.</i>	Abundant
8.	<i>Imperata cylindrica</i>	Common
9.	<i>Ipomoea aquatica</i>	Common
10.	<i>Justiacia sp.</i>	Rare
11.	<i>Limnophila chinensis</i>	Common
12.	<i>Melastoma spp.</i>	Common
13.	<i>Nelumbo nucifera</i>	Rare
14.	<i>Nyphaea sp</i>	Rare
15.	<i>Phragmites karka</i>	Common
16.	<i>Potamogeton pectinatus</i>	Abundant
17.	<i>Typha angustifolia</i>	Common
18.	<i>Vernonia anagallis</i>	Common

Source : JICA Survey Team

During the site visit, the types and details of aquatic fauna diversity present in the project area has been provided in the next table.

Table 7-79 Aquatic fauna recorded in the project area

S. no.	GROUP	SPECIES
1	Zooplankton	<i>Brachionus spp</i>
		<i>Bosmina spp.</i>
		<i>Cyclops spp.</i>
		<i>Daphnia spp.</i>
		<i>Euglaena spp.</i>
		<i>Filinia spp.</i>
		<i>Horerlla spp.</i>
		<i>Macrothrix spp.</i>
		<i>Moina spp.</i>
		<i>Nauplius spp.</i>
		<i>Vorticella sp.</i>

Source : JICA Survey Team

During the site visit, the type and details of Ichthyo fauna (fish species) present in the project area has been provided in the table below. During the site visit, the survey team found that as per

IUCN status there was only one endangered species of fish i.e. *Tor putitora* in the project area. This specie confined in upper reach and do not found in water bodies along the project alignment.

Table 7-80: Ichthyo fauna (fish species) * recorded in the project area

Sl. No.	LOCAL/ ENGLISH NAME	SCIENTIFIC NAME	LOCAL AVAILABILITY	IUCN STATUS
1.	Kotri	<i>Anabas testidinius</i>	Very common	NA
2.	?	<i>Barillius Barila</i>	Common	NA
3.	?	<i>Barillius bola</i> (<i>Raiamas bola</i>)	Common	LC
4.	Catla	<i>Catla catla</i>	Common	NA
5.	Channa	<i>Channa marulius</i>	Very Common	LC
6.	Channa	<i>Channa Punctatus</i>	Very Common	LC
7.	Mrigal	<i>Cirrhina mrigala</i>	Common	NA
8.	Magur	<i>Clarius batrachus</i>	Very common	NA
9.	Common Carp	<i>Cyprinus carpio</i>	Common	VU
10.	Kalbos	<i>Labeo calbasu</i>	Common	LC
11.	Rohu	<i>Labeo rohita</i>	Abundant	LC
12.	Tengra	<i>Mystus cavacius</i>	Very Common	NA
13.	Seenghar	<i>Mystus seeghalus</i>	Rare	NA
14.	?	<i>Barillius nelsoni</i>	Rare	NA
15.	?	<i>Puntius clavatus</i> <i>clavatus</i>	Rare	NA
16.	?	<i>Puntius gelius</i>	Rare	LC
17.	?	<i>Nemacheilus</i> <i>multifasciatus</i>	Common	NA
18.	Chital	<i>Notopterus chitala</i>	Very Common	LC
19.	?	<i>Punticus chola</i>	Common	LC
20.	?	<i>Punticus sophore</i>	Common	LC
21.	Karwadi	<i>Punticus ticto</i>	Common	LC
22.	?	<i>Raiamas bola</i>	Endangered	LC
23.	?	<i>Tor putitora</i>	Endangered	EN
24.	Mahseer	<i>Tor tor</i>	Endangered	DD
25.	?	<i>Labeo pangusia</i>	Vulnerable	NT
26.	?	<i>Chagunius chagunio</i>	Vulnerable	LC
27.	Rita	<i>Rita rita</i>	Vulnerable	LC
28.	?	<i>Pangasius pangasius</i>	Vulnerable	LC
29.	?	<i>Bagarius bagarius</i>	Vulnerable	NT

Source : JICA Survey Team and Forest working plan

Rare=<20% of the total population, Common=20-50% of the total population, Abundant=50-70% of the total population, Very abundant=>70% of the total population
NA= not assessed yet for IUCN red list; LC= Least concern; VU= Vulnerable; NF= not found in the catalogue of IUCN;
EN=Endangered; DD=Data Deficient; NT=Near Threatened

Note: The above listed species are not included in any schedule of Wild Life (Protection) Act, 1972.
*Migration for food only (sometimes due to pollution/siltation)

(6) Impacts on Gumti Wildlife Sanctuary

This survey has been done with field survey, literature review and expert interviews. Local experts say that Gumti wildlife sanctuary is abundant in rare species such as criteria. Lesser Adjutant

Gumti is the largest wildlife sanctuary in the state, covering 38,954 ha which include c. 4,200 ha of wetland. The wetland is surrounded by Tropical Semi-evergreen forest. Not much information on avifauna is available

Leptoptilos javanicus, a Vulnerable species, and Oriental Darter Anhinga melanogaster, a Near Threatened species, Baer's Pochard Aythya

Baeri (CR), . The project alignment is 4.7 km away from the sanctuary at the closest. There might be a slight change in noise and water, but the impact will be negligible level, mainly because this road is the expansion of the present highway. Moreover, with the less traffic congestion and moderate speed, the air quality situation might be even slightly better. Therefore, the impact of this road to ecosystem is minimum.

7.7 Impact Analysis

After the careful consideration of the analysis of the present conditions and estimated values, Summary of the Assessment has been provided in the table below

Table 7-81: Summary of Impact Assessment

Item	No.	Impact	Scoping			Result of Impact Assessment			Rationale
			Pre-construction stage	construction Phase	Operation Phase	Pre-construction stage	construction Phase	Operation Phase	
Pollution	1	Air Quality		✓	✓	D	B-	B-	<p>Pre Construction phase: Nil</p> <p>Construction phase: Minimum dust dispersion will be expected.</p> <p>Operation phase: Air pollution caused by exhaust gas generated as the more vehicles traffic predicted.</p>
	2	Water Quality		✓	✓	D	B-	B-	<p>Pre Construction phase: Nil</p> <p>Construction/Operation phase: Although turbidity increases due to construction near the river area, the effect is temporary. For wastewater accompanying concrete construction and wastewater containing oil, the muddy stream caused by embankment at the time of rainy weather.</p>
	3	Bottom Sediment		✓		D	B-	D	<p>Pre Construction phase: Nil</p> <p>Construction phase: Sedimentation may occur due construction of cross drainage structures and bridges on river. Suitable mitigation measures will be provided.</p> <p>Operation phase: Nil</p>
	4	Soil Contamination		✓		D	B-	B-	<p>Pre Construction phase: Nil</p> <p>Construction phase: There is a chance of soil contamination due to leakage of oil from the operation and maintenance of equipment and machineries.</p> <p>Operation phase: May occurred in case of any oil spill in the road and leaching to the surrounding.</p>

Item	No.	Impact	Scoping			Result of Impact Assessment			Rationale
			Pre-construction stage	construction Phase	Operation Phase	Pre-construction stage	construction Phase	Operation Phase	
	5	Noise and Vibration		✓	✓	D	B-	B-	<p>Pre Construction phase: Nil</p> <p>Construction phase: Minor noise may be generated due to construction activity and movement of vehicles.</p> <p>Operation phase: Noise may be generated from the movement of vehicles and machineries, which is temporary.</p>
	6	Wastes/ Hazardous Materials		✓	✓	D	B-	D	<p>Pre Construction phase: Nil</p> <p>Construction phase: Generally construction & demolition will be generated during construction phase, suitable mitigation and disposal facility will be provided.</p> <p>Operation phase: No waste will be generated</p>
Natural Environment	7	Climate/Meteorological phenomena				D	D	D	The project decreases the emissions and the impacts to climate change are minimum.
	8	Topography		✓		D	B-	D	<p>Pre Construction phase: Nil</p> <p>Construction phase: As the road is in plain terrain, no major change will occur in the topography. Only the widening of road and new bypasses due to cutting and filling will slightly change the topography.</p> <p>Operation phase: Nil</p>
	9	Soil Erosion		✓		D	D	D	<p>Pre Construction phase: Nil</p> <p>Construction phase: As the project is in flood prone area and parallel to a river, soil erosion is common particularly in rainy season.</p> <p>Operation phase: During flood and heavy rain, soil erosion may take place.</p>
	10	Hydrology		✓	✓	D	B-	D	<p>Pre Construction phase: Nil</p> <p>Construction phase: May alter the hydrological process during construction of bridges in the river. Sedimentation may also have some impact on it. Suitable measures will be provided.</p>

Item	No.	Impact	Scoping			Result of Impact Assessment			Rationale
			Pre-construction stage	construction Phase	Operation Phase	Pre-construction stage	construction Phase	Operation Phase	
									Operation phase: No impact
	11	Ecosystem		✓	✓	D	B-	B-	Pre Construction phase: Nil Construction phase: Cutting of trees and habitat fragmentation may be caused by the proposed project, which has some impact on the ecosystem. Flora and fauna close to Gumti WLS/Rema Kalenga WLS could be slightly affected with noise/air pollution. Operation phase: Temporary impact is there like Vehicular noise disturbs the hearing of animals and birds, lighting on animals and accidents road during crossing. Forest tree logging might affect the ecosystem of the logged area. Flora and fauna close to Gumti WLS //Rema Kalenga WLS could be slightly affected with noise/air pollution.
	12	Protected Area/ Forest Reserve				D	D	D	No protected area falls in the project road alignment.
	13	Landscape			✓	D	B-	B+/-	Pre Construction phase: No impact expected. Construction phase: The project slightly degrades some scenery with construction machinery. Operation phase: Some loss in continuity of the greenfield but some areas more approaches to scenic sites.
	14	Natural Disaster		✓		D	D	B+	Pre Construction phase: No impact expected. Construction phase: The project will not affect flooding conditions. Operation phase: Slope protection/stabilization measures and drainage are expected to significantly reduce the risk of natural disaster.
Social Environment	1	Involuntary Resettlement	✓			A-	A-	D	Pre Construction and Construction phases: 400.45ha (private land 266.69 ha and government land 133.76 ha) of land will be acquired for the project. A total of 581 structures would be affected due to the improvement of the project road within the proposed ROW. A total of 1,053 households

Item	No.	Impact	Scoping			Result of Impact Assessment			Rationale
			Pre-construction stage	construction Phase	Operation Phase	Pre-construction stage	construction Phase	Operation Phase	
									(3,467 people) would be affected due to the improvement of the project road within the proposed ROW. Among them 632 households will have their structures affected by the project. Operation phases: No impact is expected due to availability of resettlement sites adjacent to present location and adequate compensation and resettlement assistances.
	2.	Land Use	✓	✓	✓	B-	B-	B-/+	Pre Construction phase: Land acquisition and involuntary resettlement will cause changes in existing land use pattern. Construction phase: While changes in land use associated with construction work are relatively minor at expansion section of the existing road, land use, including agriculture would be affected at bypass sections. Operational phase: The development due to the Project will induce a change in land use along the alignment. Change in land use will be sparked off as a result of land speculation. Greater traffic volume may affect the use of road and surrounding area by local residents.
	3.	Utilization of Local Resources		✓	✓	B-	B-	B-/+	Pre Construction phase: Land acquisition and involuntary resettlement will cause changes in existing resource use pattern. Construction phase: While changes in land use associated with construction work are relatively minor at expansion section of the existing road, resource use, including agriculture would be affected at bypass sections. Operational phase: The development due to the Project will induce a change in land use along the alignment. Change in resource use will be sparked off as a result of land speculation. Greater traffic volume may affect the use of road and surrounding area by local residents.

Item	No.	Impact	Scoping			Result of Impact Assessment			Rationale
			Pre-construction stage	construction Phase	Operation Phase	Pre-construction stage	construction Phase	Operation Phase	
	4.	General, Regional/City Plans			✓	D	D	B-/+	<p>Pre Construction phase and Construction phase: No impact is expected.</p> <p>Operational phase: Based on improved transport, various options for future development will be available. Better infrastructure network may trigger influx of outsiders and economic development in the region.</p>
	5.	Social Institutions and Local Decision- making Institutions	✓	✓	✓	B-	B-	B-/+	<p>Pre Construction phase: Displacement may affect the existing network of local communities and decision-making institutions.</p> <p>Construction: Construction work will disturb access to existing social infrastructure and social services. For mitigating this impact, passage shall be secured during construction.</p> <p>Operation: Access to social infrastructure and services will be improved. Increased traffic volume may disturb the access of Community to existing social infrastructure and services. For mitigating this, passage needs to be secured.</p>
	6.	Social Infrastructure and Services	✓	✓	✓	B-	B-	B-/+	<p>Pre Construction phase: 41 Common Property Resources (CPRs) including 8 schools and 1 hospital are affected. That negatively affects social infrastructure and services.</p> <p>Construction phase: Construction work will disturb access to existing social infrastructure and social services. For mitigating this impact, passage shall be secured during construction.</p> <p>Operational phase: Access to social infrastructure and services will be improved. Increased traffic volume may disturb the access of the community to existing social infrastructure and services. For mitigating this, passage needs to be secured.</p>
	7.	Local Economy and Livelihood	✓	✓	✓	B+	B+	B+	<p>Pre Construction phase: Positive impacts are expected due to additional cash flow in PAHs and constriction of the resettlement households, etc.</p>

Item	No.	Impact	Scoping			Result of Impact Assessment			Rationale
			Pre-construction stage	construction Phase	Operation Phase	Pre-construction stage	construction Phase	Operation Phase	
									<p>Construction: Some changes are required to adapt construction activities while positive impacts are expected from construction work and additional employment.</p> <p>Operation: The construction of road and bridges will benefit the lives of local people such as improvement of access to social services and opportunity of employment.</p>
	8.	Unequal Distribution of Benefit and Damage	✓	✓	✓	B-	B-	D	<p>Pre Construction phase: Land acquisition and involuntary resettlement would lead to unequal distribution of benefits and damages between groups who are directly affected by the project and who are not.</p> <p>Construction phase: Job and business opportunities could be unequally.</p> <p>Operational phase: Generally, all stakeholders will be benefit from the projects as same as common road projects.</p>
	9.	Local Conflicts of Interests	✓	✓	✓	B-/+	B-/+	D	<p>Pre Construction and Construction Phases: Unequal distribution of benefits and damages may trigger and/or intensify local conflicts of interests in the community. Local community will be involved in construction works and petty contractors.</p> <p>Operational phase: No impacts are expected.</p>
	10.	Water Usage, Water Rights and Communal Rights	✓	✓		B-	B-	D	<p>Pre Construction phase: Water usage and water rights of the affected households may be curtailed due to resettlement.</p> <p>Construction phase: Disturbance to water usage, water rights and communal rights during construction work is expected to be minor and short-term in nature. There is no PAP claiming fisheries as occupation. A few individual ponds will be affected and compensated accordingly.</p> <p>Operational phase: No impact is expected.</p>

Item	No.	Impact	Scoping			Result of Impact Assessment			Rationale
			Pre-construction stage	construction Phase	Operation Phase	Pre-construction stage	construction Phase	Operation Phase	
	11	Cultural and Historical Heritage	✓	✓	✓	D	D	D	Pre Construction, Construction and Operation Phases: There is no sacred grove/forest or other cultural heritage site which comes in the way of the proposed road alignment.
	12.	Religious facilities	✓	✓	✓	B-	B-	B-/+	Pre Construction phase: 41 Common Property Resources (CPRs) including 8 temples and 2 churches will be affected. Construction phase: Construction work will disturb access to existing religious facilities. Operational phase: Access to the religious facilities will be improved. Increased traffic volume would disturb the access to them too.
	13.	Sensitive Facilities (ex. Hospital, school, precision	✓	✓	✓	B-	B-	B-/+	Pre Construction phase: 41 Common Property Resources (CPRs) including 1 child care centre, 7 community halls, 8 schools, 1 hospital, 13 government buildings, and 1 Panchayat office will be affected. Construction phase: Construction work will disturb access to the existing sensitive facilities. Operational phase: Access to the sensitive facilities will be improved. Increased traffic volume may disturb the access of Community to existing social infrastructure and services.
	14.	Poor People	✓	✓	✓	B-	B+	B+	Pre Construction phase: 548 households (52%) out of the total 1,053 PAHs are Below Poverty Line (BPL). They will be affected by land acquisition and resettlement. Construction phase and Operational phase: Envisage to have increase employment/ income generation opportunity.
	15.	Ethnic Minorities/ Indigenous People	✓	✓	✓	B-	B-/+	B+	Pre Construction phase: The alignment of NH208 in Tripura state under the Project would largely overlap with the area under control of the Tripura Tribal Ares Autonomous District Council (TTAADC). The Scheduled

Item	No.	Impact	Scoping			Result of Impact Assessment			Rationale
			Pre-construction stage	construction Phase	Operation Phase	Pre-construction stage	construction Phase	Operation Phase	
									<p>Tribes will be affected by the project. Among the total 1,053 PAHs and 3,467 PAPs, 546 households 1,809 people are ST.</p> <p>Construction phase: Disturbances from construction activities and to the Scheduled Tribes are expected while direct and indirect job/business opportunities are expected during construction.</p> <p>Operational phase: The improvement of the road contribute to economic growth and poverty reduction in the area.</p>
	16.	Gender	✓	✓	✓	B-	B-/+	B+	<p>Pre Construction phase: Women may hardship during the transition period until the time the project-affected households are able to regain their lost income and livelihood.</p> <p>Construction phase: ditto. Local females will be employed as unskilled/skilled worker and also play an important role in the grievance redressal mechanism (GRM).</p> <p>Operational phase: Improvement of local economy will give positive impact on improvement of job opportunity and livelihood.</p>
	17.	Children's Rights	✓		✓	B-	B-	B+	<p>Pre Construction phase: Children from households losing their land or jobs may suffer from adverse impact on their household economy, such as dropping-out of school.</p> <p>Construction phase: Access way to their schools will be physically hindered by the construction site. For mitigating this impact, passage shall be secured. Child labour can be provoked at the construction site because of the huge demand for unskilled workers.</p> <p>Operational phase: Better access to health and educational institutes for children.</p>
	18.	Public health		✓	✓	D	B-	B-	<p>Pre Construction phase: No impact is expected.</p>

Item	No.	Impact	Scoping			Result of Impact Assessment			Rationale
			Pre-construction stage	construction Phase	Operation Phase	Pre-construction stage	construction Phase	Operation Phase	
									<p>Construction phase: Influx of construction workers is likely to increase health risks, particularly that of STD/STI, HIV/AIDS, COVID-19, etc.</p> <p>Operational phase: Improved mobility of local residents and influx of external residents may increase the risk of infectious diseases. For mitigating this risk, measure for prevention of infection shall be taken.</p>
	19.	Occupational Health and Safety		✓	✓	D	B-	B+	<p>Pre Construction phase: No impact is expected.</p> <p>Construction phase: Accidents of workers may be caused by construction work.</p> <p>Operational phase: Less road maintenance work is expected and less work accidents are expected.</p>
	20.	Accidents		✓	✓	D	B-	B-/+	<p>Pre Construction phase: No activities are expected to cause accidents.</p> <p>Construction phase: There can be various construction related accidents.</p> <p>Operation phase: Better road design is expected to reduce traffic accidents. On the other hand, increase of the traffic would cause accidents.</p>
	21	Climate Change		✓	✓	D	D	D	The project decreases the emissions and the impacts to climate change are minimum.

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Note:
A+/-: Significant positive/negative impact is expected.
B+/-: Positive/negative impact is expected to some extent.
D: No impact is expected.
Source: JICA Study Team

7.8 Environmental Management Plan and Monitoring Plan

7.8.1 Environment Management Plan

The Environmental management plan (EMP) outlines existing and potential problems that may impact the environment and recommends corrective measures wherever required. Enhancement measures are also proposed in order to provide sound environmental practices and improve the aesthetics of the project area.

This EMP consists of a set of mitigation, monitoring, and institutional measures to be taken up for the project to avoid, minimize, and mitigate adverse environmental impacts and enhance positive impacts. The plan also includes the actions needed for the implementation of these measures. The major components of the Environmental Management Plan are:

- Mitigation of potentially adverse impacts;
- Monitoring of EMP implementation during project implementation and operation; and
- Institutional arrangements to implement the EMP

The environmental management measures shall be implemented during the various stages of the project viz: Pre-construction/Design stage, Construction stage, and Operational stage.

The main objectives of this EMP are:

- To formulate avoidance, mitigation and compensation measures for anticipated adverse environmental impacts during construction and operation, and ensure that environmentally sound, sustainable and good practices are adopted;
- To stipulate monitoring and institutional requirements for ensuring safeguard compliance; and
- The project road should be environmentally sustainable.

Environmental management measures shall be implemented during the various stages of the project viz: Pre-construction stage, Construction stage and Operational stage.

(1) Pre-Construction Stage

C.1. Pre-construction activities by the Authority/ Consultant

Prior to the contractor mobilization, the PMU will ensure that an encumbrance free Corridor is handed over to enable the start of construction. Clearance involves the following activities:

- Removal and felling of trees, which is very minimal;
- Relocation of common property resources and utilities like telephone poles, electric poles and hand pumps;
- Formal arrangements for maintenance of enhancement sites. This includes plantation of trees and barricades along the road; and
- Modification (if any), of the contract documents by the Engineer of the Independent Consultant.

C.2. Pre-construction Activities by Contractor

Pre-construction stage involves mobilisation of the Contractor and the activities undertaken by the Contractor about the planning of logistics and site preparation necessary for commencing construction activities. The activities include:

- Joint field verification by the Environment Specialist of the Independent Consultant and Contractor to check the different applicable component of EMP.
- 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 machineries.
- 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.

(2) Construction Stage

D.1. 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.

D.2. Construction Activities by the Authority/ Consultants

The PMU/Consultant 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 for the implementation of EMP and EMoP during construction stage;
- Monitoring and guiding the contractor on adopting good environmental and engineering practices;
- Arrangement of plantation through the Forest Department;
- Arranging training to the contractor and other stakeholders according to the needs arising; and
- To make changes in the design if need so arises.

(3) Operation Stage

The operational stage involves the following activities by the Authority Monitoring of environmental conditions through approved monitoring agency; and Monitoring of operational performance of the various mitigation/enhancement measures carried out.

EMP for this project indicating the issues, management measures, locations and responsibility matrix is presented in the table below.

Table 7-82: Environment Management Plan

AE: Authority Engineer, PMU: Project Implementation Unit

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
A. Design and Pre-construction Stage								
1. Alignment/Pavement								
1.1 Pavement damage and inadequate drainage provisions	Raise road level above the nearby areas with provision of adequate side drains to evacuate the rain water and domestic discharges (drained by habitats occasionally to prevent damage to road and rain water entry to habitats' houses. Provision of adequate no. of cross drainage structures based on drainage pattern around the alignment	To meet the Design requirement IRC: SP: 19. IRC: 37-2012 and IRC:SP:73-2007 and avoid water logging	Throughout the habitat areas Provision for Both side drains in all the important locations including built-up areas.	MI: Design and number of cross and side drains, slab/box culverts, and Hume pipes PT: Design and numbers are in accordance with site needs	Review of detail design documents & drawings and comparison with site conditions/ During design stage	Covered under preliminary design preparation by F/S consultant Detailed design cost to be borne by construction contractor	Design Consultant	NHIDCL /CSC
1.2 Construction of concrete pavement in habitat areas considering alignment level and drainage.								
1.3 Safety along the proposed alignment	Vertical and horizontal geometrics in consistent to IRC/MORTH guidelines Provision of crash barriers at high embankments. Speed breakers in habitat areas, schools, junction and curves to regulate speed. Provision of retro-reflective warning signboards near school, hospital, religious places and forests Safety kerbs at all bridges Informatory signage on approach to school	To meet the Design requirement IRC:SP:73-2007 IRC:SP:84-2014 IRC:8, IRC:25, IRC:26, IRC:35, IRC:67, IRC:103 and Section 800 of MoRTH Specifications Horizontal geometry will be based on IRC: 38-1988	Crash barriers Speed Restriction sign posts at road junction All Major intersections	MI: number and location of crash barriers, speed breakers, warning sign boards, road studs, object markers etc. PT: numbers and location are in accordance with site needs	Review of design documents and drawings and comparison with site conditions/ During design stage	Covered under preliminary design preparation by F/S consultant Detailed design cost to be borne by construction contractor	Design Consultant	NHIDCL (NH)/CSC

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	Ambulance and medical aid posts Checking for overloading at toll plazas Speed restrictions in built up sections curve locations etc	and vertical geometry will be based on IRC: SP 23-1993 “. IRC: SP: 67-2012 and to make sure safety provision in design stage						
2. Cross broder, Natural Hazards and Climate Change risks								
2.1 Damage to pavement integrity like Rutting, embankment softening and migration of liquid asphalt. Thermal expansion in bridge expansion joints and paved surfaces	Asphalt binder specifications based on viscosity-grade specifications as per IS 73-2013 guidelines and IS 15462 2004 for rubber modified binder and polymer modified binders.	To meet the IRC 37 2012 for flexible pavement design, IRC 81 1997 for strengthening of flexible pavement and to minimize damage to the bridges/pavments	Entire stretch	MI: Pavement Surface and bridge expansion joints during extreme heat PI: No softening, rutting, asphalt migration/thermal expansion of joint	Review of design documents and drawings comparison with site conditions/ during design stage	preliminary design cost of F/S consultant Detailed design cost to be borne by construction contractor	Design consultant	NHIDCL /CSC
2.2 Earthquake	Relevant IS codes shall be adopted in designing the structures to sustain the magnitude of earthquake corresponding to Seismic zone of the project area	To make the Dislodgement of superstructure as per Clause 222 of IRC: 6 and design new bridge as per relevant IRC code, to minimize damage in case of an earthquake	Entire Stretch	MI: Bridges and Culverts PT: Design conforms BIS and IRC guidelines	Review of design documents and drawings comparison with site conditions/ during design stage	F/S consultant, Detailed design cost to be borne by construction contractor	construction contractor	NHIDCL / CSC
3. Protected area, Diversion of Forest Land and Cutting of Trees								
3.1 Need for cutting of trees and diversion of forest land	Geometric adjustments to minimize tree cutting and diversion of forest land	To follow Forest Conservation Act, 1980 and minimize cutting of	Throughout the corridor.	MI: Number and location of geometric	Review final design. Check budget provision for compensatory	Covered under preliminary design preparation by	NHIDCL PMU, Design consultants forest	NHIDCL / Forest department

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	Obtain tree cutting permission from forest department Provision for mandatory compensatory afforestation as per the norms for deposit of payment to Forestry Department To cut down trees, it is necessary. to obtain forest clearance from the Forestry Dept (stage 1 clearance of the same clearance has already been obtained, and cutting will be possible after stage 2 clearance becomes effective). Alternative tree planting is required for felled trees. As for alternative trees, certain amount of the area of the modified forest and the candidate site proposed by the Forestry Dept, considering the existing vegetation, along the roadside and around the project site.	trees & forest land acquisition	Especially in the forest cover area. Hence all the trees coming in ROW in those parts will fell down.	adjustments made to avoid forestland and tree cutting, budget amount allocated for compensatory afforestation as per the norms fixed by state forest department PT: Unnecessary tree felling on forest land avoided. Budget allocation is adequate,	afforestation and additional Plantation/ during design stage	F/S consultant Detailed design cost to be borne by construction contractor	department	
4. Ecosystem								
4.1 Road design causing accidents of wild animals and disruption in their movement	Provision of rumble strip, cautionary and informatory sign boards near potential wildlife crossing locations Speed restriction in the sections where wildlife movement is reported Clearance of all shrubs grown inside the ROW once in a	To minimize accidents and disruption of wildlife movement	No visible wildlife movement in the project road. However, project road passing through forest land shall be considered.	MI: budget allocation for rumble strips, cautionary and informatory sign boards, PT: Budget adequate to fulfill	Review of bid documents and project budget plan/ during design stage	Covered under costs for F/S Consultant	NHIDCL PMU, Design Consultant	NHIDCL in coordination with Forest Department

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	year after monsoon to provide better lateral visibility to drivers Maintain 15 m distance between two trees during avenue plantation			the installation of recommended facilities and structures				
4.2 Forest Fires	Measures to avoid accident followed by fuel accumulation Removal of maintenance slash or management by controlled burning. Plant fire-resistant species in RoW Thinning slashing during non-dry season No construction camp within 500m	To minimize forest fire	Throughout the	MI: Damage to roadside flora and spillage /fuel accumulation induced accident PT: Zero incidence of forest fire	During design stage	Covered under F/S consultant cost	construction contractor	NHIDCL/ Forest department
5. Quarry								
5.1 Selection of the quarry	. When selecting a quarry, avoid the area around the water source, and avoid wildlife sanctuaries and IBA / KBA established in the country concerned	To meet the legal requirements and maintain the utility services in the area.	Near quarry area	MI: water source, wildlife sanctuaries and IBA / KBA PT: Avoidance of the area	During design stage	Covered under F/S consultant cost	construction contractor	NHIDCL/MoEF C
6. Shifting of Utilities								
6.1 Disruption of utility services to local community	All telephone and electrical poles/wires and underground cables should be shifted before start of construction. Necessary permission and payments should be made to relevant utility service	To meet the legal requirements and maintain the utility services in the area	Near forest covers and corridor	MI: Number of complaints from local people, Shifting plan and status of utility services PT: No. of	Interaction with concerned utility authorities	Included under NHIDCL's costs	Contractor/ NHIDCL/utility company	NHIDCL/ CSC

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	agencies to allow quick shifting and restoration of utility services. Local people must be informed through appropriate means about the time of shifting of utility structures and potential disruption of services if any.			complaints should be zero. Minimal time for utility shifting	and local public/ during per construction stage			
7. Water use								
Water use inequality	Compensation for the lost pond	To compensate the people who depend on pond	Near Pond area	Number of ponds lost and its values	Review the usage of pond and its values	Covered under F/S consultant cost	construction contractor	NHIDCL
8. Vibrations								
8.1 Minimizing the effect of vibration from machinery	<ul style="list-style-type: none"> Reroute truck traffic away from the residential areas, if possible select streets with fewer homes if no alternative route is available; Site equipment to be placed away from the residential location and sensitive areas; 	To follow the JICA guideline and international standards	Throughout project alignment	MI: Vibration level by ppvs PI: ppvs at the acceptable level	<ul style="list-style-type: none"> Review of vibration level monitoring data maintained by contractor Observation of construction site/ during construction period once in two year 	Included in civil works cost	Construction contractor	NHIDCL/CSC
9. Accidents.								
9.1 Accident risks associated with traffic movement.	Traffic control measures, including speed limits, will be enforced strictly. Further encroachment of squatters within the ROW will be prevented. Monitor/ensure that all safety provisions included in design and construction phase are properly maintained	To meet IRC:SP:55-2014 and provide traffic control measures to minimize accidents	Throughout the Project route	<ul style="list-style-type: none"> accidents Conditions and existence of safety signs, rumble strips etc. on the road Presence/absence of 	<ul style="list-style-type: none"> Review accident Records Site observations/ during operation period Review accident Records Site observations/ during operation period 	Operation / Maintenance cost		NHIDCL

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	<p>Highway patrol unit(s) for round the clock patrolling. Phone booth for accidental reporting and ambulance services with minimum response time for rescue of any accident victims, if possible. Tow-way facility for the breakdown vehicles if possible. Traffic control measures, including speed limits, will be enforced strictly. Further encroachment of squatters within the ROW will be prevented. Monitor/ensure that all safety provisions included in design and construction phase are properly maintained Highway patrol unit(s) for round the clock patrolling. Phone booth for accidental reporting and ambulance services with minimum response time for rescue of any accident victims, if possible. Tow-way facility for the breakdown vehicles if possible.</p>			<p>sensitive receptor structures inside the stipulated planning line as per relevant local law PT: Fatal and non-fatal accident rate is reduced after improvement MI: Number of</p>				
B. Construction Stage								
1. Air Pollution								
1.1 Dust Generation due	Concessionaire to submit location and layout plan for	To minimize air pollution and meet the	Throughout project	MI: PM10 & PM2.5	Standards CPCB methods	Included in civil works cost	Construction contractor	NHIDCL

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
to construction activities and transport, storage and handling of construction materials	storage areas of construction materials agreed by CSC Transport, loading and unloading of loose and fine materials through covered vehicles. Paved approach roads. Storage areas to be located downwind of the habitation area. Water spraying on earthworks, unpaved haulage roads and other dust prone areas. Provision of PPEs to workers.	MORT&H Specifications for Road and Bridge works Air (P and CP) Act 1974 and Central Motor and Vehicle Act 1988 General Conditions of Bid Document	corridor	level measurements Complaints from locals due to dust PT: PM2.5 level < 60 g/m3 & PM10 level < 100 g/m3 Number of complaints should be zero.	Observations Public consultation Review of monitoring data maintained by contractor/ during construction period of two years quarterly during dry season			
1.2 Emission of air Pollutants (HC,SO2,NOx etc.) from vehicles due to traffic congestion and use of equipment and Machinery	Regular maintenance of machinery and equipment. Batching, asphalt mixing plants and crushers at downwind (1km) direction from the nearest settlement. Only crushers licensed by the PCB shall be used DG sets with stacks of adequate height and use of low sulphur diesel as fuel. LPG should be used as fuel source in construction camps instead of wood Ambient air quality monitoring	To follow the Air (Prevention and Control of Pollution) Act, 1981 (Amended 1987) and Rules 1982	Asphalt mixing plants, crushers, DG sets locations	MI: Levels of HC, SOx, NOx Status of PUC certificates PT: SOx and NOx levels are both less than 80ug/m3. PUC certificate of equipment and machinery is upto	Standards CPCB methods Review of monitoring data maintained by Contractor/ during construction period of two years quarterly during dry season	Included in civil works cost	Construction contractor	NHIDCL /CSC

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	Contractor to prepare traffic management and dust suppression plan duly approved by NHIDCL (NH), Tripura			date				
2. Noise /Vibration Pollution								
2.1 Disturbance to local residents and sensitive receptors due to excessive noise from construction activities and operation of equipment and machinery	All equipment to be timely serviced and properly maintained. Construction equipment and machinery to be fitted with silencers and maintained properly. Only IS approved equipment shall be used for construction activities. Timing of noisy construction activities shall be done during night time and weekend near schools, Implement noisy operations intermittently to reduce the total noise generated Manage existing traffic to avoid traffic jams and accumulation of noise beyond standards. Restrict construction near residential, built up and forest areas construction to the night hours. Honking restrictions near sensitive areas PPEs to workers	To follow requirement Pollution (Regulation and amendments thereof Clause No 501.8.6. MORTH Specifications for Road and Bridge works and minimize pollution	Legal Noisealignment Specially at all sensitive receptors like schools and hospitals falling along the project alignment.	Throughout project MI: day and night Noise levels. Number of complaints from local people PT:Zero complaints or no Repeated complaints by local people. Average day and night time noise levels are within permissible limits for work zone areas	As per Noise rule, 2000 Consultation with local people Review of noise level monitoring data maintained by contractor Observation of construction site/ during construction period once in two year	Included in civil works cost	Construction contractor	NHIDCL/CSC

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	Noise monitoring as per EMoP.							
2.2 Minimizing the effect of vibration from machinery	<ul style="list-style-type: none"> •Construct walled enclosures around especially noisy activities or clusters of noise generating equipment; •All plant equipment and vehicles being fitted with appropriate noise suppression equipment to reduce noise and vibration levels as far as possible; •All equipment should be operating in good condition. Use of equipment having inbuilt enclosed air compressor and mufflers on all engines. •Avoid pile driving work where possible in sensitive areas by quieter alternatives where geological conditions permit their use; 	To follow the JICA guideline and alignment international standards	Throughout project alignment	MI: Vibration level by ppvs PI: ppvs at the acceptable level	Review of vibration level monitoring data maintained by contractor -Observation of construction site/ during construction period once in two year	Included in civil works cost	Construction contractor	NHIDCL/CSC
3. Land and Soil Pollution								
3.1 Landuse Change and Loss of productive / Topsoil	<p>Non-agricultural areas to be used as borrow areas to the extent possible.</p> <p>If using agricultural land, top soil to be preserved and laid over either on the embankment slope for growing vegetation to protect soil erosion.</p> <p>Land for temporary facilities like construction camp,</p>	To minimize land acquisition and preservation of top soil	Throughout the project section and borrow areas Land identified for camp, storage areas etc.	MI: Borrow pit locations/Top soil storage area PT: Zero complaints or disputes registered against	Review borrow area plan, site visits/ during construction period of two years	Included in civil works cost	Construction contractor	NHIDCL /CSC

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	storage areas etc. shall be brought back to its original Landuse			contractor by land owner				
3.2 Borrow area management	<p>Obtain EC from SEIAA before opening any new borrow area.</p> <p>Comply to EC conditions of SEIAA</p> <p>Non-productive, barren lands, upland shall be used for borrowing earth with the necessary permissions/consents.</p> <p>Depths of borrow pits to be regulated and sides not steeper than 25%.</p> <p>Topsoil to be stockpiled and protected for use at the rehabilitation stage.</p> <p>Transportation of earth materials through covered vehicles.</p> <p>Follow IRC recommended practice for borrow pits (IRC 10: 1961) for identification of location, its operation and rehabilitation</p> <p>Borrow areas not to be dug continuously.</p> <p>To the extent borrow areas shall be sited away from habitat areas.</p> <p>Borrow areas shall be levelled with salvaged material or other filling materials which do not pose</p>	<p>To follow IRC Guidelines on borrow areas and for quarries (Environmental protection Act and Rules, 1986; Water Act, Air Act)+Clause 305.2.2 MORTH Specifications for Road and Bridgeworks</p> <p>Guidelines for Borrow Areas management and proper closing of borrow areas to avoid accidents & land stability</p>	Borrow sites location	<p>MI: Existence of borrow areas in inappropriate unauthorized locations. Poor borrow area management practices. Number of accidents. Complaints from local people.</p> <p>PT: No case of non-compliance to conditions stipulated by SEIAA in clearance letter. Zero accidents. Zero complaints. No use of black cotton soil</p>	<p>Review of design documents and site observations/ during construction period of two years</p>	Included in civil works cost	Construction contractor	NHIDCL /CSC

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	contamination of soil. Else, it shall be converted into fish pond.							
3.3 Quarry Operations	<p>Aggregates will be sourced from existing licensed quarries.</p> <p>Copies of consent/ approval / rehabilitation plan for a new quarry or use of existing source will be submitted to NHIDCL.</p> <p>The contractor will develop a Quarry Redevelopment plan, as per the Mining Rules of the state and submit a copy of the approval to EA.</p> <p>Obtain environmental clearance from SEIAA in case of opening new quarry</p>	<p>To meet Clause No.111.3 MORT&H Specifications for Road and Bridge works Guidelines VI for Quarry Areas Management Environmental Protection Rules and to minimize the environmental damage</p>	<p>Existing quarries of project districts viz. Unakoti, Dhalai & Khowai Districts.</p>	<p>MI: Existence of licenses quarry areas from which materials to be sourced and Existence of a quarry redevelopment plan</p> <p>PT: Quarry license is valid.: No case of non-compliance to consent conditions and air quality meets the prescribed limit</p>	<p>Review of design documents, contractor documents and site observation Compliance to EC conditions in case of opening new Quarries/ during construction period of two years</p>	Included in civil works cost	Construction contractor	NHIDCL /CSC
3.4 Compaction of soil and impact on quarry haul roads due to movement of vehicles and equipment	<p>Construction vehicles, machinery, and equipment to be stationed in the designated ROW to avoid compaction.</p> <p>Approach roads/haulage roads shall be designed along the barren and hard soil area to reduce the compaction.</p> <p>Transportation of quarry material to the dumping site</p>	<p>To minimize environmental pollution due to utilization of haul roads</p>	<p>Parking areas, Haulage roads and construction yards.</p>	<p>MI: Location of approach and haulage roads Presence of destroyed/compacted agricultural land or land which has not be restored to its</p>	<p>Site observation/ during construction period of two years</p>	Included in civil works cost	Construction contractor	NHIDCL /CSC

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	through heavy vehicles shall be done through existing major roads to the extent possible to restrict wear and tear to the village/minor roads. Land taken for construction camp and other temporary facility shall be restored to its original conditions			original condition PT: Zero occurrence of destroyed/compacted land and undestroyed land				
3.5 Contamination of soil due to leakage/ spillage of oil, bituminous and non-bituminous debris generated from demolition and road construction	Construction vehicles and equipment will be maintained and refueled in such a fashion that oil/diesel spillage does not contaminate the soil. Fuel storage and refuelling sites to be kept away from drainage channels. Unusable debris shall be dumped in ditches and low lying areas. To avoid soil contamination Oil- Interceptors shall be provided at wash down and refuelling areas. Waste oil and oil soaked cotton/ cloth shall be stored in containers labelled 'Waste Oil' and 'Hazardous' sold off to MoEF/SPCB authorized vendors Non-bituminous wastes to be dumped in borrow pits with the concurrence of landowner and covered with a layer of	To minimize soil contamination due to spillage	Fueling station, construction sites, and construction camps and disposal location.	MI: Quality of soil near storage area Presence of spilled oil or bitumen in project area PT: Soil test conforming to no contamination. No sighting of spilled oil or bitumen in construction site or camp site	Site observation/ during construction period of two years	Included in civil work cost.	Construction contractor	NHIDCL /CSC

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	topsoil conserved from opening the pit. Bituminous wastes will be disposed off in an identified dumping site approved by the State Pollution Control Board The contamination of soil will cause the water pollution → see water pollution							
4. Water pollution								
4.1 Sedimentation caused by tabulating Water	The sheets or covers	To prevent the solid to fell off during construction activities	Bridge areas	MI: Sediment level PT: Minimum	Sediment test	Included in civil works cost	Construction contractor	NHIDCL/ CSC
5. Topography and Geology								
5.1 Change in topography due to Construction activities, earthwork, and cut and fill, stockpiles etc. No change in geology is anticipated	Side slopes of all cut and fill areas will be graded and covered, grass and shrub as per design specifications. Care should be taken that the slope gradient shall not be greater than 2:1. The earth stockpiles to be provided with gentle slopes to soil erosion.	To meet IRC: 56 -1974 recommended practice for treatment of embankment slopes for erosion control Clause No. 306 and 305.2.2 MORT&H Specifications for Road and Bridge works Guidelines IX for Soil erosion and minimize slope failure and soil erosion	Throughout the entire project road	MI: Occurrence of slope failure or erosion issues PT: No slope failures. Minimal erosion issues	Review of design documents and site Observation/ during construction period of two years especially in rainy season	Included in civil works cost	Construction contractor	NHIDCL/ CSC
6. Hydrology								

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
6.1 Sourcing of water during Construction	Requisite permission shall be obtained for abstraction of groundwater from Central Groundwater Authority. Arrangements shall be made by contractor that the water availability and supply to nearby communities remain unaffected. Water intensive activities not to be undertaken during dry season. Provision of water harvesting structure	To follow CGWA Guidelines and conservation of water resources	Throughout the project location	MI: Approval from competent authority Complaints from local people on water availability PT: Valid approval from competent authority. Zero complaints from local people.	Checking of documentation Talk to local People/ during construction period of two years	Included in civil work cost	Construction contractor	NHIDCL/CSC
6.2 Disposal of storm water during construction	Provisions shall be made to connect road side drains with existing nearby natural drains.	To minimize water logging during rain and follow Clause No.1010 EP Act 1986 MORT&H Specifications for Road and Bridgeworks	Throughout the Project section	MI: Condition of drainage system in construction site. Presence /absence of water logging in project area. PT: Existence of proper drainage system. No water logging in project area	Standards methods Site observation and review of documents/ during construction period of two years	Included in civil work cost	Construction contractor	NHIDCL /CSC
6.3 Alteration in surface water hydrology	Existing drainage system to be maintained and further enhanced. Provision shall be made for adequate size and number of cross drainage structures esp. in the areas where land is sloping towards road alignment.	To meet design requirement, Clause No. 501.8.6. MORT&H Specifications and maintaining the existing drainage system	All the major streams and Nallahs flowing through the proposed road, all the road side ponds and Rivers mainly Khowai and Gumti	MI: Proper flow of water in existing streams and rivers PT: No complain of water shortage by downstream communities. No	Review of design documents Site observation/ during construction period of two years	Included in civil works cost	Construction contractor	NHIDCL /CSC

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	Culverts reconstruction shall be done during lean flow period. Plan of proper number of culverts		Crossing the project road.	record of overtopping/ water logging				
7. Ecosystem								
7.1 Vegetation loss due to site preparation and construction activities	Restrict tree cutting upto toe line considering safety to road users. Roadside trees to be removed with prior approval of competent authority. Mandatory compensatory plantation at norms fixed by State Forest Department Additional plantation as per the IRC guidelines to be carried out by construction contractor Regular maintenance trees planted. Provision of LPG in construction camp as fuel source to avoid tree cutting. Plantation of trees on both sides of the road where technically feasible. Trees should be offset 1m back from the ultimate edge of the roadway to prevent safety hazard and provide adequate sight distance. Controlled use of pesticides/ fertilizers	To follow Forest Conservation Act1980 + IRC:SP:21 and IRC:SP:66 and minimize vegetation loss	Roadside plantation throughout the project road with survival rate of minimum 75% Additional Plantation norms fixed by state forest dept. for diversion of forest cover as 'Compensatory Afforestation' in the designated location notified by state forest department Rema Kalenga WLS border area area	MI: ROW width Number of trees for felling Compensatory plantation plan Number of trees replanted. PT: Additional compensatory afforestation done on norms fixed by state forest department.	Review of relevant documents – tree cutting permit, compensatory plantation plan. and additional plantation strategy Field observations/ during construction period of two years	Mandatory Compensatory afforestation cost is included in project costs under NHIDCL- NH. Additional compensatory afforestation costs included in civil works costs	Mandatory Compensatory plantation by forest Department and additional plantation by construction contractor	NHIDCL- NH/CSC/ State Forest Department

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	Concerns for the Rema Kalenga WLS (Bangladesh side, Border area)							
7.2 Protection of Endangered Species	Prohibit disturbance, harassment, and hunting by construction workers. Replace to nearby sites if needed. Signage for the construction workers.	To meet the Wildlife Act (1972) and JICA guidelines	Area between Gumti WLS and the alignment	MI: Existence of endangered species PT: No record of decrease in numbers or extinction	Regular visual checks endangered species in the nearby WLSs and ESZs during the construction time. Throughout the construction period	Included in contract cost by Contractor	Contractor/ Environmental Consultant	NHIDCL MOEFCC
7.3 Protection of holistic ecosystem	Prohibit disturbance, harassment, and hunting by construction workers. Replace to nearby sites if needed. Signage for the construction workers.	To meet the Wildlife Act (1972) and JICA guidelines	Area along the alignment	MI: Existence of general flora and fauna PT: minimum record of decrease in numbers or extinction	Regular visual checks endangered species in the nearby WLSs and ESZs during the construction time. Throughout the construction period	Included in contract cost by Contractor	Contractor/ Environmental Consultant	NHIDCL MOEFCC
8. Construction Camps/Working conditions								
8.1 Impact associated with location	All camps should be established with prior permission from PCB. Camps to maintain minimum distance from following: # 500 m from habitation # 500 m from forest areas where possible # 500 m from water bodies where possible # 500 m from traffic route # 500 m from identified wildlife crossing areas	To meet the design Requirement The Water (Prevention and Control of Pollution) Act, 1974 and its amendments thereof and minimize the environmental impacts due to construction camps activities, discharges and emissions	All construction camps	MI: Location of campsites and distance from habitation, forest areas, water bodies, through traffic route and construction camps PT: Distance of campsite is less than 500m from listed locations	On site observation with Interaction with workers and local community/ during construction period of two years	Included in civil works cost	Construction contractor and EO	NHIDCL /CSC
8.2 Worker's Health in construction camp	The location, layout and basic facility provision of each labor camp will be submitted to CSC and approved by	To make sure that the Building and Other Construction workers (Regulation	All construction camps	MI: Camp health records Existence of	Camp records Site observation	Part of the civil works costs	Construction contractor	NHIDCL /CSC

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	NHIDCL (NH). The contractor will maintain necessary living accommodation and ancillary facilities in hygienic manner. Adequate water and sanitary latrines with septic tanks with soak pits shall be provided. Preventive medical facilities in camp Waste disposal facilities such as dust bins must be provided in the camps and regular disposal of waste The Contractor will take all precautions to protect the workers from insect and pest to reduce the risk to health. This includes the use of insecticides which should comply with local regulations. No liquor or prohibited drugs will be imported to, sell, give and barter to the workers of host community. Awareness raising to immigrant workers/local community on communicable and sexually transmitted diseases.	of Employment and Conditions of service) Act 1996 and The Water (Prevention and Control of Pollution) Act,1974 and amendments thereof shall be followed and hygiene in camp shall be maintained		proper first aid kit in camp site Complaints from workers. PT: No record of illness due to unhygienic conditions or vectors. Zero cases of STD. Clean and tidy camp site conditions.	Consultation with contractor workers and local people living nearby/ during construction period of two years			
9. Management of Construction Waste/Debris								
9.1 Selection of Dumping Sites	Contractor to submit a waste/spoil disposal plan and	To meet design Requirement, MORT&H guidelines	At all Dumping/Disposal	MI: Location of dumping sites	Field survey and interaction with	Included in civil works cost.	Construction contractor	NHIDCL /CSC

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	<p>get it approved by CSC and EA.</p> <p>Create controlled dumping sites with a non-permeable lining incorporated in the pit design to avoid leachate seepage into the soil, which may later affect ground water quality</p> <p>Unproductive/wastelands shall be selected for dumping sites away from residential areas and water bodies</p> <p>Dumping sites must be having adequate capacity equal to the amount of debris generated.</p> <p>Public perception and consent from the village Panchayats has to be obtained before finalizing the location.</p>	<p>and General Conditions of Contract Document and to follow construction & Demolition waste rule, 2016</p>	Sites	<p>Number of public complaints.</p> <p>PT: No public complaints. Consent letters for all dumping sites available with contractor</p>	<p>local people.</p> <p>Review of consent Letter/ during construction period of two years</p>			
9.2 Reuse and disposal of construction and dismantled waste	<p>The existing bitumen surface shall be utilized for paving of cross roads, access roads, and paving works in construction sites and camps, temporary traffic diversions, and haulage routes.</p> <p>All excavated materials from roadway, shoulders, verges, drains, cross drainage will be used for backfilling embankments, filling pits, and landscaping.</p>	<p>To meet design Requirement, MORT&H guidelines and General Conditions of Contract Document and to follow construction & Demolition waste rule, 2016</p>	Throughout the project corridor	<p>MI: Percentage of reuse of existing surface material</p> <p>Method and location of disposal</p>	<p>Contractor records</p> <p>Field observation</p> <p>Interaction with local people/ during construction period of two years</p>	Included in civil works cost.		

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	Unusable and non-bituminous debris materials should be suitably disposed off at pre-designated disposal locations, with approval of the concerned authority. The bituminous wastes shall be disposed in secure landfill sites only in environmentally accepted manner. For removal of debris, wastes and its disposal, MORTH guidelines should be followed. Unusable and surplus materials, as determined by the Project Engineer, will be removed and disposed off-site.			site of construction debris PT: No public complaint and consent letters for all dumping sites available with contractor or CSC				
10. Accidents, Traffic Management and Safety								
10.1 Management of existing traffic and safety	Traffic Management Plan shall be submitted by the contractor and approved by the CSC. The traffic control plans shall contain details of diversions; traffic safety arrangements during construction; safety measures for night time traffic and precautions for transportation of hazardous materials. Timing and scheduling to be done so that transportation of dangerous goods is done during least number of people	To meet design requirement and IRC: SP: 27 -1984, Report Containing Recommendation of IRC Regional Workshops on Highway Safety IRC:SP: 32 -1988 Road Safety for Children (5-12 Years Old)	Throughout the project road corridor	MI: Traffic management plan. Presence/absence of safety signs, traffic demarcations, flag men etc. on site. Complaints from road users. No of accidents PT: No complaints.	Review traffic management plan Field observation of traffic management and safety system Interaction with people in vehicles using the road/ during construction period of two years	Included in civil works cost.	Construction contractor	NHIDCL /CSC

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	and other vehicles on the road. The Contractor will ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow.	in Construction Zones IRC:SP:55-2014 and avoid traffic congestion and safety of workers/road users during construction		No accidents due to poor traffic management. Traffic signs, demarcation lines etc. present in appropriate locations on site				
	On stretches where it is not possible to pass the traffic on the part width of existing carriageway, temporary paved diversions will be constructed. Restriction of construction activity to only one side of the existing road The contractor shall inform local community of changes to traffic routes, and pedestrian access arrangements with assistance from "Engineer". Use of adequate signage's to ensure traffic management and safety. Conduct of regular safety audit on safety measures.	The Building and other Construction workers Act 1996 and Cess Act of 1996 Factories Act 1948+Section 6 of Employer's Requirement of Bid Document						
10.2 Pedestrians, animal movement	Temporary access and diversion, with proper drainage facilities. Access to the schools, temples and other public places must be maintained	Same as above	Near habitation on both sides of schools, health centres, religious centres, graveyards, construction sites,	MI: Presence/absence of access routes for pedestrians.	Field observation Interaction with local people/ during construction period of two years	Included in civil works cost.	Construction contractor	NHIDCL /CSC

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	when construction takes place near them. Fencing wherever animal movement is expected. Large number of box culverts has been proposed. . All structures having vertical clearance above 2m and not catering to perennial flow of water may serve as underpass for animals		haulage roads, diversion sites	Road signage Number of complaints from local people PT: Easy access to schools, temples Zero complaints				
10.3 Safety of Workers and accident risk from construction activities.	Contractorsto adopt and maintain safe working practices. Usage of fluorescent and retro refractory signage, in local language at the construction sites Training to workers on safety procedures and precautions. Mandatory appointment of safety officer. All regulations regarding safe scaffolding, ladders, working platforms, gangway, stair wells, excavations, trenches and safe means of entry and egress shall be complied with. Provision of PPEs to workers. Provision of a readily available first aid unit including an adequate supply of dressing materials.	Same as above	Construction sites	MI: Availability of Safety gears to workers Safety signage Training records on safety Number of safety related accidents PT: Zero fatal	Site observation Review records on safety training and accidents Interact with construction Workers/ during construction period of two years	Included in civil works cost	Obligation of NHIDCL Construction contractor	CSC

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	The contractor will not employ any person below the age of 18years Use of hazardous material should be minimized and/or restricted. Emergency plan (to be approved by engineer) shall be prepared to respond to any accidents or emergencies. Accident Prevention Officer must be appointed by the contractor.			accidents. Zero or minor non-fatal accidents.				
10.4 Accident risk to local community	Restrict access to construction sites only to authorized personnel. Physical separation must be provided for movement of vehicular and human traffic. Adequate signage must be provided for safe traffic movement Provision of temporary diversions and awareness to locals before opening new construction fronts.	Same as above	Construction sites	MI: Safety signs and their location Incidents of accidents Complaints from local people PT: Zero incident of accidents. Zero complaints.	Site inspection Consultation with local people/ during construction period of two years	Included in civil works cost	Construction contractor	NHIDCL /CSC
11. Site restoration and rehabilitation								
11.1 Clean-up Operations, Restoration and	Contractor will prepare site restoration plans, which will be approved by the 'Engineer'.	To restore the original condition in surrounding	Throughout the project corridor, construction camp	MI: Condition of camp, borrow areas and	Site observation Interaction with	Included in civil works cost.	Construction contractor	NHIDCL /CSC

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
Rehabilitation	The clean-up and restoration operations are to be implemented by the contractor prior to demobilization. All construction zones including river-beds, culverts, road-side areas, camps, hot mix plant sites, crushers, batching plant sites and any other area used/affected by the project will be left clean and tidy, to the satisfaction of the Environmental officer. All the opened borrow areas will be rehabilitated and 'Engineer' will certify		sites and borrow areas	construction sites, Presence/absence of construction material/debris after completion of construction works on site. PT: Clean and tidy sites. No trash or debris left on site. Site restored and leveled.	locals Issue completion certificate after restoration of all sites are found Satisfactory/ immediately after construction is over			
Operation and Maintenance stage								
1. Ecosystem								
1.1 Anticipated risk of vehicle-animal collision and human-animal conflict	Effectiveness of mitigative measures (rumble strips, informative hoarding /cautionary signage, clearance of shrubs from right of way, maintaining 15m distance between 2 trees during avenue plantation etc.) recommended in design stage shall be monitored. NHIDCL, Tripura to keep record of all accidents. Fresh assessment in case of future widening	To minimize vehicle-animal collision and human-animal conflict	No wildlife movement corridor in the project road. However, provision shall be undertaken in the forest area along the project road.	MI: No. of vehicle - animal collision. Time (day or night, season/month and location of collision. Cause of collision. No of incidence of human - animal conflict. PT: minimum vehicle - animal	Site Observation Discussion with local People Collection of information from Forestry Department/ during operation period	Included in Operation / Maintenance cost	NHIDCL field offices/Forest Department	

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
				collisions. No of consultation done with forest department				
1.2 Vegetation	Planted trees, shrubs, and grasses to be properly maintained. The tree survival audit to be conducted at least once in a year to assess the effectiveness	To follow Forest Conservation Act 1980 and make sure survival of trees/green cover	Project tree plantation sites	MI: Tree/plants survival rate PT: Minimum rate of	Records and field observations. Information from Forestry Department/ during operation period	Included in Operation / Maintenance cost	NHIDCL /Forest Department	
1.3 Protection of Endangered Species	Prohibit disturbance, harassment, and hunting by road users. Replace to nearby sites if needed. Signage for the road users	To meet the Wildlife Act (1972) and JICA guidelines	Area between Gumti WLS and the alignment	MI: Existence of endangered species PT: No record of decrease in numbers or extinction	Regular visual checks endangered species in the nearby WLSs and ESZs during the operation time. Throughout the operation period.	Included in Operation / Maintenance cost	NHIDCL	NHIDCL MOEFCC
1.4 Protection of holistic ecosystem	Prohibit disturbance, harassment, and hunting by road users. Replace to nearby sites if needed. Signage for the road users	To meet the Wildlife Act (1972) and JICA guidelines	Area along the alignment	MI: Existence of general flora and fauna PT: minimum record of decrease in numbers or extinction	Regular visual checks endangered species in the nearby WLSs and ESZs during the operation time. Throughout the operation period.	Included in Operation / Maintenance cost	NHIDCL	NHIDCL MOEFCC
2. Air Pollution								
2.1 Air pollution due to vehicular movement	Roadside tree plantations shall be maintained at least with 70% survival rate. Regular maintenance of the road will be done to ensure good surface condition	To meet the requirement of Environmental Protection Act, 1986; The Air (Prevention and	Throughout the project road corridor	MI: Ambient air quality(PM2.5,P M10, Sox, NOx)	As per CPCB requirements Site inspection/ during operation/ period quarterly during dry season	Included in Operation / Maintenance cost	NHIDCL	

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	Ambient air quality monitoring. If monitored parameters exceeds prescribed limit, suitable control measures must be taken. Signages shall be provided reminding them to properly maintain their vehicles to economize on fuel consumption. Enforcement of vehicle emission rules in coordination with transport department or installing emission checking equipment's	Control of Pollution) Act, 1981 and minimize the air pollution		PT: Levels are equal to or below baseline levels given in the IEE report				
3. Noise Pollution								
3.1 Noise due to movement of traffic	Effective traffic management and good riding conditions shall be maintained Speed limitation to 20 km/hour and honking restrictions near sensitive receptors Construction of noise barriers near sensitive receptors with consent of local community The effectiveness of the multi layered plantation should be monitored and if need be, solid noise barrier shall be placed. Create awareness amongst the residents about likely noise levels from road operation at different distances, the safe	To meet the requirement of Noise Pollution (Regulation and Control) Rules,2000 and amendments Thereof and minimize the noise pollution	All Sensitive receptors along the project alignment	MI: Noise levels PT: Levels are equal to or below baseline levels given in the IEE report	Noise monitoring as per noise rules ,2000 Discussion with people at sensitive receptor sites/ quarterly during operation period	Included in Operation / Maintenance cost	NHIDCL	

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
	ambient noise limits and easy to implement noise reduction measures while constructing a building near road.							
4. Land and Soil Pollution								
4.1 Soil erosion at embankment during heavy rainfall.	Periodic checking to be carried to assess the effectiveness of the stabilization measures viz. turfing, stone pitching, river training structures etc. Necessary measures to be followed wherever there are failures	To minimize soil erosion during storm	At bridge locations and embankment as well as highland slopes and other probable soil erosion areas.	MI: Existence of soil erosion sites Number of soil erosion sites PT: Zero or minimal occurrences of soil erosion	On site Observation/ during operation period in rainy season	Included in Operation / Maintenance cost	NHIDCL	
5. Water resources/Flooding and Inundation/Sedimentation								
5.1 Siltation	Regular checks shall be made for soil erosion and turfing conditions for its effective maintenance.	To check erosion and minimize siltation	Near all the surface Water bodies	MI: Water quality PT: No turbidity of surface water bodies due to the road	Site observation/ during operation period in rainy season	Included in Operation / Maintenance cost	NHIDCL	
5.2 Water logging due to blockage of drains, culverts or streams	Regular visual checks and cleaning (at least once before monsoon) of drains to ensure that flow of water is maintained through cross drains and other channels/streams. Monitoring of water borne diseases due to stagnant water bodies	To meet IRC: SP:21-2009 and avoid water logging	Near surface Water bodies/cross drains/side drains	MI: Presence/ absence of water logging along the road PT: No record of overtopping/ Water logging 70% tree survival	Site observation/ during operation period in rainy seson	Included in Operation / Maintenance cost	NHIDCL	
6. Maintenance of Right of Way and Safety								
				MI: Presence and				

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
6.1 Accident Risk due to uncontrolled growth of vegetation	Maintain shoulder completely clear of vegetation. Minimum offset as prescribed in IRC:SP:21-2009 to be maintained Regular maintenance/trimming of plantation along the road side No invasive plantation near the road.	To meet IRC: SP:21-2009 and improve visibility	Throughout the Project route	the extent of vegetation growth on either side of road. Number of accidents. PT: No accidents due to vegetation growth	Visual inspection Check accident records/ during operation period	Included in Operation / Maintenance cost	NHIDCL	
6.2 Accident risks associated with traffic movement.	Traffic control measures, including speed limits, will be enforced strictly. Further encroachment of squatters within the ROW will be prevented. Monitor/ensure that all safety provisions included in design and construction phase are properly maintained Highway patrol unit(s) for round the clock patrolling. Phone booth for accidental reporting and ambulance services with minimum response time for rescue of any accident victims, if possible. Tow-way facility for the breakdown vehicles if possible.	To meet IRC: SP:55-2014 and provide traffic control measures to minimize accidents	Throughout the Project route	MI: Number of accidents Conditions and existence of safety signs, rumble strips etc. on the road Presence/absence of sensitive receptor structures inside the stipulated planning line as per relevant local law PT: Fatal and non-fatal accident rate is reduced after improvement	Review accident Records Site observations/ during operation period	Included in Operation / Maintenance cost	NHIDCL	
6.3 Transport of Dangerous Goods	Existence of spill prevention and control and emergency responsive system Emergency plan for vehicles carrying hazardous material	To prepare emergency plan for vehicle carrying hazardous chemical/metaterials	Throughout the Project stretch	MI: Status of emergency system whether operational or not	Review of spill prevention and emergency response plan	Included in Operation / Maintenance cost	NHIDCL	

Source of potential impact	Remedial Measure	Objective	Location	Monitoring indicators (MI)/ Performance Target (PT)	Monitoring Methods/period of management	Mitigation Costs	Institutional Responsibility	
							Implementation	Supervision
				PT: Fully functional emergency system	Spill accident records/ during operation period			

Source: JICA Survey Team

7.8.2 Environment Monitoring Plan

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 stages. 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. 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.

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 methodology covers the following key aspects:

- Components to be monitored;
- Parameters for monitoring of the above components;
- Monitoring frequency;
- Monitoring standards;
- Responsibilities for monitoring

(1) Performance Indicators

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

Ambient Air Quality Monitoring

The air quality parameters viz. Sulphur di-oxide (SO₂), Oxides of Nitrogen (NO_X), Carbon Monoxide (CO) and Particulate Matter (PM 2.5 & PM 10) 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 duration and the pollution parameters to be monitored and the responsible institutional arrangements are detailed out in the Environmental Monitoring Plan.

Noise Quality Monitoring

The noise levels shall be monitored at designated locations in accordance with the Ambient Noise Quality standards. The duration and the noise pollution parameters to be monitored and the responsible institutional arrangements are detailed in the Environmental Monitoring Plan.

Water Quality Monitoring

Water quality parameters such as pH, BOD, COD, DO, Coliform, Total Suspended Solids, Total Dissolved Solids, Iron, etc. shall be monitored at all identified locations during the construction

stage as per standards prescribed by Central Pollution Control Board and IS:10500 quality standards. The duration and the pollution parameters to be monitored and the responsible institutional arrangements are detailed out in the Environmental Monitoring Plan.

Soil Quality Monitoring

Soil quality parameters such as NPK, oil & grease and heavy metals shall be monitored at all the identified locations during the construction stage as per the standards. The duration and the pollution parameters to be monitored and the responsible institutional arrangements are detailed out in the Environmental Monitoring Plan.

(2) Monitoring Plans for Environmental Condition

To ensure the effective implementation of the mitigation measures and environmental management plan, it is essential that an effective Environmental Monitoring Plan (EMoP) to be designed. The EMoP contains parameters, location, sampling and analysis methods, frequency, and compared to standards or agreed actions that will indicate non-compliances and trigger necessary corrective actions. The objectives of the EMoP are to:

- Ensure that impacts do not exceed the applicable legal standards
- Check the implementation of mitigation measures in the manner described in the EIA report
- Monitor implementation of the EMP
- Provide an early warning of potential environmental damage
- Check whether the proposed mitigation measures have been achieved the intended results, and or/ other environmental impacts occurred.

Monitoring plan does not include the requirement of arising out of Regulation Provision such as obtaining NOC/ consent for plant site operate.

Table 7-83: Environmental Monitoring Plan

Env. Indicators	Project Stage	Parameters (Measured items)	Method/ Guidelines	Purpose of the monitoring	Location	Frequency and Duration	Standards	Approximate cost (₹)	Implementation	Supervision
Air Pollution	Construction stage	SPM, PM 10, PM2.5, SOx, NOx	High volume sampler to be located 50 m from the selected locations in the downwind direction. Use method specified by CPCB	To assess the ambient air quality during the construction stage for comparison with baseline values	Sampling per built up area during active construction as per given numbers of samples- Batching Plant (1), Mahadevtila/Chebri village, Dwarikapur, Kalyanpur, Teliamura, BSF camp area, Taidu, Jantrana Para, Tingharia, Rangamati, Chelagangmung,, Suknachari, Rupachari, Harina Total=15 Samples (Batching and hot mix plants sampling part of SPCB annual renewal of permits)	Thrice in a year during construction for 2 years	Air quality standard by CPCB	15X3X2X100=9,00,000	Construction contractor through approved monitoring agency	NHIDCL/CSC
	Operation stage	SPM, PM 10, PM2.5, SOx, NOx		To assess the ambient air quality during the operation stage for confirming improvement in ambient air quality	Representative sample three each for residential, commercial and sensitive (9Locations)-	24 hr continuous, 3/year for 1 year (Total 3 times in a year barring, monsoon)	Air quality standard by CPCB	3X10000x9=2,70,000	NHIDCL PMU through approved monitoring agency	NHIDCL/CSC
Water Pollution	Construction stage	Drinking Water (as per IS: 10500-1991)	Ground water criteria for freshwater classification	To assess the water quality during the construction stage for comparison with baseline values	water from 13 locations including each at construction camps (drinking water)	3 times in a year (except monsoon) for 2years	Water quality standard by CPCB	13x 5000x3x2= 3,90,000	Construction contractor through approved monitoring agency	NHIDCL/CSC

Env. Indicators	Project Stage	Parameters (Measured items)	Method/ Guidelines	Purpose of the monitoring	Location	Frequency and Duration	Standards	Approximate cost (₹)	Implementation	Supervision
					Grab sample collected from source and analysis as per Standard Methods for Examination of Water and Wastewater					
	Operation stage	Drinking Water (as per IS: 10500-1991)		To assess the water quality during the operation stage for changes if any	Drinking water from 10 locations (representative)	3 times in a year (except monsoon) for one year	Water quality standard by CPCB	10X3X5000 = 1,50,000	NHIDCL PMU through approved monitoring agency	NHIDCL/CSC
	Construction stage	Drinking Water (as per IS: 10500-1991)	Surface water criteria for freshwater classification	To assess the water quality during the construction stage for comparison with baseline values	Water from 8 locations including each at construction camps (drinking water) Grab sample collected from source and analysis as per Standard Methods for Examination of Water and Wastewater	3 times in a year (except monsoon) for 2 years	Water quality standard by CPCB	8x 5000x3x2 = 2,40,000	Construction contractor through approved monitoring agency	NHIDCL /CSC
	Operation stage	Drinking Water (as per IS: 10500-1991)		To assess the surface water quality during the operation stage for changes if any	water from 5 locations (representative)	3 times in a year (except monsoon) for one year	Water quality standard by CPCB	5X3X5000 = 75,000	NHIDCL PMU through approved monitoring agency	NHIDCL/CSC
Noise levels	Construction stage	Equivalent Noise levels on dB (A) scale for day and Night	IS:4954-1968 as adopted by CPCB for Identified Study	To assess the ambient noise level during the construction stage for comparison with baseline values	Same as air quality at 13 locations	Once in a year for Two years	National Ambient Noise Standard	13X2X5000 =1,30,000	Construction contractor through approved, monitoring agency	NHIDCL /CSC
	Operation stage	Equivalent Noise levels on dB (A) scale for day and Night	Area CPCB/IS:4954-1968 Using Noise level meter	To assess the noise level during the operation stage for confirming improvement if any	Same as air quality	One time per year for 1 year (9 locations)	specified in environment	5000x9 =45,000	NHIDCL PMU through approved monitoring	NHIDCL /CSC

Env. Indicators	Project Stage	Parameters (Measured items)	Method/ Guidelines	Purpose of the monitoring	Location	Frequency and Duration	Standards	Approximate cost (₹)	Implementation	Supervision
							Protection Act, 1986		agency	
Soil Quality	Construction Stage	NPK (ICAR standard) and heavy metals	As specified by the site engineer SHAJ/ supervision consultant	To assess soil quality during the construction stage for comparison with baseline values	Labour Camp, Dumping/storage areas and HMP sites (6 locations)	Once during whole construction stage	ICAR standard	1,04,000(@₹ 8000/sample)	Construction contractor through approved monitoring agency	NHIDCL/ CSC
	Operation stage	Oil and grease		To assess the soil quality during the operation stage if any spillage occurred	At oil spillage locations and other probable soil contamination location (Max. 6 locations)	Once for the first year of operation	CPCB standard	48000(@₹ 8000/sample)	NHIDCL PMU through approved agency	NHIDCL/ CSC
Soil Erosion	Construction Stage	Visual check for Soil erosion and siltation		To identify the erosion location if any so that corrective action shall be taken appropriately	Cut and fill locations	After first rain	Visual Checks	Included in Engineering Cost	Construction contractor	NHIDCL/ CSC
	Operation Stage	Visual check for Soil erosion and siltation		To identify the erosion location if any so that corrective action shall be taken appropriately		Once during operation of 1 st year	Visual Checks	Routine Engineering Work	Engineering Team of NHIDCL PMU	
Drainage Congestion	Construction stage	Visual Checks		To identify the drainage congestion location if any so that corrective action shall be taken appropriately	Throughout the Project Corridor especially Probable drainage congestion areas	Once in a year before rainy season	None Specific	Included in Engineering Cost	Construction contractor'	NHIDCL/ CSC
	Operation Stage			To identify the drainage congestion location if any so that corrective action shall be taken appropriately		Once in a year before rainy season	None Specific	Routine Engineering Work	NHIDCL PMU	

Env. Indicators	Project Stage	Parameters (Measured items)	Method/ Guidelines	Purpose of the monitoring	Location	Frequency and Duration	Standards	Approximate cost (₹)	Implementation	Supervision
Borrow Areas	Construction Stage	Visual Checks	IRC guidelines	To follow the IRC guidelines	Borrow areas to be operated	Once in a month	IRC guidelines	Part of the Maintenance contractor' quote	Construction contractor with approval from NHIDCL PMU	NHIDCL /CSC
	Operation Stage	Visual Checks	Rehabilitation as per IRC guidelines	To follow the IRC guidelines	Closed Borrow Areas	Quarterly for 1 year				
Construction Sites and Labour Camp	Construction stage	Hygiene, drainage Medical Facilities Etc.	Rapid audit as per reporting format	To provide hygienic condition at labour camp	Construction Sites and Camp	Quarterly during construction period	IRC guidelines	Part of the regular monitoring	Construction contractor with approval from NHIDCL PMU	NHIDCL /CSC
Tree Plantation	Construction Stage	Surveillance monitoring of trees felling		To check the number of trees to be felled. Compensatory plantation as discussed with Forest Dept.	Throughout the Project Section	Throughout Construction Period Once a month	As suggested by Forest Dept.	As decided by forest dept.	Compensatory: NHIDCL /Local Forest Departments	
	Operation stage	Audit for survival rate of trees plantation		To make sure survival rate shall be maintained	Throughout the Project Section	Quarterly First five years	As suggested by Forest Dept.	As decided by forest dept.	The Contacted Engineer during operation will be responsible for monitoring up to the Defect Liability Period in any particular stretch. After this period NHIDCL through Construction contractor will be responsible for monitoring	
Record of Accident	Construction Stage	Type, nature and cause of accidents. Methodology as suggested by CSC and approved by SHAJ		To maintain the accidents records	Throughout the stretch including construction sites, crusher, diversions, HMP, earthwork, demolition site etc.	occurrence of accidents	As suggested by CSC	Part of the regular monitoring	Construction contractor	NHIDCL /CSC
	Operation stage			To maintain the accidents records	Throughout the stretch	occurrence of accidents	-	-	Road Safety unit of NHIDCL PMU with support from local police	

Env. Indicators	Project Stage	Parameters (Measured items)	Method/ Guidelines	Purpose of the monitoring	Location	Frequency and Duration	Standards	Approximate cost (₹)	Implementation	Supervision
Ecosystem	Construction Stage	Types and numbers of Endangered species	Regular checks and local experts interview of types and numbers of IUCN CR, EN, VU categories WL Protection law and JICA guidelines	Confirmation of the habitat of rare species and analysis of their habitat status	-Area between Gumti WLS and alignment -Near forests and waterbodies	Throughout construction time Quarterly	As per Indian and JICA Guideline (2010)	As decided by forest dept.	PMU	PMU with MoEFCC
		General flora and fauna	Types and abundance of flora and fauna	Conservation of the holistic Ecosystem	Throughout the alignment	Throughout construction time Quarterly		As decided by forest dept.	PMU	PMU with MoEFCC
	Operation stage	Types and numbers of Endangered species	Regular checks and local experts interview of types and numbers of IUCN CR, EN, VU categories WL Protection law and JICA guidelines	Confirmation of the habitat of rare species and analysis of their habitat status	-Area between Gumti WLS and alignment -Near forests and waterbodies	Throughout operation time Quarterly	As per Indian and JICA Guideline (2010)	As decided by forest dept.	PMU	PMU with MoEFCC
		General flora and fauna	Types and abundance of flora and fauna	Conservation of the holistic Ecosystem	Throughout the alignment	Throughout operation time Quarterly		As decided by forest dept.	PMU	PMU with MoEFCC
Wildlife Vehicle Collisions	Construction Stage	Nature and cause of collision, season, Month and time of collision.		To maintain the records	Project road passing through forest land	occurrence of collision	As suggested by forest department	Civil Cost	Construction contractor	NHIDCL/ C SC
	Operation stage	Success of road furniture's viz. rumble strip, cautionary signages etc. designed for safe movement Nature and cause of collision, season, Month and time of collision Monitoring of movement path based on information available with forest		To maintain the records and provide information if any further improvement will be required	Project road passing through forest land	Random all through the year		Operation and Maintenance Cost	NHIDCL	PMU in coordination with forest department or through an specialized wildlife expert team

Env. Indicators	Project Stage	Parameters (Measured items)	Method/ Guidelines	Purpose of the monitoring	Location	Frequency and Duration	Standards	Approximate cost (₹)	Implementation	Supervision
		department and local people.								

Source: JICA Survey Team

Table below shows the Environmental Monitoring Budget. Air, Surface water, ground water monitoring are most costly monitoring activities.

Table 7-84: Environmental Monitoring Budget

S. No.	Parameters/ Components	Frequency	Unit Cost/Sample (Rs)	Total Cost (Rs)
1	Ambient Air Monitoring Construction Stage	At 05 locations for three season in a year for 2 years (Total 30 samples in 2 years)	5,600	168,000
	Operation Stage	At 4 locations for three season for a year (Total 12 samples in 1 year)	5,600	67,200
2	Ground Water Sampling Construction Stage	At 4 locations for three season in a year for 2 years (Total 24 samples in 2 years)	5,000	120,000
	Operation Stage	At 4 locations for three season for a year (Total 12 samples in 1 year)	5,000	60,000
3	Surface Water Sampling Construction Stage	At 4 locations for three season in a year for 2 years (Total 24 samples in 2 years)	5,000	120,000
	Operation Stage	At 4 locations for three season for a year (Total 12 samples in 1 year)	5,000	60,000
4	Noise Monitoring Construction Stage	At 05 locations for three season in a year for 2 years (Total 30 samples in 2 years)	70,000	21,000
	Operation stage	At 04 locations for three season for a year (Total 12 samples in 1 year)	- 7,00	8,400
5	Soil Monitoring Construction Stage	At 03 locations for three season in a year for 2 years (Total 18 samples in 2 years)	- 4,500	81,000
	Operation Stage	At 03 locations for for three season for a year (Total 09 samples in 1 year)	- 4,500	40,500
Total Monitoring Cost				746,100

Source: JICA Survey Team

7.8.3 Institutional Arrangement

Institutional Arrangements

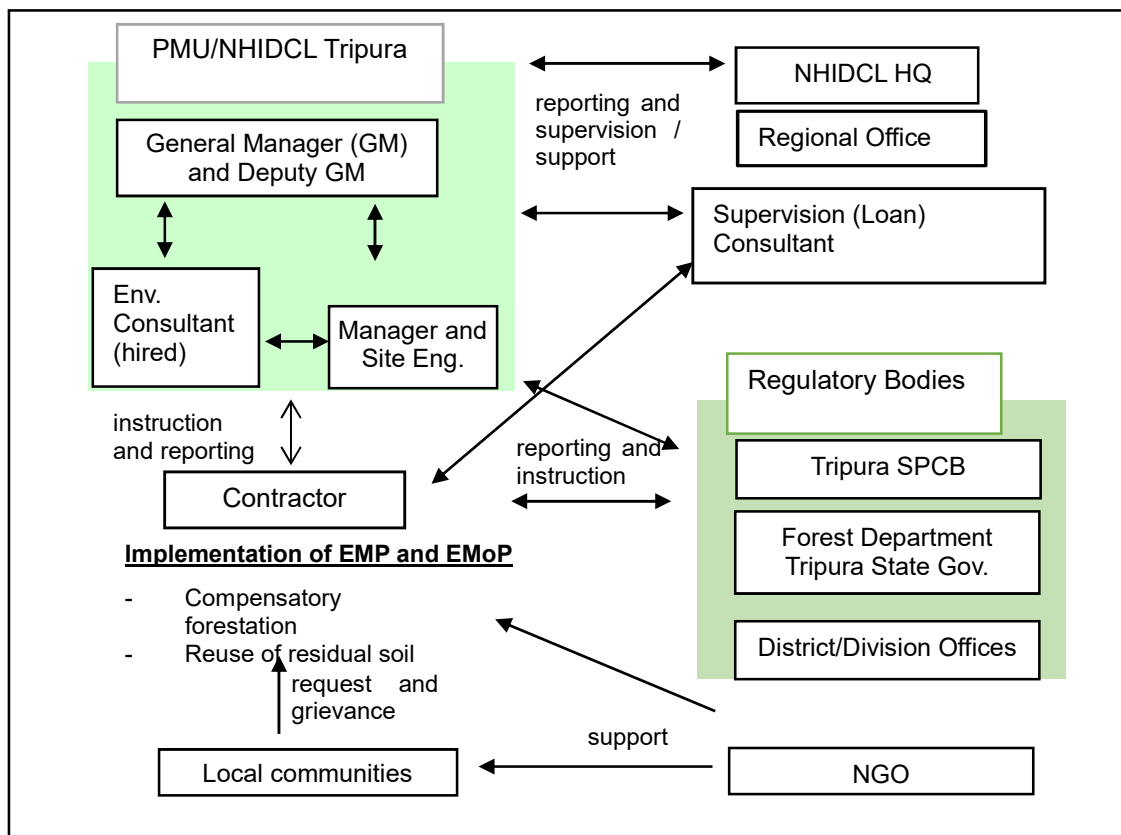
As is shown in Figures below, NHIDCL is the project implementation unit during the construction period as well as the operation and maintenance period. It is thus responsible for implementation of Environmental Management and Monitoring Plan. However, cost of monitoring works during the construction period is a part of construction contract. External consultant shall be employed and arranged in Project Management Unit-PMU for implementation of EMP and EMoP, and supervising consultant shall support PMU so that the actual work is complied with JICA Guideline.

During the operation and maintenance period, air quality monitoring works should be cost-wise responsibility of NHIDCL while actual measuring works could be entrusted to MSPCB. Other points of air quality monitoring locations should be subject to further monitoring works in the event excessive monitoring values are observed.

Afforestation program should begin during the construction work or after the construction work, and it should be in the monsoon season. Area of afforestation, species of trees, rate of survival, achievement of afforestation, etc. should all be monitored. NGO could be employed for staff training on the monitoring of wildlife including bird species as well as to plant trees of afforestation area, while contractor can be in charge of afforestation.

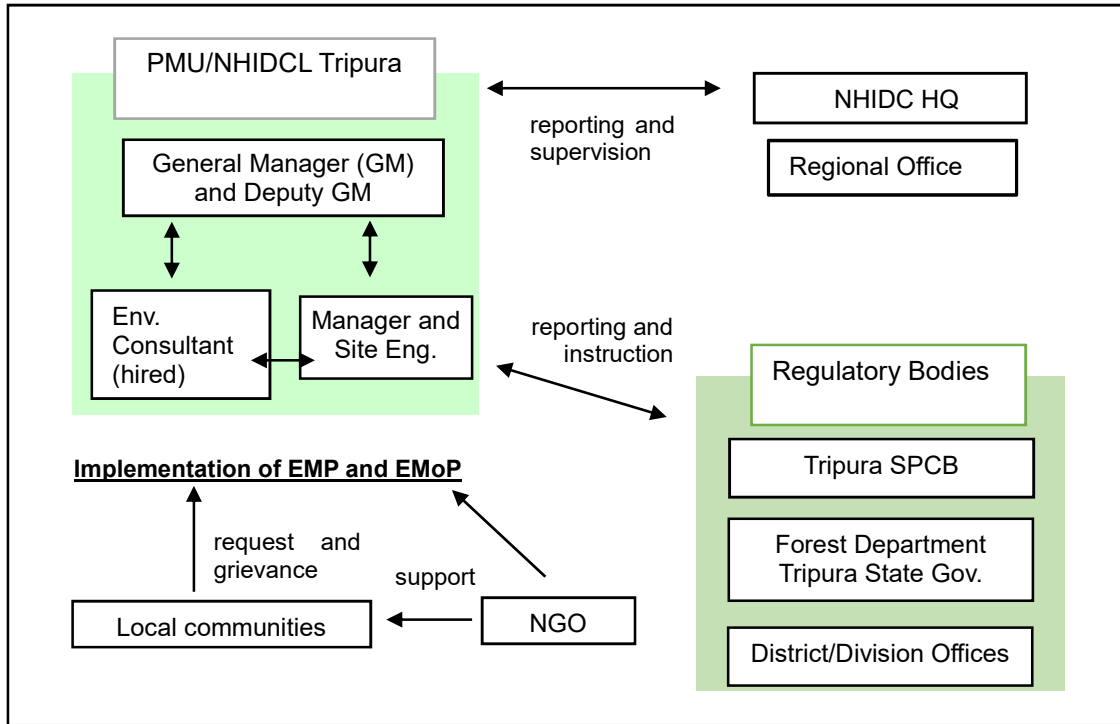
Tripura State Department of Environment and Forestry could play an important role for guidance in respect of afforestation program. NHIDCL should therefore follow the guidance of Tripura State Department of Environment and Forestry.

7-189



Source: JICA Study Team

Figure 7-45: Organization of Environmental Management and Monitoring Plan during the Pre-Construction and Construction Period



Source: JICA Study Team

Figure 7-46: Organization of Environmental Management and Monitoring Plan during the Operation and Maintenance Period

Capacity Building

To enhance the capacity of officials for effective implementation of proposed mitigation measures and monitoring the resultant effects, as well as create awareness amongst workers and public, the training and awareness program is planned and is given in the Table 7-85. The institutions/agencies like regional office of MoEF, SPCB/CPCB, and Indian Institute of Technologies can be consulted for such trainings. Independent subject's experts/consultants (e.g., for the environmental awareness program, impact assessment specialist will be the resource person) can also be the resource persons to impart trainings. These experts /agencies shall be appointed based on specific need for the training. A separate budget for training has been allocated under the CSC budget.

Table 7-85: Outline Capacity Building Program on EMP Implementation

S.N	Target group	Subject(s)	Method	Time
1	All staffs of NHIDCL including PMU project staff involved in implementation of the project	Environmental Overview: Environmental Regulations, project related provisions of various Acts/ Guidelines, Procedures of EC and FC, process and methodology for EIA, EMPs	Lectures cum interaction	Before beginning of the implementation of the subproject

2	Managers (Env.) at PMU, Supervision Consultant's Environmental Specialists and Select NGOs	Implementation of EMPs: Basic features of an EMP, Planning, designing and execution of environmental mitigation and enhancement measures, monitoring and evaluation of environmental conditions - during construction and operation	Workshops and Seminars	Before the construction begins
3	Environmental officer, design team, Supervision Consultant Construction Contractors' staff	Environmentally Sound Construction Practices: Clean construction technology, alternatives materials and techniques for construction, Waste Management and minimization in construction, pollution control devices and methods for construction sites and equipment, Environmental clauses in contract documents and their implications, protection of flora and fauna Environmental monitoring during construction	Workshops and Site visits	Before the construction
4	PMU and Supervision Consultant, NGOs and community representatives	Monitoring Environmental Performance during Construction: Air, Water, Soil and Noise, tree survival Monitoring requirement and techniques, Evaluation and Review of results, Performance indicators and their applicability, possible corrective actions, reporting requirements and mechanisms	Lectures, Workshops and site visits	During initial phases of construction
5	-do-	Long-term Environmental Issues in Project Management: Designing and implementing environmental surveys for ambient air, noise, biological and water quality surveys, data storage, retrieval and analysis, contract documents and environmental clauses, risk assessment and management, contingency planning and management and value addition	Workshops and seminars	During implementation of the Subproject
6	Public /contractors workers	Awareness program on environmental protection and measures being implemented by NHIDCL and their role in sustaining the measures taken including for noise pollution, air pollution, safety, soil conservation, and agricultural productivity enhancement	Workshops	During construction and initial phase say 3 years
7	NHIDCL Staff, Supervision Consultant, Engineering Staff of Contractor.	Restoration of sites viz borrow areas, construction Camps, Crushing units, HMP etc. And Reporting Formats/procedure	Lecture/Pre-sanitations	before Contractor Demobilization

Source: JICA Survey Team

7.8.4 Environmental Management Budget

The environmental budget for the various environmental management measures proposed in the EMP is detailed in table below. The budget has been worked out on the basis of market rates. The final cost for the Environmental Management is shown as below.

Most of the measures have been addressed as part of good engineering practices, the costs for which have been accounted for in the engineering/cost. All costs towards pre-construction clearances/permission will be borne by executing agency. These costs are indicative. The environmental budget for the various environmental management measures proposed under the project is presented in Table below. A total budget amount of Rs. 7,852,000 (7 million 852 thousand rupees) excluding compensatory afforestation and NPV decided by forest dept.) has been allocated for implementation of environment safeguards under the project.

Table 7-86: Summary of Environmental Management Budget

Sl. NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE (Rs.)	AMOUNT (Rs.)	Responsibility
A	Tree Plantation					
A.1	Net present value over 126.2014 ha of forest land under DFO, South Tripura/Gumti/Khowai	126.2014	Ha	(Will be decided by Forest Dept. during stage-1 clearance)		PMU of NHIDCL/CSC through Forest Department
A.2	Cost of compensatory afforestation	-	Ha	(Will be decided by Forest Dept. during stage-1 clearance)		PMU of NHIDCL/CSC through Forest Department
Sub Total					--	
B	Environmental Monitoring					
B.1	Ambient air quality monitoring (Construction Stage) as per Annexure 3 for 2 years at thrice in a year	15	No.	10,000	900,000	NHIDCL/CSC through Approved Monitoring Agency
B.2	Ambient air quality monitoring (Operation Stage) as per Annexure 3 @three times for one year	9	No.	10,000	270,000	
B.3	Ambient noise level monitoring (Construction Stage) as per Annexure 3 once in a year for two years	13	No.	5,000	130,000	
B.4	Ambient noise level monitoring as per Annexure 3 once in a year for one year	9	No.	5,000	45,000	
B.5	Water quality monitoring of surface water as per Annexure 3 for two years at 8 location for three times including samples from construction camp for drinking water quality	8	No.	5,000	240,000	
B.5	Water quality monitoring of surface water as per Annexure 3 for one year at 5 location for three times including samples from construction camp for drinking water quality	5	No.	5,000	75,000	

Sl. NO.	ITEM DESCRIPTION	QUANTITY	UNIT	RATE (Rs.)	AMOUNT (Rs.)	Responsibility
B.6	Ground Water quality monitoring for 13 locations three times a year during construction stage	13	No.	5,000	390,000	
B.6	Ground Water quality monitoring for 10 locations three times a year during operation stage	10	No.	5,000	150,000	
B.7	Soil Quality analysis as per Annexure 3 during construction stage	13	No.	8,000	104,000	
B.8	Soil Quality analysis as per Annexure 3 during operation stage	6	No.	8,000	48,000	
Sub Total					2,352,000	
C	Environmental Training/ Awareness Camp					
C.1	Training at site	2		1,00,000	200,000	PMU through Supervision Consultant
C.2	Awareness Camp	6		50,000	300,000	
Sub Total					500,000	
D	Budget for conservation and management of biodiversity in and around the project site				5,000,000	PMU through Supervision
Grand Total= Rs. 7,852,000/-						

Source: JICA Survey Team

7.8.5 Monitoring Forms

In this section, the monitoring forms for this project is given.

Form1: Monitoring Form during Planning/Design Stage for NH208

Monitoring Period From Date Month Year

To Date Month Year

S.N.	Items	Check Point	Frequency	Evaluation or Mitigation status Y:Good /Yes N: Poor /No	Remark And Signature by Checker
1	Social impact	- Check notification	<input type="checkbox"/> Monthly/ <input type="checkbox"/> Quarterly/ <input type="checkbox"/> Bi-annually	<input type="checkbox"/> Y / <input type="checkbox"/> N	Signature by inspector
		- Check payment record	<input type="checkbox"/> Monthly/ <input type="checkbox"/> Quarterly/ <input type="checkbox"/> Bi-annually	<input type="checkbox"/> Y / <input type="checkbox"/> N	
2	Crops and vegetation	- Interviews with local residents will also help in this matter.	<input type="checkbox"/> Before commencement date	<input type="checkbox"/> Y / <input type="checkbox"/> N	
3	Impacts on ROW design	- Check final design drawing and original plan	<input type="checkbox"/> Before the commencement of construction activities	<input type="checkbox"/> Y / <input type="checkbox"/> N	
4	Noise and vibration	- Determination of critical sites and methods of mitigation during the construction period	<input type="checkbox"/> Monthly/ <input type="checkbox"/> As necessary	<input type="checkbox"/> Y / <input type="checkbox"/> N	
5	Water quality	- Check final planning and approve if proposal is suitable	<input type="checkbox"/> Before the commencement of construction activities	<input type="checkbox"/> Y / <input type="checkbox"/> N	
6	Land slide and soil erosion	- Visit site and check land plans, alignment	<input type="checkbox"/> Site visits <input type="checkbox"/> once after monsoon	<input type="checkbox"/> Y / <input type="checkbox"/> N	
7	Loss of or damage to Religious places and eco-sensitive areas.	- Check encroachment on religious areas	<input type="checkbox"/> Before and during construction phase	<input type="checkbox"/> Y / <input type="checkbox"/> N	
		- Check eco-sensitive areas	<input type="checkbox"/> Before construction phase	<input type="checkbox"/> Y / <input type="checkbox"/> N	
Total				Yes __, No __	

Form2: Monitoring Form during Construction Stage

Type of work: _____

Monitoring Season: Pre-monsoon / Post-monsoon / Winter

Monitoring Period From Date Month Year

To Date Month Year

S.N.	Items	Check Point	Frequency	Evaluation or Mitigation status Y:Good /Yes N: Poor /No	Remark And Signature by Checker
1	Social impact	- Check if the community has brought the problem to the notice of the Consultant and Client	<input type="checkbox"/> Monthly	<input type="checkbox"/> Y / <input type="checkbox"/> N	Signature by Inspector
2	Air pollution	- Check watering as per the frequency given in the EMP.	<input type="checkbox"/> Weekly	<input type="checkbox"/> Y / <input type="checkbox"/> N	
		- Proper implementation can be achieved by site inspection along with interviews with local residents.	<input type="checkbox"/> Weekly	<input type="checkbox"/> Y / <input type="checkbox"/> N	
		- Seasonal monitoring	<input type="checkbox"/> Seasonal	As per Form C1-4	
3	Noise and vibration	- Check that the Contractor is performing mitigation measures.	<input type="checkbox"/> Monthly	<input type="checkbox"/> Y / <input type="checkbox"/> N	
		- This can be achieved by interviewing the locals and site inspection. - Seasonal monitoring	<input type="checkbox"/> Monthly <input type="checkbox"/> Seasonal	<input type="checkbox"/> Y / <input type="checkbox"/> N As per Form5	
4	Water quality	- Visit site and check drain provision/functioning - Seasonal monitoring	<input type="checkbox"/> Weekly <input type="checkbox"/> Seasonal	<input type="checkbox"/> Y / <input type="checkbox"/> N As per Form6, 7	
5	Oil spills and hazardous wastes	- Check the mitigation measures.	<input type="checkbox"/> One check	<input type="checkbox"/> Y / <input type="checkbox"/> N	
		- A fortnightly inspection is necessary until the completion of the project.	<input type="checkbox"/> One check	<input type="checkbox"/> Y / <input type="checkbox"/> N	
6	Spoil disposal	- A monthly inspection of the disposal sites along with the review	<input type="checkbox"/> Weekly	<input type="checkbox"/> Y / <input type="checkbox"/> N	

S.N.	Items	Check Point	Frequency	Evaluation or Mitigation status Y: Good / Yes N: Poor / No	Remark And Signature by Checker
		of the design plan is a better way of assessment.			
7	Construction waste disposal	- Interviews with local residents will also give a proper assessment of the issue.	<input type="checkbox"/> Weekly	<input type="checkbox"/> Y / <input type="checkbox"/> N	
8	Land slide and soil erosion	- A site inspection along with the review of the design plans is necessary.	<input type="checkbox"/> During rainy seasons	<input type="checkbox"/> Y / <input type="checkbox"/> N	
9	Earthworks operation	- Ensure the contractor performs detailed design and instability checks	<input type="checkbox"/> Before commencement date of construction	<input type="checkbox"/> Y / <input type="checkbox"/> N	
		- Check if erosion or instabilities were observed.	<input type="checkbox"/> Before commencement date of construction	<input type="checkbox"/> Y / <input type="checkbox"/> N	
		- The conditions at the site can be observed by a site inspection along with review of the design plan.	<input type="checkbox"/> Before commencement date of construction	<input type="checkbox"/> Y / <input type="checkbox"/> N	
10	Traffic safety	- Checking the traffic problems at the construction site.	<input type="checkbox"/> Monthly	<input type="checkbox"/> Y / <input type="checkbox"/> N	
11	Disturbance to flora	- Inspect ROW boundary and adjacent area	<input type="checkbox"/> Weekly / <input type="checkbox"/> Monthly	<input type="checkbox"/> Y / <input type="checkbox"/> N	
12	Disturbance to fauna	- Visit site and check the proposed alignment and construction area	<input type="checkbox"/> Monthly	<input type="checkbox"/> Y / <input type="checkbox"/> N	
13	Loss or damage of cultural sites or religious places	- Interviews with local residents will also give a proper assessment of the issue.	<input type="checkbox"/> Once in six months.	<input type="checkbox"/> Y / <input type="checkbox"/> N	
14	Construction labour force and its impacts	- Check if the Contractors are following the mitigation measures	<input type="checkbox"/> Weekly	<input type="checkbox"/> Y / <input type="checkbox"/> N	
		- Check with the communities and construction staff if any conflict has occurred; if yes find out reason.	<input type="checkbox"/> Weekly	<input type="checkbox"/> Y / <input type="checkbox"/> N	
		- This can be achieved by regular site inspections. The	<input type="checkbox"/> Weekly	<input type="checkbox"/> Y / <input type="checkbox"/> N	

S.N.	Items	Check Point	Frequency	Evaluation or Mitigation status Y:Good /Yes N: Poor /No	Remark And Signature by Checker
		frequency should be once in fifteen days.			
15	Work camp operation	- During construction and after completion of the works. The inspection should be planned once every two months throughout the project period	<input type="checkbox"/> Monthly	<input type="checkbox"/> Y / <input type="checkbox"/> N	
Total				Yes __, No __	

Form3: Monitoring Form during Operation Stage

Operation Stage: _____

Monitoring Season: Pre-monsoon / Post-monsoon / Winter

Monitoring Period From Date Month Year _____

To Date Month Year _____

S.N.	Items		Frequency	Evaluation or Mitigation status Y:Good /Yes N: Poor /No	Remark And Signature by Checker
1	Noise and vibration	- Visit site and compare with Normal situation - Seasonal monitoring	Periodical Periodical	<input type="checkbox"/> Y / <input type="checkbox"/> N As per Form5	Signature by Inspector
2	Air Quality	- Seasonal monitoring	Periodical	As per Form4	
3	Water Quality	- Seasonal monitoring	Periodical	As per Form6, 7	
4	Plantation	- The number of trees surviving during each visit shall be compared with the number of sapling plant	Assess growth every year for initial five years <input type="checkbox"/> 1st/ <input type="checkbox"/> 2nd/ <input type="checkbox"/> 3rd / <input type="checkbox"/> 4th / <input type="checkbox"/> 5th	<input type="checkbox"/> Y / <input type="checkbox"/> N	
		- Record the growth of plantation	Assess growth every year for initial five years <input type="checkbox"/> 1st/ <input type="checkbox"/> 2nd/ <input type="checkbox"/> 3rd / <input type="checkbox"/> 4th / <input type="checkbox"/> 5th	<input type="checkbox"/> Y / <input type="checkbox"/> N	
5	Positive impact to the road accessibility	- hearing from PAPs, detail of their opinion	Periodical	<input type="checkbox"/> Y / <input type="checkbox"/> N	
6	Land slide and soil erosion	- A site inspection along with the alignment is necessary.	<input type="checkbox"/> During rainy seasons	<input type="checkbox"/> Y / <input type="checkbox"/> N	
Total				Yes____, No __	

Form4: Monitoring of Air Quality

Type of work: _____

Monitoring Season: Pre-monsoon / Post-monsoon / Winter

Monitoring Period From Date Month Year

To Date Month Year

Item Unit	Date	Item	1	2	3	4	5	6	Remark
			PM ₁₀ µg/m ³	PM _{2.5} µg/m ³	CO ppm	SO _x µg/m ³	NO _x µg/m ³	Lead µg/m ³	
No. 1 (Detail of Location)		Max							
		Ave							
		Min							
No. 2 (Detail of Location)		Max							
		Ave							
		Min							
No. 3 (Detail of Location)		Max							
		Ave							
		Min							
		Max							
		Ave							
		Min							
NEQS			100	60	04µg/m ₃	80	80	1	
WHO Standards			150-230	70	30	400	100-150		
Duration			24hours	24hours	24hours	24hours	24hours	24hours	

Form5: Monitoring of Noise and Vibration

Type of work: _____

Monitoring Frequency: 1st / 2nd / 3 rd

Monitoring Period From Date Month Year _____

To Date Month Year _____

	Item	Unit	Date1	Date2	Date3	Remark (Date)	
			DD/M M/YY	DD/M M/YY	DD/M M/YY		
NEQS	Noise Residential Area Day Time (6:00-22:00); 55 dB(A) Night Time(22:00-6:00);50dB(A) Silent Area Day Time (6:00-22:00); 45 dB(A) Night Time(22:00-6:00);40dB(A)						
No. 1	(Detail of Location)	Noise-1	L _{eq}	dB(A)			
		Noise-2	L _{min}	dB(A)			
		Noise-3	L _{max}	dB(A)			
		Vib-1	L ₁₀	dB			
No. 2	(Detail of Location)	Noise-1	L _{eq}	dB(A)			
		Noise-2	L _{min}	dB(A)			
		Noise-3	L _{max}	dB(A)			
		Vib-1	L ₁₀	dB			
No. 3	(Detail of Location)	Noise-1	L _{eq}	dB(A)			
		Noise-2	L _{min}	dB(A)			
		Noise-3	L _{max}	dB(A)			
		Vib-1	L ₁₀	dB			
	(Detail of Location)	Noise-1	L _{eq}	dB(A)			
		Noise-2	L _{min}	dB(A)			
		Noise-3	L _{max}	dB(A)			
		Vib-1	L ₁₀	dB			

Form6: Monitoring of Surface Water Quality

Type of work: _____

Monitoring Times : 1st / 2nd / 3rd

Monitoring Period From Date Month Year

To Date Month Year

		1	2	3	4	5	6	7	8	9	10	11	12	13
Name of river	Location	Temperature	pH	E.C	TSS	TDS	Turbidity	T. Hardness	DO	BOD	COD	Nitrate	Ammonia	T-Coli
		°C		µS/cm	mg/L	mg/L	NTU	(mg/L as CaCO3)	mg/L	mg/L	mg/L	(mg/L as NO3)	mg/L	(MPN/100 mL)
River1														
River2														
River3														
River4														
National Standard	Desirable Limit		5-8.5	-	-	500	5	300	-	-	-	45	-	nil
National Standard	Permissible Limit			-	-	2000	10	600	-	-	-	100	-	
		14	15	16	17	18	19	20	21	22	23	24	25	
Name of river	Location	E-coli	Flow velocity	Chloride	Sulphate	Calcium	Magnesium	Fluoride	O&G	Zinc	Manganese	Iron	Copper	

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				(mg/L as Cl)	(mg/L as SO4)	(mg/L as Ca)	(mg/L as Mg)	(mg/L as F)	-	(mg/L as Zn)	(mg/L as Mg)	(mg/L as Fe)	(mg/L as Cu)	
River1														
River2														
River3														
River4														
Standard	Desirable Limit	-	-	250	200	75	30	1	-	5	30	0.3	0.05	
Standard	Permissible Limit	-	-	1000	400	200	100	1.5	-	15	100	1	1.5	

Form7: Monitoring of Groundwater / Community Water Tank Quality

Type of work: _____

Monitoring Times : 1st / 2nd / 3rd

Monitoring Frequency : Daily / Weekly / Monthly Seasonal

Monitoring Period From

To

Construction Stage : Pre-Construction / Construction / Post-Construction

Date	Measure Point					
	No.1 (Detail of Location)	No.2	No.3	No.4	No.5	
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
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28						
29						
30						
31						
31						

Form8: Monitoring of Land Slide and Soil Erosion

Detail of location: _____

Type of work: _____

Monitoring Times: 1st / 2nd / 3rd

Monitoring Period From Date Month Year

To Date Month Year

S.N.	Items	Unit	Detail	Remark
1	Current land use			
2	Size of land slide/soil erosion	Km x Km.		
3	Reason of land slide/soil erosion			
4	Past record	DD/MM/YY		
5	Nearest water source (if any)	Nos., kind		

Form9: Monitoring of Plantation

Type of work: _____

Monitoring Times: 1st / 2nd / 3rd

Monitoring Period From Date Month Year

To Date Month Year

S.N	Location	Block	Species	Number of trees	Height of trees (m) Max/Ave/Min	BHD	Growth Excellent/ Good/ Poor	Remark

Form10: Monitoring of Borrow Area/Surplus Soil Dumping Site

Location: _____

Monitoring Times: 1st / 2nd / 3rd

Monitoring Period From Date Month Year

To Date Month Year

Construction Stage : Pre-Construction / Construction / Post-Construction

S.N.	Items	Unit	Detail	Remark
1	Current land use			
2	Size of area	m x m		
3	No. of settlement in the borrow area	Nos.		
4	No. of trees in the borrow area	Nos.		
5	Scale of haul road in the area (if any)	Nos. x Length(km) x Width (m)		
6	Detail of the existing structure (if any)	Nos., kind		
7	Detail of the existing infrastructure (if any)	Nos., kind		
8	Nearest water source (if any)	Nos., kind		

7.9 Resettlement Action Plan

7.9.1 Description of the project

Refer to Section 7.2.4(1) above.

7.9.2 Potential impacts

Refer to the results of scoping (Section 7.5) and impact analysis (Section 7.6) above.

7.9.3 Objectives

(1) Objectives

The aim of this Resettlement Action Plan (RAP) is to mitigate all such unavoidable negative impacts caused due to the project and resettle the displaced persons and restore their livelihoods. This Full Resettlement Plan has been prepared on the basis of project census survey findings and consultation with various stakeholders. The plan complies with NHIDCL policy for involuntary resettlement. The issues identified and addressed in this document are as follows: -

- Type and extent of loss of land/ non-land assets, loss of livelihood, loss of common property resources and social infrastructure.

- Impacts on indigenous people, vulnerable groups including households below poverty line (BPL), Scheduled Tribe, family/household headed by women, physically challenged/disabled person.
- Public consultation and people's participation in the project.
- Proposed legal and administrative framework and formulation of resettlement policy for the project.
- Preparation of entitlement matrix, formulation of relocation strategy and restoration of businesses/income.

Resettlement and rehabilitation cost estimate including provision for fund and Institutional framework for the implementation of the plan, including grievance redress mechanism and monitoring & reporting.

(2) Definitions

The Definition of various terms used in this RAP is as follows:

- (a) "Administrator for Resettlement and Rehabilitation" means an officer not below the rank of District Collector of the State Government appointed by it for the purpose of resettlement and rehabilitation of the Project Affected Families of the Project concerned provided that if the appropriate Government in respect of the project is the Central Government, such appointment shall be made in consultation with the Central Govt.
- (b) "affected zone", in relation to a project, means declaration of this Policy by the appropriate Government area of villages or locality under a project for which the land is being acquired under Land Acquisition Resettlement and Rehabilitation, 2013 or any other Act in force or an area that comes under submergence due to impounding of water in the reservoir of the project.
- (c) "agricultural family" means a family whose primary mode of livelihood is agriculture and includes family of owners as well as sub-tenants of agricultural land, agricultural labourers, occupiers of forest lands and of collectors of minor forest produce.
- (d) "agricultural labourer" means a person normally resident in the affected zone before the declaration of the affected zone who does not hold any land in the affected zone but who earns his livelihood principally by manual labour on agricultural land therein immediately before such declaration and who has been deprived of his livelihood.
- (e) "Agricultural land" includes lands used or capable of being used for the purpose of-
 - agriculture or horticulture;
 - dairy farming, poultry farming, pisciculture, breeding or livestock and nursery growing medical herbs.
 - raising of crops, grass or garden produce; and
 - land used by an agriculturist for the grazing of cattle, but does not include land used for the cutting of wood only.
- (f) "Appropriate Government" means,-
 - (i) In relation to acquisition of land for the purposes of the NHIDCL, the Central Government;
 - (ii) in relation to a project which is executed by Central Government agency(NHIDCL)/Central Government undertaking or by any other agency on the orders/directions of Central Government, the Central Government, otherwise the State Government and in relation to acquisition of land for other purposes, the State Government.
- (g) 'BPL Family': the Below Poverty Line Families shall be those as defined by the Planning Commission of India from time to time.

- (h) “Commissioner for Resettlement and Rehabilitation”, in relation to a project, means the Commissioner for Resettlement and Rehabilitation appointed by the State Government not below the rank of Commissioner/Secretary of that Government.
- (i) “Displaced family” means any tenure holder, tenant, Government lessee or owner of other property, who on account of acquisition of his land including plot in the abadi or other property in the affected zone for the purpose of the project, has been displaced from such land or other property.
- (j) “Family” means Project Affected Family consisting of such persons, his or her spouse, minor sons, unmarried daughters, minor brothers or unmarried sisters, father, mother and other members residing with him and dependent on him for their livelihood.
- (k) “Holding” means the total land held by a person as an occupant or tenant or as both;
- (l) “Marginal farmer” means a cultivator with an unirrigated land holding up to one acres or irrigated land holding up to half acres.
- (m) “non-agricultural laborer” means a person who is not an agricultural laborer but is normally residing in the affected zone before the declaration of the affected zone and who does not hold any land under the affected zone but who earns his livelihood principally by manual labor or as a rural artisan immediately before such declaration and who has been deprived of earning his livelihood principally by manual labor or as such artisan in the affected zone.
- (n) “Notification” means a notification published in the Official Gazette;
- (o) “Occupiers” mean members of Scheduled Tribe community in possession of forest land prior to 25th October, 1980;
- (p) “Resettlement zone”, in relation to a project, means the declaration of any area under our National Policy by the appropriate Government acquired or proposed to be acquired for resettlement and rehabilitation of Project Affected Families as a resettlement zone.
- (q) “Requiring Body” shall mean any company, a body corporate, an institution, or any other organization for whom land is to be acquired by the appropriate Government, and includes the appropriate Government if the acquisition of land is for such Government either for its own use or for subsequent allotment of such land in public interest to a body corporate, institution, or any other organization or to any company under lease, license or through any other system of transfer of land to such company, as the case may be.
- (r) “Small farmer” means a cultivator with an unirrigated land holding up to two acres or with an irrigated land holding up to one acre.

7.9.4 Socioeconomic studies

(1) Census survey

The census survey was carried out in the month November- December, 2020 as per the alignment. The objectives of the census survey was to generate an inventory of social impacts on the people affected by the project, their structures affected, social profile of the project affected people, their poverty, their views about the project and also their views on various options of rehabilitation and resettlement. A questionnaire was used to collect detailed information on affected households/business for a full understanding of impacts in order to develop mitigation measures and resettlement plan for the PAPs. A structured census questionnaire was used to collect detailed information on affected households/ properties for a full understanding of impacts in order to develop mitigation measures and resettlement plan for the PAPs. The census survey includes the following:

- Inventory of the affected assets
- Categorization and measurements of potential loss
- Physical measurements of the affected assets/structures

- Identification of trees and crops
- Household characteristics, including social, economic and demographic profile
- Identification of non-titleholders
- Assessment of potential economic impact

The present census survey has covered 100% structures affected within the proposed ROW including titleholders and non-titleholders. The additional information about the titleholders land will be collected on completion of landholders' data collection from revenue department which is in the progress. The results of census survey presented in the report will also be updated further after completion of landholders' data collection.

(2) Summary Project Impacts

The project impacts can be broadly classified as (i) impacts on private land, (ii) impacts on private structures including Encroachers and Squatters, (iii) impacts on livelihoods due to loss of private properties and (iv) loss of common property resources. As per the socio-economic survey, total household 1,053 will be affected in the project. The Summary of Resettlement Impacts is provided in the below tables.

Table 7-87: Summary of Resettlement Land Acquisition

Sl. No.	Impacts	Total
1	Number of project affected households	1,053
2	Number of project affected persons	3,467
3	Number of households for resettlement (households whose residential structures will be damaged)	463
4	Number of persons for resettlement (persons whose residential structures will be damaged)	1,632
5	Total land acquisition requirements (in ha)	400.45
6	Total private land acquisition requirements (in ha)	266.69
7	Total Government land acquisition requirements (in ha)	133.76
8	Total number of land units to be acquired	480
9	Number of affected structures	581
10	Number of common property resources (CPR)	41

Source: DPR and JICA Study Team

(3) Land Acquisition

The land acquisition is quite significant in the project because of availability of limited ROW. According to the Land Acquisition Plan (LAP) prepared as a part of Project Report, 400.45 ha out of which 266.69 ha private land, 133.76 ha government land will be acquired for the project. 98% of the 266.69ha private land is used for agriculture and horticulture.

Total number of project affected households (PAHs) is 1,053. The area is excluding the area that already lies with Executing Agency in terms of proposed roads falling in the alignment. A project census survey will be carried out to identify the persons who would be affected by the project and to make an inventory of their assets that would be lost to the project, which would be the basis of calculation of compensation.

Many project affected persons (PAPs) will be losing their land for the project and their livelihoods as well as dwellings are affected. The details of project impact on land and various types of loss due to the land loss are discussed in this section.

(4) Composition of PAPs and PAHs: types of impacts

To understand the socio-economic profile of project area, the socio-economic information of PAPs was collected through the socio-economic Survey (SES) and census survey. The analysis of impacts confirms that a total of PAHs are 1,053 and PAPs are 3,467. Out of 1,053 PAHs, 480 are titleholders and 573 are nontitle holders. Out of 480 title holders, 421 are those who are affected by land only, 53 affected by land plus residential houses and 6 are affected by land plus commercial structures. Among 573 nontitle holders, 410 are affected by residence (mainly tin shed houses), 112 are affected by shops and 51 are kiosks.

Table 7-88: Composition of PAPs and PAHs

Sl. No.	Type of impacts	Total no. of PAHs	Total no. of PAPs	No. of ST PAHs	No. of ST PAPs
1	Titleholders with loss of land only	421	1,263	201	620
2	Titleholders with loss of land with their residential structures	53	172	38	124
3	Title holders with loss of land with commercial structure	6	26	5	21
4	Non-title holders with loss of residential structures	410	1,460	175	694
5	Non-title holders with loss of commercial structures	112	426	103	296
6	Non-title holders with loss of Kiosks or vending grounds	51	120	24	54
Total		1,053	3,467	546	1,809

Source: JICA Study Team

(5) Types of structures affected

Types of structure to be affected and their numbers are shown in the below table.

Table 7-89: Composition of affected structures

S.No.	Type	Number
1	Pucca	97
2	Semi Pucca	139
3	Kachha	206
4	Tin Shed	139
Total		581

(6) Loss of Community Property Resources (CPRs)

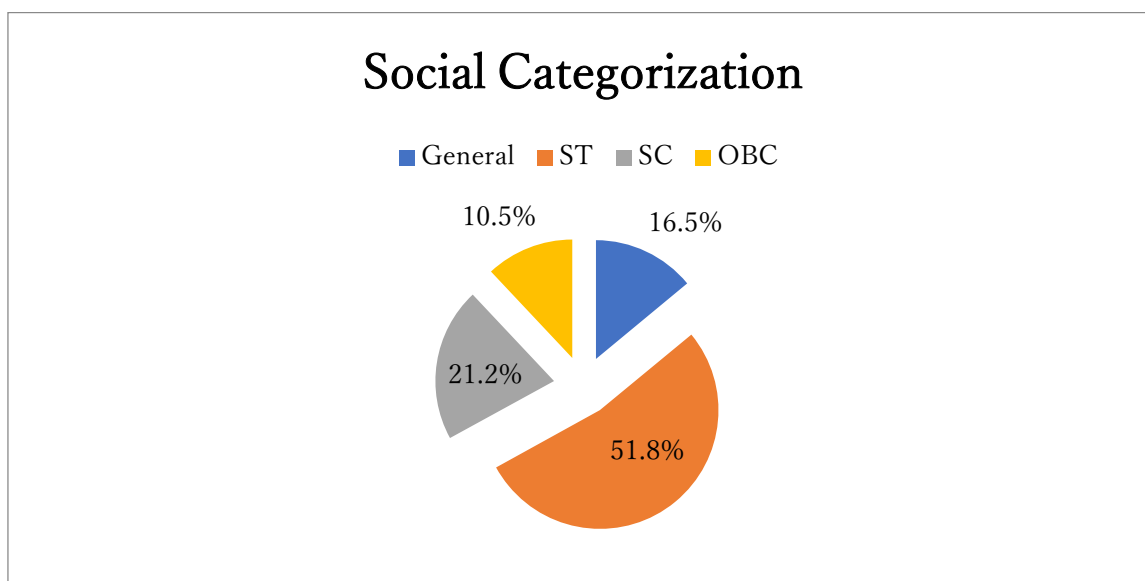
41 CPRs are also affected by proposed project. The findings of the survey are presented in the following sections. During the census survey, it was observed that there are forty one community property resources including community, religious and government properties within the proposed ROW. Among CPRs, 8 schools and 1 hospital are also going to be affected as shown in the below table.

Table 7-90: Composition of Common Property Resources (CPR)

S.No.	Type	Number
1	Anganwari center (Child care center)	1
2	Religious structure (8 temples and 2 churches)	10
3	Community hall	7
4	School	8
5	Hospital	1
6	Government building	13
7	Panchayat office	1
Total		41

(7) Social Categories of the PAHs

The social stratification of the project area shows the dominance of Scheduled Tribe (ST) shares 51.8% (546 households) of the total households. The second stratum of the social grouping in the area is of schedule Caste (SC) population in the project area sharing 21.2 % (224 households) and general population with 16.5 % (174 households), followed by other backward caste 10.5% (109 households). The detail of social grouping in the project area is presented in the below figure.



Source: DPR and Census Survey by JICA Study Team, Data, Nov- Dec, 2020

Figure 7-47: Social Categories of PAPs along the Project Road

(8) Religious Categories of the PAHs

The project area is dominated by Hindu community as they form 83% (874 households) of the total PAHs, followed by Buddhist which is 10% (105 households), Christian 5% (53 households) and Muslim 2% (21 households).

(9) Number of Project Affected Persons (PAPs)

There are altogether 3,467 PAPs concerning to titled and non-titled categories, who are being affected by the project. It includes 56% (1,943 people) males and 44% (1,524 people) females.

The number of PAPs is substantially significant in the project area mainly because presence of joint family system and a large number of shareholders of landed properties.

(10) Vulnerable Households being affected in the project

In the project area there are 73.7% (777 households) falling in the vulnerable category (households below poverty line (BPL), including Scheduled Tribe, headed by women, or including physically challenged/disabled person). The vulnerable households consist of 546 ST households (which includes 317 BPL households among them 15 are Women Headed Households) and 231 non-ST BPL households. All WHHs belongs to ST only. No physically challenged household is identified.

Table 7-91: Vulnerable Households

	BPL households	Non-BPL households	Total
ST households	317*1	229	546
Non-ST households	231	0*2	231
Total	548	229	777

*1 Including all the 15 women headed households (WHHs) among the PAHs.

*2 There is no vulnerable household out of the ST households or the BPL households.

Source: Census Survey by JICA Study Team, Nov.- Dec., 2020

(11) Income Level of the Affected Households

The census survey on the monthly income levels of each PAHs in affected districts indicates that approx. 25% (263 households) have income less than INR 5,000, 40% (421 households) of PAHs have monthly income in the range of INR 5,000-10,000, 29% (306 households) have monthly income in the range of INR 10,000-20,000, 5% (53 households) of PAHs have income in the range of INR 20,000-50,000, and 1% (10 households) have monthly income in the range of INR 50,000-100,000. The average income level of households in the project area is summarized in the below table.

Table 7-92: Monthly Income Level of the Affected Households

Sl. No.	Monthly Income Categories in (Rs)	%
1	<5000	25%
2	5,000 to 10,000	40%
3	10,000 to 20,000	29%
4	20,000 to 50,000	5%
5	50,000 to 100,000	1%
	Total	100%

Source: Census Survey by JICA Study Team, Data, Nov- Dec, 2020

(12) Occupation by PAHs

The occupational status of head of the households i.e. the primary occupation by the households reveals that 40% (421 households) households are having Agriculture/Horticulture as their primary source of income. About 18% (190 households) households are depending on business and this includes the business they are carrying out in the road side mainly shops, Wage Earner are 24% (253 households), 17% (179 households) are engaged in private service and 1% (11 households) are engaged in Government jobs. The details of occupations by the PAPs are presented in the below table.

Farmers (with agriculture/horticulture as occupational status) will be affected losing their farmland and their standing crops on it. 98% of the 266.69ha private land to be acquired is used for agriculture and horticulture.

Wage earners will not be affected by the project in terms of livelihood as they work in nearby cities and towns but residing in project area.

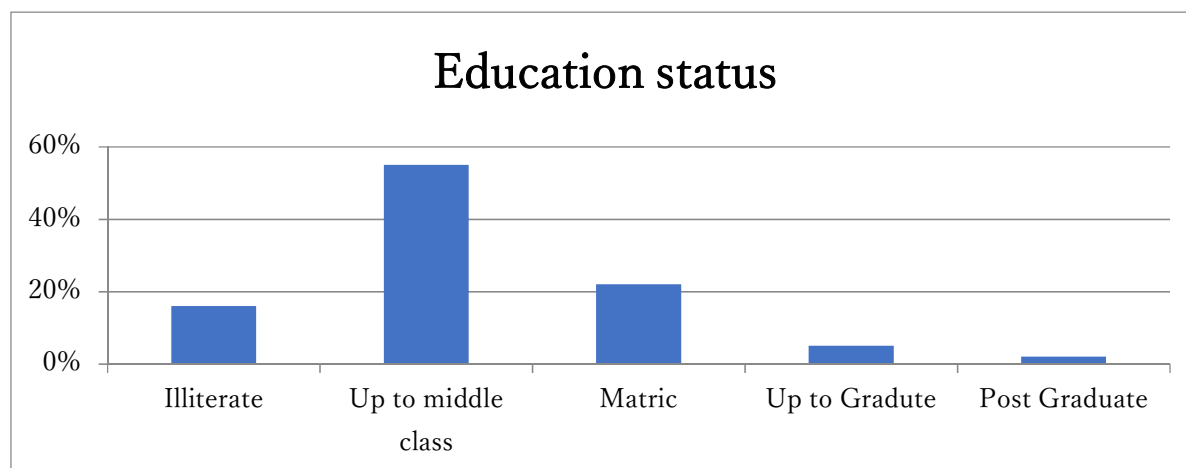
Table 7-93: Occupational Status of PAPs

Sl. No.	Occupational Status of Aps	%
1	Government/ Semi Government Service	1%
2	Business	18%
3	Agriculture/Horticulture	40%
4	Wage Earner	24%
5	Private Service	17%
	Total	100%

Source: Census Survey by JICA Study Team, Data, Nov- Dec, 2020

(13) Educational Status of PAPs

The educational status of head of the households reveals that overall scenario of literacy level is not encouraging in the project area as significant percentage of population, i.e., 16% (168 households) are still illiterate. Another 55% (579 households) has attained the education up to middle class level, 22% (232 households) Matric, 5% (53 households) up to Graduate, 2% (21 households) Post Graduate attained the education below matric which are presented in the below figure.



Source: Census Survey by JICA Study Team, Data, Nov- Dec, 2020

Figure 7-48: Educational Status of PAPs

(14) Impact on Scheduled Tribe

The presence of ST population in the project area as affected person is about 51.8% (546 households). Impacts to the Scheduled Tribe and action plan to mitigate them are stated in Section 7.10.

(15) Gender Impact and Mitigation Measures

The gender composition of PAPs shows that the male accounts for 56% (1,943 people) males and 44% (1524) females

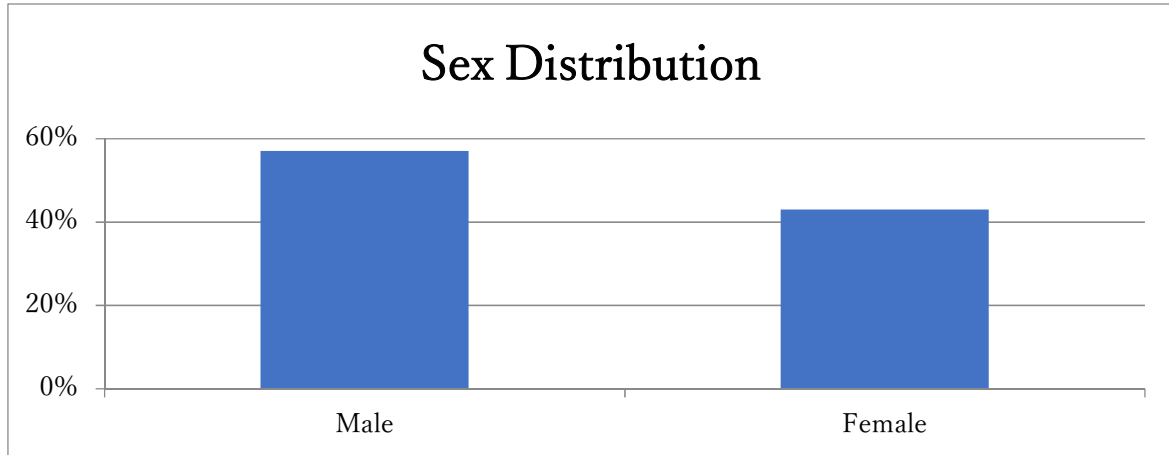


Figure 7-49: Gender Ratio in study area

The working women and girl students face lot of problem for travel, due to non-availability of good road and transport network. Especially in rainy season, the problem increases manifold which sometimes compels the girl students abstains from classes.

Only primary health centers (PHCs) are located at some villages and the quality of treatment and medical facilities are less than satisfactory. In emergency they have to reach hospitals at district headquarters only.

Health status will improve as they will be able to visit a governmental hospital in Agartala if sick and especially during pregnancy and will not have to depend on uneducated rural midwife for safe delivery, which are common in villages. Incidence of child mortality & maternal mortality rate will reduce with easy access to government health care facility centres.

The women feel that their mobility will increase as market and relatives' places will be easily accessible for them as better road condition will induce more transport vehicles to operate. More shops, markets will open within the village approach area and as a result they will get quality leisure time at their disposal.

Women from poor families will get job opportunity during construction work as casual labour or at office. Besides, women can operate individual / family enterprise by opening small tea stalls, shops/eateries to provide meals to the construction labourers. This will enhance their family income as well as their entrepreneurial skill which may be useful in future.

Women labourers feel that improved road network will provide them with better job opportunity as they will be able to travel further and even can commute from home.

Moreover, travel by public transport system, like government bus service, will become cheaper and money saved on transport can be better utilized for household needs.

The girl students will be able to attain higher education at colleges, since journey time and cost will be greatly reduced and the girls can commute from home all by themselves free of hazard.

During disbursement of compensation and provision of assistance, priority will be given to female-headed households. Additionally, women headed households are considered as vulnerable and provision for additional assistance (lump sum amount @ Rs.10,000/- per affected households) has been made in the entitlement of the RAP. Provision for equal wage and health safety facilities during the construction will be ensured by the EA. Therefore, the sub project activities will not have any negative impact on women.

7.9.5 Legal framework

Refer to Section 7.3.2 above.

7.9.6 Institutional Framework

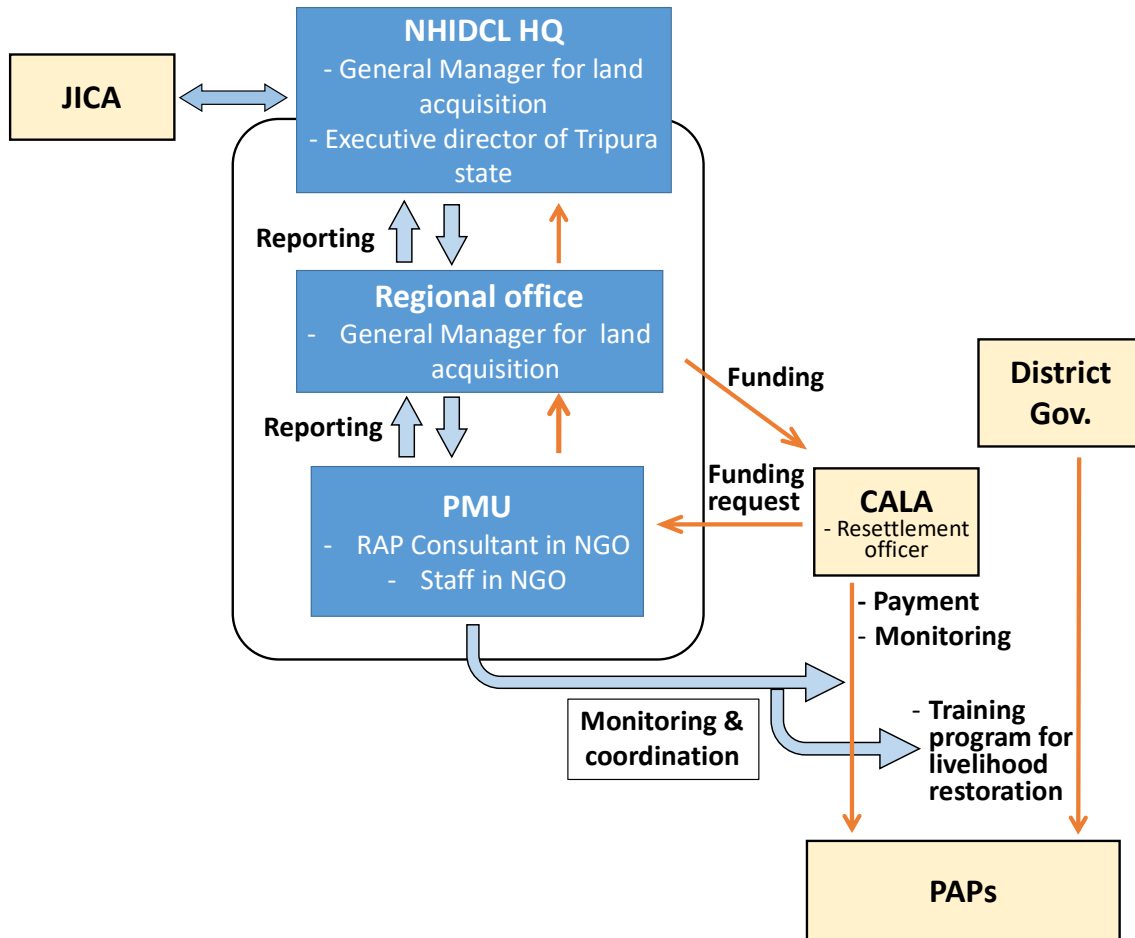
Institutions for planning & implementation of RAP vary substantially in terms of their respective roles and capacity. Timely establishment & involvement of appropriate resettlement and rehabilitation institutions would significantly facilitate achievement of objectives of the resettlement and rehabilitation program. The primary institutions who will be involved in this implementation process are follows.

- National Highway and Infrastructure Development Corporation Ltd (NHIDCL)
- NHIDCL Regional Office
- Competent Authority for Land Acquisition (CALA)
- District Government including Autonomous District Councils
- Non-Government Organization (NGO)

NHIDCL is the nodal agency for implementation of the proposed project. Therefore, the prime responsibility for land acquisition lies with the NHIDCL, Tripura. However, for the implementation of RAP, there will be a set of institutions involved at various levels and stages of the project. In practice, such land acquisition is normally done through the district government and the Competent Authority for Land Acquisition (CALA). The land acquisition process starts with the appointment of a revenue functionary of the State Government as CALA for each NH Project. It's role is taking of physical possession of the land by the implementing authority and disbursement of compensation to each affected/interested party

For Tripura state, being under jurisdiction of the sixth schedule of the constitution, Autonomous District Councils (ADC) will also be involved in the approval of project. The Project Management Unit (PMU) will be established under the regional office of NHIDCL and will hire the services of some experienced NGO for monitoring and coordination of implementation of the RAP. The proposed institutional arrangement with their roles and responsibilities are shown in the below table.

7



Source: JICA Survey Tam

Figure 7-50: Institutional Arrangement for RAP

7.9.7 Eligibility

(1) Definition of PAPs and Eligibility

The project will have three types of project affected persons (PAPs) i.e., (i) persons with formal legal rights to land lost in its entirety or in part; (ii) persons who lost the land they occupy in its entirety or in part who have no formal legal rights to such land, but who have claims to such lands that are recognized or recognizable under national laws; and (iii) persons who lost the land they occupy in its entirety or in part who have neither formal legal rights nor recognized or recognizable claims to such land. The involuntary resettlement requirements apply to all three types of displaced persons. PAPs entitled for compensation, assistance and rehabilitation provisions under the project are:

- All PAPs losing land either covered by formal legal title, recognizable title, or without legal status;
- Tenants and sharecroppers whether registered or not;
- Owners of buildings, crops, plants, or other objects attached to the land;
- and PAPs losing business, income, and salaries

Compensation eligibility is limited by a cut-off date as set for this project on the day of the beginning of the census survey which is decided by the EA. PAPs who settle in the affected areas after the cut-off date will not be eligible for compensation. They, however, will be given sufficient

advance notice, requested to vacate premises and dismantle affected structures prior to project implementation. Their dismantled structures materials will not be confiscated and they will not pay any fine or suffer any sanction.

For this project, LA notification has not been published yet, then cut-off date for titleholders has not been officially fixed. For preparation of this RAP, the JICA Study Team set the cut-off date on 15th Sep. 2020, just after first stage of public consultation and before starting of the census survey for the RAP.

(2) Entitlement

The entitlement provisions various categories of PAPs in terms loss of land house and income as per census survey are detailed below:

Agricultural land impacts will be compensated at replacement cost. Cash compensation at replacement cost will be determined according to RTFCLARR ACT, 2013 or replacement of land if available. If the residual plot(s) is (are) not viable, i.e., the PAP becomes a marginal farmer, three options are to be given to the PAP, subject to his acceptance which are (i) The PAP remains on the plot, and the compensation and assistance paid to the tune of required amount of land to be acquired, (ii) Compensation and assistance are to be provided for the entire plot including residual part, if the owner of such land wishes that his residual plot should also be acquired by the EA, the EA will acquire the residual plot and pay the compensation for it and (iii) If the PAP is from vulnerable group, compensation for the entire land by means of land for land will be provided if PAP wishes so, provided that land of equal productive value is available. All fees, stamp duties, taxes and other charges, as applicable under the relevant laws, incurred in the relocation and rehabilitation process, are to be borne by the EA.

Loss of homestead /Commercial land will be compensated at replacement cost. Cash compensation at replacement cost will be determined according to RTFCLARR ACT, 2013 or replacement of land if available. All fees, stamp duties, taxes and other charges, as applicable under the relevant laws, incurred in the relocation and rehabilitation process, are to be borne by the EA.

Loss of Structures Residential/Commercial/Other will be compensated at replacement value with other assistance. The details on the determination of compensation will be as (i) Compensation of structure will be paid at the replacement cost to be calculated as per latest prevailing basic schedules of rates (BSR) without depreciation, (ii) Shifting assistance of Rs. 10,000/-, (iii) Right to salvage material from demolished structure and frontage, etc., and (iv) Rental assistance as per the prevalent rate in the form of grant to cover maximum three month rentals.

Loss of rental accommodation by the tenants will be compensated as rental assistance and shifting assistance. The details assistance will be as per (i) Rental assistance for both residential & commercial tenants as per the prevalent rate in the form of grant to cover maximum three month rentals, (ii) Additional structures erected by tenants will also be compensated and deducted from owner's compensation amount, (iii) Shifting assistance based on type of house and household assets, (iv) Any advance deposited by the tenants will be refunded from owners total compensation package to the tenant on submission of documentary evidences and (v) Right to salvage material from demolished structure and frontage etc. erected by tenants.

Loss of structure by non-title holder will be also compensated as per applicable guidelines. The squatters will be compensated for structure and also get shifting assistance. The detail assistance will be as per (i) compensation for both residential & commercial squatter as per the prevalent

rate in the form of grant to cover maximum three month rentals, (ii) Shifting assistance will be Rs. 10,000/-, (iii) Right to salvage material from demolished structure and frontage etc. erected by squatters.

Loss of Trees will be compensated to Land holders, Share- croppers and Lease holders based on the market value to be computed with assistance of horticulture department. This can further be detailed in specific ways such as (i) Advance notice to PAPs to harvest fruits and remove trees, (ii) b) For fruit bearing trees compensation at average fruit production for next 15 years to be computed at current market value and (iii) For timber trees compensation at market cost based on kind of trees.

Loss of Crops will be compensated to land holders, share- croppers and lease holders based on the market value to be computed with assistance of agricultural department. The detailed compensation methods are (i) advance notice to PAPs to harvest crops and (ii) in case of standing crops, cash compensation at current market cost to be calculated of mature crops based on average production.

Loss of Livelihood due to Loss of primary source of income will be compensated through rehabilitation assistances. There are various categories of entitled persons under this category which are (i) Titleholders losing income through business, (ii) Titleholders losing income through agriculture, (iii) Non-titleholders namely squatters and vulnerable encroachers losing primary source of income, (iv) Wage earning employees indirectly affected due to displacement of commercial structure, (v) Agricultural labourer/share-cropper and (vi) Licensed mobile vendors and kiosk operators. Details of entitlements for the above categories are described below:

Title holders losing their business establishment due to displacement will be provided rehabilitation assistance through a lump sum Transportation allowance of Rs. 9,000/-

Titleholders losing income through agriculture will be provided with the rehabilitation assistance which are (i) Training Assistance will be provided for income generating vocational training and skill up gradation options as per PAPs choice at the rate of Rs. 5,000 per affected household to those households losing their primary source of income and (ii) Employment opportunity for PAPs in the road construction work, if available and if so desired by them.

Non-titleholders namely squatters and vulnerable encroachers losing primary source of income will be provided with rehabilitation assistances through (i) Training would be provided for up-gradation of skills @ Rs. 5,000/ - per family to the PAPs, (ii) Employment opportunity for PAPs in the road construction work, if available and/if so desired by them, Or (iii) National/State level job card under National Rural Employment Guarantee Program.

Wage earning employees indirectly affected due to displacement of commercial structure will be assisted through rehabilitation assistance which are; (i) persons indirectly affected due to the employer having being displaced, on case-by-case, based on local wage rates for three months, (ii) Employment opportunity for PAPs in the road construction work, if available and if so desired by them, Or (iii) National/State level job card under National Rural Employment Guarantee Program.

Rehabilitation assistance for Agricultural labourer/ share-cropper will be paid as per the details such as (i) Assistance is to be paid as per the prevailing local wage rates for 100 days., (ii) b) Employment opportunity for PAPs in the road construction work, if available and if so desired by them, Or (iii) National/State level job card under National Rural Employment Guarantee Program.

Licensed mobile vendors and kiosk operators will be provided with the rehabilitation assistance which are (i) Mobile vendors are not eligible for compensation or assistance (ii) Those mobile vendors in possession of a permit from local authorities to operate in the affected area will be treated as kiosks operators, (iii) Kiosk operators and vendors licensed to operate from affected locations will be entitled to a one time lump sum assistance of Rs. 5,000/-.

Loss of community infrastructure/common property resources will be compensated either by cash compensation at replacement cost or reconstruction of the community structure in consultation with the affected community

Additional Assistance to vulnerable groups (including BPL, Scheduled Tribe, family/household headed by women, physically challenged/disabled person) will be paid with Special Assistance which will be one time lump sum assistance of Rs. 20,000/ to vulnerable households. This will be paid above and over the other assistance(s) as per this entitlement matrix.

Temporary impact during construction like disruption of normal traffic, damage to adjacent parcel of land / assets due to movement of heavy machinery and plant site will be compensated to either individual or community in the form of, (i) The contractor shall bear the cost of any impact on structure or land due to movement of machinery during construction or establishment of construction plant, and (ii) All temporary use of lands outside proposed RoW to be through written approval of the landowner and contractor. Location of Construction camps by contractors in consultation with RCD.

Any unanticipated impacts (if any) due to the project will be documented and mitigated based on the spirit of the principle agreed upon in this entitlement matrix. Once they occur, they shall be reported, monitored and mitigated by compensation and/or other means of assistance through the Grievance Redressal Mechanism.

(3) Entitlement Matrix

Compensation for the lost assets to all displaced persons will be paid on the basis of replacement cost. Resettlement assistance for lost income and livelihoods will be provided to both title holders and non-title holders. Special resettlement and rehabilitation measures will be made available to the “Vulnerable Group” comprises of PAPs living below poverty line (BPL), Scheduled Tribe, family/household headed by women/female, widows, physically challenged (disabled person), and land less. An Entitlement Matrix has been formulated, which recognizes and lists various types of losses resulting out of the project and specific compensation and resettlement packages. Entitlement Matrix presented in the table below.

Table 7-94: Entitlement Matrix

Sl.	Impact Category	Entitlements	Implementation Guidelines
PART I. TITLE HOLDERS-Compensation for Loss of Private Property			
1	Loss of Land (agricultural, homestead,	1.1 Compensation for land at Replacement Cost of Land for land, where feasible	Land will be acquired by the competent authority in accordance with the provisions of RFCTLARR Act, 2013.

Sl.	Impact Category	Entitlements	Implementation Guidelines
	commercial or otherwise)		<p>Replacement cost for Land will be, higher of (i) market value as per Indian Stamp Act, 1899 for the registration of sale deed or agreements to sell, in the area where land is situated; or (ii) average sale price for similar type of land, situated in the nearest village or nearest vicinity area, ascertained from the highest 50% of sale deeds of the preceding 3 years; or (iii) consented amount paid for PPPs or private companies.</p> <p>Plus 100% solatium and 12% interest from date of notification to award.</p> <p>The multiplier factor adopted by GOI for land in rural area, based on the distance from urban area to the affected area, will be applied.</p> <p>In case of severance of land, house, manufactory or other building, As per Section 94(1), the whole land and /or structure shall be acquired, if the owner so desires.</p>
2	Loss of Structure (house, shop, building or immovable property or assets attached to the land)	2.1 Compensation at replacement cost	<p>The market value of structures and other immovable properties will be determined by NHIDCL on the basis of relevant NHIDCL Schedule of rates (SR)N as on date without depreciation.</p> <p>Plus 100% solatium</p> <p>For partly affected structures, the PAP will have the option of – claiming compensation for the entire structure, if the remaining portion is unviable.</p>
PART II. REHABILITATION AND RESETTLEMENT (additional assistance to the above)- Both Land Owners and Families Whose Livelihood is Primarily Dependent on Land Acquired			
3	Loss of land	3.1	<p>Employment to at least one member per affected family in the project or arrange for a job in such other project as may be required after providing suitable training and skill development in the required field and at a rate not lower than the minimum wages provided for in any other law for the time being in force.</p> <p>Or</p> <p>One-time payment of Rs. 500,000/-for each affected household.</p> <p>Or</p> <p>Annuity policy that shall pay Rs. 2,000/- per month for 20 years with appropriate indexation to CPIAL</p>

Sl.	Impact Category	Entitlements	Implementation Guidelines
		3.2 Monthly subsistence allowance of Rs. 3,000/- per month for a period of one year to affected households who require to relocate due to the project	
		3.3 Transportation assistance of Rs. 50,000/- for affected households who require to relocate due to the project	
		3.4 One time assistance of Rs. 25,000/- to all those who loss a cattle shed	
		3.5 One time Resettlement Allowance of Rs, 50,000/- for affected household who have to relocate	
		3.6 Additional onetime assistance of Rs. 50,000/-to scheduled caste and scheduled tribe families who are displaced from scheduled areas and who require to relocate due to the project	
4	Loss of Residence	4.1 An alternative house for those who have to relocate, as per IAY specification in rural areas and constructed house/flat of minimum 50sq.m. in urban areas or cash in lieu of house if opted (the cash in lieu of house will be Rs, 70,000/-in the line with Gol IAY standards in rural areas and Rs. 150,000 in case of urban areas) , for those who do not have any homestead land and who have been residing in the affected areas continuously for a minimum period of 3years	Stamp Duty and registration charges will be borne by the project in case of new houses or sites.
		4.2 Employment to at least one number per affected family in the project or arrange for a job in such other project as may be required after providing suitable training and skill development in the required field and at a rate not lower than the minimum wages provided for any other law for the time being in force. Or One Time payment of Rs. 500,000/- for each affected household Or Annuity policy that shall pay Rs. 2,000/- per month or 20 years with appropriate indexation to CPIAL	
		4.3 Monthly subsistence allowance of Rs. 3,000/- per month for a period of one year to affected households who require to locate due to the project	
		4.4 Transportation assistance of Rs. 50,000/- for affected households who require to relocate due to the project	
		4.5 One time assistance of Rs. 25,000/-to all those who lose a cattle shed	
		4.6 One time assistance of Rs. 25,000/- for each affected family of an artisan or self-employed and who has to relocate	
		4.7 One time Resettlement Allowance of Rs, 50,000/-for affected household who have to relocate	

Sl.	Impact Category	Entitlements	Implementation Guidelines
		4.8 Additional onetime assistance of Rs. 50,000/-to scheduled caste and scheduled tribe families who are displaced from scheduled areas and who require to relocate due to the project	
		4.9 Right to salvage affected materials.	
5	Loss of shop/trade/commercial structure	5.1 Employment to at least one number per affected family in the project or arrange for a job in such other project as may be required after providing suitable training and skill development in the required field and at a rate not lower than the minimum wages provided for in any other law. Or One-time Payment of Rs. 500,000/-for each affected household Or Annuity policy that shall pay Rs, 2,000/-per month for 20 years with appropriate indexation to CPIAL	
		5.2 Monthly subsistence allowance of Rs. 3,000/-per month for a period of one year to affected household who require to relocate due to the project	
		5.3 Transportation assistance of Rs. 50,000/-for affected household who require to relocate due to the project	
		5.4 One time assistance of Rs. 25,000/- for each affected family of an artisan or self-employed or small trader and who has to relocate	
		5.5 One time Resettlement Allowance of Rs. 50,000/-for affected household who have to relocate	
		5.6 Additional one-time assistance of R. 50,000/-to scheduled caste and scheduled tribe families who are displaced from scheduled areas and who require to relocate due- to the project	
		5.7 Right to salvage affected materials	
PART III.IMPACT TO SQUATTERS/ENCROACHERS- Those in the existing right-of way where no land acquisition is done			
6	Impact of Squatters	6.1 Loss of House 6.1.1 Compensation at scheduled rates without depreciation for structure with 1-month notice to demolish the affected structure 6.1.2 Right to salvage the affected materials 6.1.3 House construction grant of Rs. 70,000/-for all those who have to relocate and who do not have a house. Additional house site grant of Rs. 50,000 to those who do not have a house site 6.1.4 One time subsistence allowance of Rs.18,000/- 6.1.5 Shifting time assistance of Rs. 10,000/-	Only those directly affected squatters who live there will be eligible for all assistance Structure owners in RoW / Government lands who do not live there and have rented out the structure will be provided compensation for structure and no other assistance will be provided to them. The occupier (squatter-tenant) will be eligible for other assistance.

Sl.	Impact Category	Entitlements	Implementation Guidelines
		<p>6.2 Loss of shop</p> <p>6.2.1 Compensation at scheduled rates without depreciation for structure with one-month notice to demolish affected structure</p> <p>6.2.2 Right to salvage the affected materials</p> <p>6.2.3 One time rehabilitation grant of Rs. 20,000/-for reconstruction of affected shop</p> <p>6.2.4 One time subsistence allowance of Rs. 18,000/-</p> <p>6.2.5 Shifting time assistance of Rs. 10,000/-</p>	<p>Only those directly affected squatters who do business there will be eligible for all assistance.</p> <p>Structure owners in RoW / Government lands who do not live there and have rented out the structure will be provided compensation for structure and no other assistance will be provided to them. The occupier (squatter-tenant) will be eligible for other assistance.</p>
		<p>6.3 Kiosks/ Street Vendors</p> <p>6.3.1 1-month advance notice to relocate to nearby place for continuance of economic activity</p> <p>6.3.2 For temporary loss of livelihood during construction period, a monthly subsistence allowance of Rs. 3,000/- will be paid for the duration of disruption to livelihood, but not exceeding 3 months</p> <p>6.3.3 If relocation to nearby place and continuance of economic activity in the same place is not possible, then one time rehabilitation grant of Rs,18,000/-</p>	<p>The PMU and the implementation support NGO/ agency will consult such displaced persons and assess the requirement of subsistence allowance and rehabilitation grant</p>
		<p>6.4 Cultivation</p> <p>6.4.1 2-month notice to harvest standing crops or market value of compensation for standing crops</p>	
7	Impact to Encroachers	<p>7.1 Cultivation</p> <p>7.1.1 2-month notice to harvest standing crops or market value of compensation for standing crops, if notice is not given</p> <p>7.2 Structure</p> <p>7.2.1 1-month notice to demolish the encroached structure</p> <p>7.2.2 Compensation at scheduled rates without depreciation for the affected portion of the structure</p>	<p>Market value for the loss of standing crops will be decided by the PMU, NHIDCL in consultation with the agriculture or Horticulture Department</p> <p>The value of commercial structure and other immovable properties will be determined by NHIDCL on the basis of relevant scheduled rates (SR) as on date without depreciation</p>
PART IV.IMPACT TO VULNERABLE HOUSEHOLD			
8	Vulnerable Household	<p>8.1 Training for skill development. This assistance includes cost of training and financial assistance for travel/conveyance and food.</p>	<p>One adult member of the affected household, whose livelihood is affected, will be entitled for skill development.</p> <p>The PMU with support from the</p>

Sl.	Impact Category	Entitlements	Implementation Guidelines
		8.2 One time assistance of Rs. 25,000/- to Displaced Households who have to relocate	NGO will identify the number of eligible vulnerable displaced persons during joint verification and updating of the RAP and will conduct training need assessment in consultations with the PAPs so as to develop appropriate training programmes suitable to the PAPs skill and the region. Suitable trainers or local resources will be identified by PMU and NGO in consultation with local training institutes.
PART V. IMPACT DURING CIVIL WORKS			
9	Impact to structure / assets/tree/crops	9.1 The contractor is liable to pay damages to assets/tree/crops in private/public land, caused due to civil works	The PMU will ensure compliance
10	Use of private land	10.1 The contractor should obtain prior written consent from the landowner and pay mutually agreed rental for use of private land for storage of material or movement of vehicles and machinery or diversion of traffic during civil works	
PART VI. COMMON PROPERTY RESOURCES			
11	impact to common property resources such as places of worship, community buildings, schools, etc	11.1 Relocation or restoration, if feasible, or cash compensation at replacement cost.	
12	Utilities such as water supply, electricity, tc	12.1 Will be relocated and services restored prior to commencement of civil works	The PMU will ensure that utilities are relocated prior to commencement of civil works in that stretch of the road corridor in accordance with the civil works schedule
PART VII. UNFORSEEN IMPACT			
<p>Unforeseen Impacts encountered during implementation will be addressed in accordance with the principles of RFLARR2013/ Safeguard policy Guidelines of Multilateral Institutions. In addition to the all entitlements given in the non-tribal area, Tribal Development Plan will be prepared for development assistance of the affected tribal communities in course of the competent authorities' community and human development plans including TTAADC's plans covering the following aspects:</p> <ol style="list-style-type: none"> Contribution of existing tribal development and/or human development plans Assistance of competent authorities to prepare new tribal development plans and implement the plans Development of alternate fuel, fodder and non timber forest produce resources on non-forest lands 			

7.9.8 Valuation of and compensation for losses

All lands proposed to be acquired under this project will be compensated as per replacement cost. Land surveys to determine compensation rates will be conducted on the basis current land use and

assessment of market value. Records as they are on the cut-off date will be taken into consideration while determining the current use of land. The EA will determine the replacement cost as per RTFCLARR ACT, 2013 based on market survey and in consultation with PAPs. After notification for acquisition as per National Highway Safeguard Policies, the EA will negotiate with PAPs for voluntary acquisition and ensure payment of additional registration cost and solatium to all PAPs. The EA will ensure that the rates established for the project are sufficient to purchase the same quality and quantity of land in the specific area.

The compensation for houses, buildings and other immovable properties will be determined on the basis of replacement cost as on date without depreciation. The EA will determine the replacement cost of structures in consultation with the owners by assessing (i) sources and cost of materials, whether the materials are locally available; (ii) type of shops (private or state-owned); (iii) distance to be travelled to procure materials; (iv) obtaining cost estimates through consultation with three contractors/suppliers in order to identify cost of materials and labor; (v) identifying the cost of different types of houses of different categories and compare the same with district level prices.

Cash compensation for properties belonging to the community if opted by the community, will be provided to enable construction of the same at new places through the community/local self-governing bodies / appropriate authority in accordance with the modalities determined by such bodies / authority to ensure correct use of the amount of compensation.

Compensation for trees will be based on their market value. Loss of timber trees will be compensated at their replacement cost while the compensation for the loss of fruit bearing trees will be calculated as annual produce value for at next 15 years depending on the nature of crops/trees.

7.9.9 Resettlement measures

(1) Land acquisition and resettlement procedure

The procedure mentioned in this section shall be followed for declaration of the affected area, carrying out survey and census of affected persons, assessment of government land available and land to be arranged for rehabilitation and resettlement, declaration of the resettlement area or areas, preparation of the draft rehabilitation and resettlement scheme or plan and its final publication.

Where the appropriate government is of the opinion that there is likely to be involuntary displacement of four hundred or more families en masse in plain areas, or two hundred or more families en masse in tribal or hilly areas, DDP blocks or areas mentioned in the Schedule V or Schedule VI to the Constitution due to acquisition of land for any project or due to any other reason, it shall, declare, by notification in the Official Gazette, area of villages or localities as an affected area.⁵⁶

Every declaration shall be published in at least three daily newspapers, two of which shall be in the local vernacular having circulation in villages or areas which are likely to be affected, and also by affixing a copy of the notification on the notice board of the concerned gram panchayats or municipalities and other prominent place or places in the affected area and the resettlement

⁵⁶ National Rehabilitation & Resettlement Policy, 2007. Below is the link (Sect しゅうせいし of Chapter V, page no. 40)
<https://dolr.gov.in/sites/default/files/National%20Rehabilitation%20%26%20Resettlement%20Policy%2C%202007.pdf> retrieved on 5 Jan. 2021.

area, and/or by any other method as may be prescribed in this regard by the appropriate Government.

Once the declaration is made, the Administrator for Rehabilitation and Resettlement shall undertake a baseline survey and census for identification of the persons and families likely to be affected.

Every such survey shall contain the following village-wise information of the affected families:-

- Members of the family who are permanently residing engaged in any trade, business, occupation or vocation in the affected area.
- Families who are likely to lose, or have lost, their house, agricultural land, employment or are alienated wholly or substantially from the main source of their trade, business, occupation or vocation.
- Agricultural labourers and non-agricultural labourers.
- Families belonging to the Scheduled Caste or Scheduled Tribe categories.
- Vulnerable persons such as the disabled, destitute, orphans, widows, unmarried girls, abandoned women, or persons above sixty years of age; who are not provided or cannot immediately be provided with alternative livelihood, and who are not otherwise covered as part of a family.
- Families those are landless (not having homestead land, agricultural land, or either homestead or agricultural land) and below poverty line in the affected area preceding the date of declaration of the affected area.
- Scheduled Tribes families who are or were having possession of forest lands in the affected area prior to the LA Notice Publication date.
- Every survey undertaken under shall be completed within a period of ninety days from the date of declaration.

On completion of the above survey on expiry of a period of ninety days, whichever is earlier, the Administrator for Rehabilitation and Resettlement shall, by notification, and also in such other manner so as to reach all persons likely to be affected, publish a draft of the details of the findings of the survey conducted by him and invite objections and suggestions from all persons likely to be affected thereby. This draft shall be made known locally by wide publicity in the affected area. On the expiry of thirty days from the date of publication of the draft of the details of survey and after considering the objections and suggestions received by him in "this behalf, the Administrator for Rehabilitation and Resettlement shall submit his recommendations thereon along with the details of the survey to the appropriate Government.

Within forty-five days from the date of receipt of the details of the survey and recommendations of the Administrator for Rehabilitation and Resettlement, the appropriate Government shall publish the final details of survey in the Official Gazette. The appropriate Government shall, by notification, declare any area (or areas) as a resettlement area (or areas) for rehabilitation and resettlement of the affected families.

The Administrator for Rehabilitation and Resettlement shall ensure that the affected families may be settled, wherever possible, in a group or groups in such resettlement areas. However, it has to be ensured that the affected families may be resettled with the host community on the basis of equality and mutual understanding, consistent with the desire of each group to preserve its own identity and culture.

The Administrator for Resettlement and rehabilitation shall draw up a list of lands that may be available for rehabilitation and resettlement of the affected families.

The lands drawn up shall consist of:-

- Land available or acquired for the project and earmarked for this purpose
- Government wastelands and any other land vesting in the Government available for allotment to the affected families.
- Lands that may be available for purchase or acquisition for the purposes of rehabilitation and resettlement scheme or plan.
- A combination of one or more of the above.

However, the Administrator for Rehabilitation and Resettlement should ensure that such acquisition of land does not lead to another set of physically displaced families. The Administrator for Rehabilitation and Resettlement, on behalf of the appropriate Government, may either purchase land from any person through consent award and may enter into an agreement for this purpose, or approach the state Government concerned for acquisition of land for the purposes of rehabilitation and resettlement scheme or plan.

After completion of baseline survey and census of the affected families and assessment of the requirement of land for resettlement, the Administrator for Rehabilitation and Resettlement shall prepare a draft scheme or plan for the rehabilitation and resettlement of the affected families after consultation with the representatives of the affected families including women and the representative of the requiring body.

The draft rehabilitation and resettlement scheme or plan shall contain the following particulars, namely:-

- (a) The extent of land to be acquired for the project and the name(s) of the affected village(s);
- (b) A village-wise list of the affected persons, family-wise, and the extent and nature of land and immovable property owned or held in their possession in the affected area, and the extent and nature of such land and immovable property which they are likely to lose or have lost, indicating the survey numbers thereof;
- (c) A list of agricultural laborers in such area and the names of such persons whose livelihood depends on agricultural activities;
- (d) A list of persons who have lost or are likely to lose their employment or livelihood or who have been or likely to be alienated wholly or substantially from their main sources of trade business, occupation or vocation consequent to the acquisition of land for the project or involuntary displacement due to any other cause;
- (e) A list of non-agricultural laborers, including artisans;
- (f) A list of affected landless families, including those, without homestead land and below poverty line families;
- (g) A list of vulnerable affected persons.
- (h) A list of occupiers, if any;
- (i) A list of public utilities and government buildings which are affected or likely to be affected;
- (j) Details of public and community properties, assets and infrastructure;
- (k) A list of benefits and packages which are to be provided to the affected families;
- (l) Details of the extent of land available in the resettlement area for resettling and for allotment of land to the affected families.
- (m) Details of the amenities and infrastructural facilities which are to be provided for resettlement.

- (n) The time schedule for shifting and resettling the displaced persons in the resettlement area or areas.
- (o) Such other particulars as the Administrator for Rehabilitation and Resettlement may consider necessary.

The draft scheme or plan may be made known locally by wide publicity in the affected area and the resettlement area (or areas) in such manner as may be prescribed by the appropriate Government.

The draft rehabilitation and resettlement scheme or plan shall also be discussed in gram sabhas in rural areas and in public hearings in urban and rural areas where gram sabhas don't exist.

The draft rehabilitation and resettlement scheme or plan shall also be discussed in gram sabhas in rural areas and in public hearings in urban and rural areas where gram sabhas don't exist.

The consultation with the gram sabha or the panchayats at the appropriate level in the Scheduled Areas under' Schedule V of the Constitution shall be in accordance with the provisions of the Provisions of the Panchayats (Extension to the Scheduled Areas) Act, 1996 (40 of 1996).

In cases of involuntary displacement of Scheduled Tribes families from the Scheduled Areas, the concerned Tribes Advisory Councils may also be consulted.

While preparing a draft scheme or plan, the Administrator for Rehabilitation and Resettlement shall ensure that the entire estimated cost of the rehabilitation and resettlement scheme or plan forms an integral part of the cost of the project for which the land is being acquired. The entire expenditure on rehabilitation and resettlement benefits and the expenditure for rehabilitation and resettlement of the affected families are to be borne by the requiring body for which the land is being acquired. The Administrator for Rehabilitation and Resettlement shall ensure that the entire estimated cost of rehabilitation and resettlement benefits and other expenditure for rehabilitation and resettlement of the affected families is communicated to the requiring body for incorporation in the project cost.

The Administrator for Rehabilitation and Resettlement shall submit the draft scheme or plan for rehabilitation and resettlement to the appropriate Government for its approval. In case of a project involving land acquisition on behalf of a requiring body, it shall be the responsibility of the appropriate Government to obtain the consent of the requiring body, to ensure that the necessary approvals as required under this policy have been obtained, and to make sure that the requiring body has agreed to bear the entire cost of rehabilitation and resettlement benefits and other, expenditure for rehabilitation and resettlement of the affected families as communicated by the Administrator for Rehabilitation and Resettlement, before approving it. After approving the rehabilitation and resettlement scheme or plan, the appropriate Government shall publish the same in the Official Gazette. On final notification of the rehabilitation and resettlement scheme or plan, it shall come into force.

It shall be the responsibility of the requiring body to provide sufficient funds to the Administrator for Rehabilitation and Resettlement for proper implementation of the rehabilitation and resettlement scheme or plan. As soon as the rehabilitation and resettlement scheme or plan is finalized, the requiring body shall deposit one-third cost of the rehabilitation and resettlement scheme or plan with the Administrator for Rehabilitation and Resettlement. The administrator for Rehabilitation and Resettlement shall keep proper books of accounts and records of the funds placed at his disposal and submit periodic returns to the appropriate Government in this behalf.

In case of a project involving land acquisition on behalf of a requiring body, an exercise for fast-track updating of land records shall be undertaken on currently with the land acquisition proceedings. Persons who have acquired any right prior to the date of issue of the notification under sub-section (1) of section 24 of the RTFCLARR Act, 2013 (or such notification under any other Act of the Union or a State for the time being in force under which land acquisition is being undertaken) as per the updated records shall also have right to proportionate compensation along with the original landowners referred to in the notification.

- (a) The compensation award shall be declared well in time before displacement of the affected families. Full payment of compensation as well as adequate progress in resettlement shall be ensured in advance of the actual displacement of the affected families.
- (b) The compensation award shall take into account the market value of the property being acquired, including the location-wise minimum price per unit area fixed (or to be fixed) by the State Government.
- (c) Conversion to the intended category of use of the land being acquired (for example, from agricultural to non-agricultural) shall be taken into account in advance of the acquisition, and the compensation award shall be determined as per the intended land use category.
- (d) The applicable conversion charges for the change in the land use category shall be paid by the requiring body, and no reduction shall be made in the compensation award on this account.

In case of a project involving land acquisition on behalf of a requiring body, and if the requiring body is a company authorized to issue shares and debentures, the affected families who are entitled to get compensation for the land or other property acquired, shall be given the option to take up to twenty percent of the compensation amount due to them in the form of shares or debentures or both of the requiring body, as per the guidelines to be notified by the Central Government: Provided that the appropriate Government, at its discretion, may raise this proportion up to fifty percent of the compensation amount.

Land compulsorily acquired for a project cannot be transferred to any other purpose except for a public purpose, and after obtaining the prior approval of the appropriate Government.

If land compulsorily acquired for a project or part thereof, remains unutilized for the project for a period of five years from the date of taking over the possession by the requiring body, the same shall revert to the possession and ownership of the appropriate Government without payment of any compensation or remuneration to the requiring body. Whenever any land acquired for a public purpose is transferred to an individual or organization (whether in private sector, public sector or joint sector) for a consideration, eighty percent of any net unearned income so accruing to the transferor, shall be shared amongst the persons from whom the lands were acquired or their heirs, in proportion to the value at which the lands were acquired. The fund shall be kept in a separate account which shall be administered in such manner as may be prescribed.

(2) Measures of livelihood restoration

Income restoration interventions are much more complex due to occupational diversity of PAPs. For example, there may be a mix of a large number of land title holders (big, small and marginal farmers) and share croppers due to bypass option and non-title holders engaged in small business enterprises (vehicle repairing shops, small hotels, other rural/semi urban small activity based shops, commercial squatters etc.) as displaced people. This complex nature of occupational diversity poses a problem for mitigation measures in the context of economic rehabilitation. The

task becomes even more challenging due to the inherent pressure of completion of road construction work in a time bound manner.

However, the R&R framework proposed for the project has adequate provisions for restoration of livelihood of the affected communities. Attempts have been made towards improving the Income restoration strategies. The focus of restoration of livelihood is to ensure that PAPs are able to at least "regain their previous living standards." To restore and enhance the economic conditions of the PAPs, certain income generation and income restoration programs are incorporated in the RAP. To begin with, providing employment to the local people during construction phase will enable them to participate in the benefits of the project, reduce the size of intrusive work forces & keep more of the resources spent on the project in the local economy. It will also give the local communities a greater stake & sense of ownership in the project.

The R&R framework of the project provides that the loss of livelihood which would mainly result from the loss of land will be compensated by way of:

- Alternate economic rehabilitation support and training for up-gradation of skills or imparting new skills; and various R&R assistance such as Transportation Allowance, Economic rehabilitation grant for vulnerable.
- Preference of providing employment through the contractors for road works specially to those belonging to vulnerable groups.

Alternate village income sources such as village based industries will be promoted by the project in association with the local NGOs/CBOs. Villagers will be supported & encouraged to develop industries that are suited to their resources, skills and interests. Support in the form of technical assistance and training, marketing, business management and coordination will be provided by the appointed NGOs and as per applicable law.

The project will assist the PAPs in liaison with NGO, to encourage the PAPs to work in the road construction services. The project will:

- Assist to establish contact with the construction contractors for road works;
- Encourage to enlist labour for work to handle road related contract services;
- Compensate them for the loss of livelihood and income resulting from land acquisition;
- Identify training needs & modules;
- Assist access to poverty alleviation programs of the Govt. such as Swarnjayanti Gram Swa Rojgar Yojna especially for those below poverty line.
- Also assist to identify self-employment options.

(3) Self-Employment Generation Scheme

PAPs will be encouraged to take up training for income generating activities, with active support from the project through the NGO, in self-employment schemes.

Besides the land losers, other PAPs namely homestead losers; daily wage labourers and PAP in the vulnerable category are eligible for enrolment into the training program. For training and up gradation of skills Rs. 5,000 per family has been worked out as per the entitlement matrix. The NGOs will take the initiative to make necessary arrangements for providing infrastructure and other institutional support that will be required, to assist the PAP to get financial support through local bank and Government program. The said activities will be facilitated in collaboration with the PMU. The NGO would generate awareness among the PAPs about the different income earning opportunities and facilitate and training among PAPs. The PMU will not only take the initiative for self employment generating schemes and also arrange for appropriate training programmes so that the trained PAPs will be eligible for others jobs.

The principles governing the resettlement and rehabilitation will take into consideration:

- Rehabilitation assistance in the form of shop space if opted by 50 people or more.
- Transportation allowance.
- Women, handicapped and BPLs will be in the vulnerable category, will be given priority in allotment of shops.
- Only occupiers at the time of eviction will be considered for assistance for squatters.
- Compensation for those who don't want shop space, these PAPs will be assisted for alternate livelihood scheme. Till then, the amount paid for assistance will be kept in banks as joint account with the Project Authority.
- Only one shop per PAP will be considered, multiple occupations will not be considered.
- Only those PAPs will be eligible for such compensation whose primary source of income is from shops that will be lost.
- Conditions for shop allotment to PAPs will be laid down which will include formation of market committees with PAP participation, representative of this committee for smooth operation and maintenance of the complex. A nominal license fee will be charged.
- Access to loans will be facilitated by the Project Authority.
- Shops will be allotted based on the type of business carried out prior to eviction.

(4) Options of self-employment and EA's Assistance

It is perceived that the EA will be unable to provide direct employment to the PAPs. Hence, an alternative programmes are proposed as outlined in the above sections. Training for self-employment and assistance in setting up micro-enterprises is the primary vehicle of rehabilitation. The following order of priority would be considered for the PAPs entitled for self-employment:

- Have the requisite educational qualification.
- Have taken training in some micro-enterprise scheme and appeals to the EA for assistance; and
- Possess previous experience in running micro-enterprises.
- However, relaxation will be made for women, those below poverty line, and minorities and vulnerable PAPs who have taken training, but may not have requisite educational qualifications and experience. In both cases, the PMU in consultation with the NGO and the DLCs will vet appeals.
- The key parameters of the EA level of assistance in setting up of micro-enterprises are as follows:
- Survey of marketing opportunities by the NGO and information on PAPs under the supervision of PMU.
- Identification of training needs and modules that matches market opportunities.
- This will be done by the NGO.
- NGO to assist the PAPs to form groups/cooperatives that can bid for contracts tendered by the construction contractors or its sub-contractors. Activity to be supervised by PMU.
- PMU through the NGO will assist the PAPs to get access to capital by facilitating formation of a credit window affordable to the PAPs as individuals or groups in the local bank.
- EA will co-ordinate with the local bank to extend credit to the PAPs. EA will extend a letter of introduction to the bank.
- Encourage the PAPs to service loans and through awareness generation and training programmes by the NGO.
- PMU in collaboration with the NGO will also facilitate the PAPs access to poverty alleviation programmes of the Government.
- PMU will monitor the ventures established and incomes derived from these programmes. The information will be fed into the R&R database. The ventures and incomes derived

will again be monitored by an independent agency and the Lending Institute vets the reports submitted by the PMU.

(5) Market Feasibility Study

No business enterprise or income restoration program will sustain until and unless it is based on the market need and demand. Hence, EA through its PMU and contracted NGO who will undertake the detailed market feasibility study to clearly prepare the list of all viable and feasible enterprises. The scope of this study covers service and non-service based enterprises, the raw material availability and assured consumer market. The findings of the study will also be matched with the profile of the PAPs and accordingly the options will be offered to the PAPs. However, R&R consultants in the local district and village markets to make reconnaissance of the proposed demand and supply situation conducted rapid market survey. The local district markets comprise of all types of shops; hardware, construction materials, general store, vegetable markets, cloth stores, auto repair shops etc. The development of the project is expected to increase urbanization and commercialization of the society in particular along the project corridor. Demand for consumer goods in the area would consequently increase. Initiation of road construction activities will also result in a heavy spree of construction activities in and around the project area. This would consequently increase cash flow in the area.

Co-operatives of women markets can be set up for preparation of jams and pickles, basket making and moulding of leaf cups and plates. Poultry and animal husbandry units can also be set up in villages. Nursery to raise plants could also be quite viable since EA is committed to plant trees, as they would be felling many for the project. PMU through NGO will facilitate marketing facilities support through backward and forward linkages in order to make the self-employment schemes successful. The NGO will conduct periodical monitoring of these units over the implementation period and will take midterm correction measures if required. For marketing purposes, the NGO may tie these units up with khadi and village industries cooperatives (KVIC) or with the export promotion board or similar organizations. After establishment of the initial marketing linkages, the NGO will have to be gradually phase out their involvement.

(6) Training of PAPs

Very few PAPs possess any professional skills in the project area. Hence, a large scale and intensive training programme need to be undertaken. The PAPs eligible for training will either be trained in the Training Institutes identified by NGOs. Training will be provided to vulnerable PAPs as per the entitlement matrix. It is expected that such training will be organized within 12 months of property acquisition. NGO shall carry out the detail exercise of skill mapping and training need assessment before finalization of any training schemes.

The NGO will be trained to upgrade their skills so as to deliver the R&R components more effectively. Since reporting and documentation is an essential component of NGO activity, NGO will be provided with EA Guidelines to prepare the formats etc. during orientation, which will be conducted just after signing of the contract.

The training imparted will be essentially of two types: a technical training relevant for jobs and the other for non-land and land based self-employment and skill development schemes. The policy is devised under the following parameters:

- Eligible PAPs will get training assistance.
- Provision for training has already been made in the RP budget. This amount is not redeemable in cash. It is based on an estimate of a minimum of 6 weeks of training per person, which may be stretched to :
- Maximum of one year, which could allow daily allowance to EP, cost of experts, trainers and other incidental expenses. In case where the type of training requested by the PAPs

- exceeds the budgeted amount, the EA will review the request on a case-by-case basis through PMU or the shortfall will be met from ERG in case PAP is eligible for that.
- PAPs will have the right to participate in institutional form of training at proposed institutions facilitated by NGO.
 - PAPs will have the right to transfer his/her training entitlement to his/her immediate family member if the PAP desires to do so. The nodal NGO will coordinate the process.
 - PAPs shall request the EA for participation in a particular training in consultation with the NGO. The EA will approve and pay the Training Institution directly and the cost will be deducted from the PAPs training entitlement.
 - Eligibility criteria for training will feature on the ID card.
 - On completion of training PAPs will receive an introductory letter/certificate from the EA. This will assist the PAPs in approaching the bank for loans to start micro enterprises.

The implementation of the training procedure would involve the following PAPs:

- PMU in consultation with the Rehabilitation officers will prepare TOR for the NGO vis-à-vis its role in the training program. Facilitation training for PAPs will be in the TOR of NGOs.
- Once the NGO is selected, it will map all relevant proposed institutions/programs in the area that would impart training.
- Regular survey of perceived training needs of PAPs by NGO in collaboration with the PMU and Panchayat level committees will lead to prioritizing and selection of schemes for training.
- Identification of Training Institutes/individuals/experts by the NGO can be subcontracted to conduct relevant training demanded by PAPs within the financial means of the entitlement and preparation of TOR for the same by the NGO.
- Preparation of list of trainees (phase wise) by the NGO in collaboration with the DLCs and PMU.
- Awareness generation and information dissemination on the schemes by the NGO to the selected trainees to ensure transparency about the training schemes and the entitled amounts.
- Registration of the PAPs, payment of courses and maintenance of all records, regarding portion of entitlement used by PAP for a particular course, will be done by the NGO. The NGO will submit the information to PMU, for inclusion in the R&R database.

The PMU, EA will co-ordinate with the different recognized training organization, including professionals who will be engaged by the EA, to impart training in different trades to the PAPs either in the project area or any other place fixed by the institutes. Care shall be taken PMU and NGO that the funds for training are utilized in best possible ways.

(7) Women's needs and participation

In the process of R&R, women require special attention. Change caused by relocation does not have equal implications for members of both the sexes and may result in greater inconvenience to women. Due to disturbance in production system, reduction in assets like land and livestock, women may have to face the challenge of running a large household in limited income and resources. This in turn may force woman as well as children to participate in work for supplementing the household income. In contrast to this, due to changes that are likely to take places for any development project, especially changes in environment and land labour ratio, those women who at present are engaged in activities like agriculture labour, or collection and sale of forest produce may find themselves unemployed and dependent.

EA would, therefore, make efforts to maintain the social support network for women headed households as far as possible so that they remain closer to their locations and /or provide special services at the new sites. Special assistance would consist of the following:

- Allowing them priority in site selection
- Relocating them near site wherever possible
- Arranging with the contractor to construct their houses
- Providing assistance with dismantling salvageable materials from their original home
- Providing them priority access to all other mitigation and development assistance, and
- Monitoring their nutritional & health status.

Some examples of meeting practical needs of women that will be implemented by EA through NGO are:-

- Reduce women's workloads by providing standpipes, toilet facilities, and the likes.
- Improve health services by providing safe drinking water, family planning and HIV/AIDS counselling, sanitation training, immunization, etc.
- Assist in childcare services for wage earning mothers, primary schools, inputs in kitchen gardening etc.
- Increase access to productive resources.
- Promote equal opportunities for women's employment.

Encouraging women's participation in development projects is a policy being followed by GOI. There are several ways in which women will be able to participate in the implementation programme:-

- At least 50 percent of the NGO personnel involved must be women and recruited from the local area specifically from among the PAPs.
- The independent agency for monitoring and evaluation will have 33% representation of women key professionals and technical support team.

(8) Measures towards income restoration and uplift of vulnerable people

EA has evolved a number of measures towards resettlement and rehabilitation of the vulnerable families including the women headed households, SC/ST below poverty line and the poor (BPL in general) getting affected by its projects. The considerations therein have been compiled as follows:

- All the affected families falling under the vulnerable category including the BPL are going to be assisted to uplift their economic status irrespective of their ownership status. Thus, it implies that whether they do or do not possess legal title of the lands/assets, whether they are tenants or encroachers or squatters, they will be assisted in restoring their livelihood.
- Additional grant for severance of land, residual plots, expenses on fees, taxes, etc.
- and alternative economic rehabilitation support and training for up-gradation of the skills.
- In case of loss of non-agricultural private property, option for residential/commercial plot at resettlement site will be provided free of cost to vulnerable families if so opted by a group of them apart from all other considerations like compensation at replacement value, Transportation allowance, shifting allowance, rental allowance for disruption caused to BPL tenants, compensation for advance rental deposits, right to salvage materials for the demolished site, etc.
- Even in case of illegal use of the ROW, the vulnerable encroachers and all squatters
- are to be assisted in accordance with the entitlement matrix by considering relevant facts on family income and proposed assets only in the case of the person being under the poverty line. A vulnerable person in this case is eligible to receive assistance for structures

at replacement cost. He/she will also have the right to salvage materials for the demolished structure.

- There is a provision for additional support to the vulnerable people who have been
- affected by the loss of livelihood / primary source of income. The assistance will be the economic rehabilitation grant supported with vocational training of PAPs choice. The training will include starting of a suitable production or service activity. In case the money is not spent on the training program, the equivalent amount is to be paid as per PAPs choice.
- Inter agency linkages for income restoration.
-

Majority of the eligible families for income restoration earn their livelihood from marginal agriculture or petty businesses, and it is imperative to ensure that the PAPs are able to reconstruct their livelihood. Based on the market feasibility study, the list of livelihood schemes will be developed, and based on felt needs of the target group population the activities will be prioritized through people's participation. Further, these options will be tested for their viability against availability of skill, raw material and available appropriate technology. Suitable alternative livelihood schemes will be finally selected, where training on skill up gradation, capital assistance and assistance in the form of backward-forward linkages (with respect to the selected livelihood schemes) can be provided for making these pursuits sustainable for the beneficiaries, of the target group. Income generation schemes will be developed in consultation with the project affected/displaced families. The grants received for such purpose for the project, will be used for the skill development training to upgrade their proposed skill, purchase of small scales capital assets etc. While developing the enterprise development or the income generation activities, the NGOs will contact the local financial institutions for financing the economic ventures. The marketing and milk federations will also be contacted for planning sustainable economic development opportunities.

(9) Short-Term Income Restoration Activities

Short term income restoration activities mean restoring PAPs' income during periods immediately before and after relocation. Such activities will focus on the following:

- Ensuring that adequate compensation is paid before relocation.
- Transit allowances.
- Providing short term, welfare based grants and allowances such as:
- One time relocation allowance or free transport to resettlement areas or assistance for transport.
- Free or subsidized items.
- Special allowance for vulnerable groups as per entitlement framework capacity.
- Timely establishment & involvement of appropriate R&R institutions would significantly facilitate achievement of objectives of the R&R program. The main R&R institution would include:
 - EA
 - Local Administration
 - Line departments
 - NGO
 - **District Level Committee (DLC)** / Grievance Redressal Committee (GRC)
 - Training Institutions
 - Monitoring and Evaluation Agency

7.9.10 Site selection, site preparation, and relocation

The project involves linear acquisition of land and linear impacts on structures throughout the alignment. The landowners are eligible of identical land at the same district but it is very hard to

find the land in same position with easy accessibility. Thus, the landowners opted for cash compensation during the survey so that they could purchase the land as per their suitability or will.

Damage to the common property resources (CPRs) including public service facilities should be avoided as much as possible. However, in case if it is unavoidable, the CPRs will be reconstructed by the project as mitigation measure.

7.9.11 Housing, infrastructure, and social services

Provision of housing is compensated by the financial assistance. Resettlement will take place within the community, and there is no necessity of new facilities for social services (e.g., schools, health services) to maintain the existing services for the PAPs except to reconstruct the CPR facilities affected by the project.

7.9.12 Environmental protection and management, Community Participation, etc. at the relocation area

There is no movement of the community outside the impacted area and thus there is no requirement of i) Environmental protection and management of relocation areas ii) Community participation, involvement of re-settlers and host community and iii) Integration with host populations.

7.9.13 Grievance procedures

There is a need for an efficient grievance redressal mechanism, which will assist the PAPs in resolving queries and complaints. Any disputes will be addressed through the grievance redressal mechanism.

Formation of Grievance Redressal Committee (GRC) is the most important for grievance redressal and it is anticipated that most, if not all grievances, are settled by the GRC. Detailed investigation will be undertaken which may involve field investigation with the concerned PAPs. The GRCs are expected to resolve the grievances of the eligible persons within a stipulated time.

The GRCs will continue to function, for the benefit of the PAPs, during the entire life of the project including the defects liability period. The response time prescribed for the GRCs is 15 days. The GRC will meet once in a fortnight to expedite redressal of grievances.

People are not debarred from moving to the court for issues including those related to resettlement and rehabilitation Entitlement. However, it is expected that the GRCs will play a very crucial role in redressing grievances of the PAPs, and will help the implementation of the project as scheduled.

(1) Constitution of Grievance Redressal Committee (GRC)/ District Level Committee (DLC)

The committee will comprise of representatives of local NGOs; public representatives (viz., Member of Parliament, Member of Legislative Assembly, etc.) from respective district; representative of women group, squatters and vulnerable PAPs; line department and affected persons especially women as well as the representative of respective District Administration. Minimum participation of women in GRC will be 33%. At least two persons from each group will be there in the GRC. The functions of the GRC will be:

- To provide support for the PAPs on problems arising out of Land/ Property acquisition.
- To record the grievances of the PAPs, categorizes and prioritize and solve them within a month.

- To inform PMU of serious cases within an appropriate time frame; and
- To report to the aggrieved parties about the development regarding their grievance and decision of PMU.

GRC is organized in each district then it could be called as District Level Committee.

(2) Constitution of GRC in TTAADC Area

The committee will comprise of representatives of TTAADC, public representatives (viz., Member of Parliament, Member of Legislative Assembly, etc) from respective district, representative of women group and ST, line department and PAPs as well as the representative of respective District Administration. Minimum participation of women in GRC will be 33%. At least two persons from ST group will be in the GRC. The functions of the GRC will be as same as GRC in general but all functions shall be provided under the presence of TTAADC representatives and community representatives.

(3) Operational Mechanism

It is proposed that GRC will meet regularly (at least once in 15 days) on a pre-fixed date (preferably on first 7th day of the month). The committee will look into the grievances of the people and will assign the responsibilities to implement the decisions of the committee. The committee will deliver its decision within a month of the case registration.

Grievance not resolved amicably at the district level will be routed through NGO to the GRC. Arbitrator may also be appointed for unresolved cases. Arbitrator will be selected by PMU.

The various queries, complaints and problems that are likely to be generated among the PAPs will primarily relate to disputes of ownership of assets, identification of legal heirs of deceased property owner and other non-land related issues.

The PMU and office of NHIDCL will act as public information centres, which will be in possession of all documents relating to the Project including compensation packages and grievance redressal procedures, and will provide any information regarding compensation and grievance redressal.

Through public consultations, the PAPs will be informed that they have a right to grievance redressal. The PAPs can call upon the support of NGO to assist them in presenting their grievances or queries to the GRC. The NGO will act as an in-built grievance redressal body.

The operational mechanism for TTAADC area is similar to that of the whole project area. Implementation structure of the GRC is shown in the institutional framework in subsection 4.2.9 below

(4) Grievance Redressal Mechanism for PAPs

The successive grievance redressal stages are illustrated in the flow chart shown in the below figure.

Flow Chart

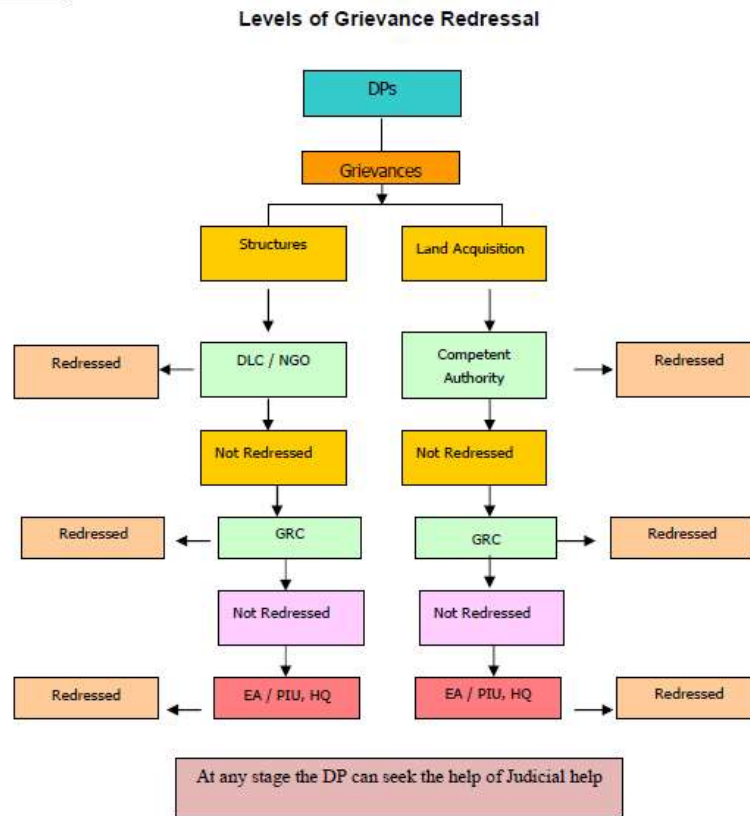


Figure 7-51: Flow Chart of Grievances Redressal

The DLCs and the NGOs will meet at regular intervals as decided by the community, specifically for grievance redressing purposes at a pre-decided date, time and place. The PAPs can be formally present in these meetings and discuss their queries and grievances. At the community level, the committee will have the power to resolve matters either by providing information or agreeing on a follow-up action. It may also reject some grievances for not being legitimate. However, the premise for not recording the grievance should be explained to the grievant. Legitimate grievances, which the DLC is unable to resolve, will be taken to the GRC, which will then take the necessary action after reviewing the findings of a thorough investigation. The DLC will maintain a register of all queries and grievances, and the subsequent action taken.

The PAPs will lay their grievance, concerning compensation for structures / land acquisition, and resettlement and rehabilitation assistance to the DLC/NGO. The DLC and NGO will examine the grievance, and will do utmost to reach an amicable settlement to the satisfaction of the PAPs. PAPs/DPs have the Competent Authority (CALA) as their entry point to lay their grievance on land acquisition. To prevent PAPs from facing any barrier (institutionally/mentally) to communicate with CALA as a government agency, and to assure of simplicity/easiness, convenience, and reliability in GRM, measures could be taken, such as assistance of locally identified NGO for LA grievance as well, local language for acceptance of grievance at CALA, oral grievance accepted in local language, easy to access, no process fee, disclosure of grievances, etc.

(5) Role of NHIDCL/EA Headquarters

The PAPs, who would not be satisfied with the decision of the GRC, will have the right to take the grievance to the NHIDCL/EA Head Office for its redressal. Failing the redressal of grievance

at NHIDCL/EA, the PAPs will take the case to Arbitration. The Arbitrator(s) will be independent but appointed by NHIDCL. Taking grievances to arbitration and Judiciary will be avoided as far possible and the NGO will make utmost efforts at reconciliation at the GRC level.

(6) Grievance Redressal Mechanisms functioning in the previous JICA loan projects (reference)

For reference, a similar grievance redress mechanisms were planned in the previous projects assisted by JICA for improvement of other national highways in the north eastern states. According to report from executing agencies, for improvement of NH51 in Meghalaya, four grievances of PAPs were submitted and filed concerning inappropriate valuation of the affected properties, request for increase of compensation, individual names missing from the list of PAPs and unidentified affected structure. Following the grievance redress mechanism, the authority (West Garo Hills District Council) requested Meghalaya PWD to verify the grievances. For other part of the road improvement, such as Shillong-Dawki road in Meghalaya and Aizawl-Tuipang road in Mizoram, the projects are still in initial stage, and there is no grievance at present pertaining to land acquisition, resettlement and rehabilitation⁵⁷.

7.9.14 Organizational Responsibility

The role and responsibilities of the various offices in resettlement and rehabilitation implementation are presented below:

(1) At Corporate Level

The General Manager:

- In-charge of overall project activities.
- Participate in the State Level Committees to facilitate land acquisition, pre- construction activities and implementation of resettlement and rehabilitation activities.

Executing Agency:

- Co-ordinate the implementation of resettlement and rehabilitation activities with corporate and field staff.
- Appoint NGO for resettlement and rehabilitation implementation and monitoring and evaluation consultants for monitoring and evaluation.
- Plan and conduct training programs for staff capacity building as well as capacity of field level NGOs and partner agencies.
- Review the micro plans prepared by the NGO.
- Review monthly progress report.
- Monitor the progress on resettlement and rehabilitation and land acquisition.
- Advice PMU/NGO/M&E Agency on policy related issues during implementation.
- Ensure early release of money to PMUs for resettlement and rehabilitation activities.

(2) Project Management Unit (PMU)

This unit will coordinate the process for land acquisition, relocation and rehabilitation, distribution of project provided assistance and PAPs access to government programs. NGO would be selected who would be working in close association with the Project Management Unit.

⁵⁷ This information is response to the advice given by a member of the JICA external committee for environmental and social considerations at the Working Group meeting on 31 Jul. 2020, such as “To Confirm the operational status of the grievance redress mechanisms in the previous phases (contents of complaints, appropriateness of countermeasures, etc.) and describe them in the DFR.”

(3) RAP Implementation Field Offices and Tasks

The PD-PMU will be responsible to carry out the following tasks concerning resettlement of the project:

- Overall responsibility of Implementation of resettlement and rehabilitation activities of RAP.
- Responsible for land acquisition and resettlement and rehabilitation activities in the field.
- Ensure availability of budget for resettlement and rehabilitation activities.
- Liaison with District Administration for support for land acquisition and implementation of resettlement and rehabilitation.
- Participate in the district level committees.

(4) Competent Authority for Land Acquisition (CALA)

- Overall responsibility for Land Acquisition
- Co-ordinate with District Administration and NGO for land acquisition and resettlement and rehabilitation.
- Translation of resettlement and rehabilitation policy in local language.
- Ensure development of resettlement sites, wherever required.
- Participate in the allotment of residential, commercial and agricultural plots.
- Liaison with District Administration for dovetailing government's income generating and developmental programs for the displaced persons.
- Ensure the inclusion of those PAPs who may have not been covered during the census survey;
- Monitor physical and financial progress on land acquisition and resettlement and rehabilitation activities.
- Participate in regular meetings.
- Organize bi-monthly meetings with the NGO to review the progress on resettlement and rehabilitation

(5) NGO/NGOs will be principally responsible for the day-to-day implementation work

- Survey and verification of the displaced persons.
- Verification of land records followed by verification on the spot related to identified plots and owners.
- Develop rapport with the displaced persons s.
- Verify and Photograph of each PAP for ID cards.
- Assist to issue identity cards to the displaced persons s.
- Co-ordinate with the DRO to implement resettlement and rehabilitation activities.
- Conduct market feasibility study.
- Valuation of properties/assets for finalization of replacement value.
- Participate with the DRO to undertake public information campaign at the commencement of the projects.
- Distribute the pamphlets of resettlement and rehabilitation policy to the displaced persons.
- Assist the PAPs in receiving the compensation.
- Facilitate the process of arranging loans for displaced persons.
- Facilitate the opening of joint accounts.
- Generate awareness about the alternate economic livelihood and enable the PAPs to make informed choice.
- Prepare micro-plans for resettlement and rehabilitation.

- Enable the PAPs to identify the alternate sites for agriculture, residential and commercial plots.
- Participate in the consultation on allotment of shops and residential plots.
- Ensure the PAPs have received their entitlements.
- Ensure the preparation of rehabilitation sites.
- Participate in the meetings organized by the PMU.
- Submit monthly progress reports.
- Identify training needs and institutions for the PAPs for income generating activities.
- Participate in the disbursement of cheques for the assistance at public places.
- Coordinate the training programs of the PAPs for income generating activities.
- Coordinate the meeting of District Level Committees.
- Accompany PAP to GRC.
- Awareness campaigns for highway related diseases.
- Ensure the PAP judiciously uses compensation and resettlement and rehabilitation assistance.

As shown above, the tasks that NGO will be principally responsible are various and heavy. If it is appropriate, a contract with a group of NGOs taking their shares of the responsibility could be arranged.

(6) District Level Committee (DLC)

RAP will be implemented through District Level Committees that will be established in the project affected districts (Khowai, Gumti and South Tripura). The committee would include District Magistrate or his representative, District Land Acquisition Officer, Representatives from the District Council, Pradhans of Panchayat Samities, representative of affected villages including women, representative of Revenue Department, Line Departments, PWD, Mining Departments, people's representatives, NGO and representatives of affected population. The formation of DLCs would be facilitated by NGOs. The functions of the DLC will be as follows: (i) to meet regularly to review the progress of land acquisition/ resettlement and rehabilitation; (ii) approval of the micro-plan on the basis of methodology defined in the RAP; and (iii) facilitate the implementation of the RAP programs in the project-affected area.

The DLC would also: (i) meet regularly at pre-decided dated specifically for grievance redressing purpose at the District Council Office; (ii) help in amicable settlement of disputes at community level; (iii) carry forward the ones which are not reconciled at the Grievance Redressal Committee (iv) coordination with local govt. authorities & field offices.

(7) Coordination with Other Agencies and Organizations

PMU will establish networking relationships with line departments and other Govt. & non-Govt. organizations. The Revenue Department has an influencing role in land acquisition proceedings, and initiation of resettlement process. Unless the compensation process is prompt and efficient, implementation process will get delayed. PMU will coordinate with the Project Land Acquisition Officer to expedite the land acquisition process.

Income restoration will be sole responsibility of the Project Authority (NHIDCL). It will be implemented by cooperation of CALA and NGO for coordination of training courses, etc. NGO will facilitate linkages to be established with the agencies implementing centrally sponsored poverty alleviation programs to restore the income of PAPs.

Restoration of community assets such as hand pumps, bore wells will require help from. EA will extensively work on developing lateral linkages for mobilization of resources to benefit the PAPs and to achieve the desired results expected from implementation of RAP.

CALA or District Council is responsible for providing land records, acquiring land and other properties and handing them over to the proper authorities. The District Rural Development Agency (DRDA) will extend the IRDP and other developmental schemes to include the displaced persons.

(8) NGO Participation

This will be required by the PMU. A good rapport with the affected community will facilitate a satisfactory resettlement and rehabilitation of the PAPs and minimize disturbance particularly physical and economic. To overcome this deficiency, experienced and well-qualified NGO in this field will be engaged to assist the EA in the implementation of the RAP. NGO hired for RAP implementation will also be responsible for HIV/AIDS, trafficking of women and children, child labour, etc. The NGO should have experience of addressing such social issues.

The NGO, in this sense, will have to ensure that due entitlements flow to the PAPs in the most effective and transparent manner. The success of the NGO inputs will largely depend on their liaison with the PAPs and other concerned government agencies. Other involved agencies are expected to collaborate with Project, based on instructions from the EA, in accordance with the policy framework and the RAP. These arrangements have to be made during the first month of Project implementation in order to set up the various committees and implementation mechanisms required for the project.

7.9.15 Implementation schedule

(1) Introduction

Implementation of RAP mainly consists of compensation to be paid for affected structures and rehabilitation and resettlement activities. The time for implementation of resettlement plan will be scheduled as per the overall project implementation. All activities related to the land acquisition and resettlement must be planned to ensure that compensation is paid prior to displacement and commencement of civil works. Public consultation, internal monitoring and grievance redress will be undertaken intermittently throughout the project duration.

However, the schedule is subject to modification depending on the progress of the project activities. The civil works contract for each project will only be awarded after all compensation and relocation has been completed for project and rehabilitation measures are in place.

(2) Schedule for Project Implementation

The proposed project resettlement and rehabilitation activities are divided in to three broad categories based on the stages of work and process of implementation. The details of activities involved in these three phases i.e. Project Preparation phase, RAP Implementation phase, Monitoring and Reporting period are discussed in the following paragraphs.

(3) Project Preparation Phase

The major activities to be performed in this period include establishment of PMU at project and project level respectively; submission of RAP for approval from NHIDCL; appointment of NGO and establishment of GRC etc. The information campaign & community consultation will be a process initiated from this stage and will go on till the end of the project.

(4) RAP Implementation Phase

After the project preparation phase the next stage is implementation of RAP which includes issues like compensation of award by EA; payment of all eligible assistance; relocation of PAPs; initiation of economic rehabilitation measures; site preparation for delivering the site to contractors for construction and finally starting civil work.

(5) Monitoring and Reporting Period

As mentioned earlier the internal monitoring will be the responsibility of PMU and implementing NGO and will start early during the project when implementation of RAP starts and will continue till the completion of the sub-project. The independent monitoring and reporting will be the responsibility of Construction Supervision Consultant (CSC) to be hired for the sub project.

CALA will also monitor physical and financial progress on land acquisition and resettlement and rehabilitation activities, and Organize bi-monthly meetings with the NGO to review the progress on resettlement and rehabilitation

(6) Resettlement and rehabilitation Implementation Schedule

A composite implementation schedule for resettlement and rehabilitation activities in the project including various sub tasks and time line matching with civil work schedule is prepared and presented in the form of Table. The cut-off date will be notified formally for titleholder as the date of LA notification and for non-titleholders as the date of census survey. For this project, LA notification has not been published yet, then cut-off date for titleholders has not been officially fixed. For preparation of this RAP, the JICA Study Team set the cut-off date on 15th Sep. 2020, just after first stage of public consultation and before starting of the census survey for the RAP.

However, the sequence may change or delays may occur due to circumstances beyond the control of the Project and accordingly the time can be adjusted for the implementation of the plan. The implementation schedule can also be structured through package wise. The entire stretch can be divided in to various contract packages and the completion of resettlement implementation for each contract package shall be the pre-condition to start of the civil work at that particular contract package. Implementation Schedule of NHIDCL is presented below in the below table.

Table 7-95: Implementation Schedule of RAP for NH208 (Tripura)

	2020				2021				2022				2023																												
	1Q		2Q		3Q		4Q		1Q		2Q		3Q		4Q		1Q		2Q																						
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6											
Project Preparation Stage																																									
Screening project impact																																									
Public Consultation on alignment																																									
Prepare Land Acquisition Plan																																									
Carry out Census Survey																																									
Prepare Resettlement Plan (RAP)																																									
RAP Implementation Stage																																									
Obtaining RAP approval from NHIDCL																																									
Disclosure of RAP																																									
Hiring NGO for RAP Implementation																																									
Formation of GRC (Grievance Mechanism)																																									
Implementation of GRC																																									
Public Consultation																																									
Co-ordination with district authority for LA																																									
Submission of LA proposals to DC																																									
Declaration of cut-off date (LA notification)																																									
Payment of compensation																																									
Taking possession of acquired land																																									
Handling over the acquired land to contractor																																									
Notify the date of construction start to PAPs																																									
Income Restoration Program																																									
Awareness Training																																									
Rehabilitation of PAPs																																									
Monitoring and Reporting Period																																									
Internal monitoring and reporting																																									
Hiring Construction Supervision Consultant																																									
External monitoring and reporting																																									

7.9.16 Cost and budget

(1) General

The resettlement cost estimate for this project includes eligible compensation, resettlement assistance and support cost for RAP implementation. The support cost, which includes staffing requirement, monitoring and reporting, involvement of NGO in project implementation and other administrative expenses are part of the overall project cost. The unit cost for structures and other assets in this budget has been derived through field survey, consultation with affected families, relevant local authorities and reference from old practices. Contingency provisions have also been made to take into account variations from this estimate. Some of the major items of this resettlement and rehabilitation cost estimate are outlined below:

- Compensation for agricultural, residential and commercial land at their replacement value
- Compensation for structures (residential/ commercial) and other immovable assets at their replacement cost
- Compensation for crops and trees
- Assistance in lieu of the loss of business/ wage income/ employment and livelihood
- Assistance for shifting of the structures
- Resettlement and Rehabilitation Assistance in the form of Training allowance
- Special assistance to vulnerable groups for their livelihood restoration
- Cost for implementation of RAP.

(2) Compensation for Agricultural Land

The unit rate for agricultural land has been estimated as per Land Acquisition Resettlement and Rehabilitation Act, 2013 and National Highway Safeguard Policies. To meet the replacement cost of land compensation will be calculated over updated land rate with additional as registration cost plus solatium or as decided by District Magistrate. It may be noted that the District Magistrate have the discretionary power in valuation of land in his jurisdiction. The State Government may also announce packages for Land Acquisition.

(3) Compensation for Residential/ Commercial and other structures

The compensation cost of structures are arrived at by assessment of market value, consultation with PAPs and data collected from building contractors and property agents this meets the replacement cost of the structures.

(4) Source of Funding and Fund Flow Management

The cost related to land acquisition and resettlement cost will be borne by the EA. EA will ensure allocation of funds and availability of resources for smooth implementation of the project resettlement and rehabilitation activities. The EA will, in advance, initiate the process and will try to keep the approval for the resettlement and rehabilitation budget in the fiscal budget through the ministry of finance. In the case of assistance and other rehabilitation measures, the EA will directly pay the money or any other assistance as stated in the RAP to PAPs. The implementing NGO will be involved in facilitating the disbursement process and rehabilitation program.

(5) Resettlement and Rehabilitation Budget

A detailed indicative resettlement and rehabilitation cost is given in the below table

Table 7-96: Resettlement and Rehabilitation Budget

Item	Rate	Total Area (Ha) / Number	Cost
	(In Rs. Per Ha)		(In Rs.)
I. Compensation for loss of Private Property			
1. Loss of Land (agricultural, homestead commercial or otherwise)			
Land Acquisition Cost for 266.69 Ha (including 100% solatium for land acquisition)	11,500,000	266.69	3,066,935,000
Special cash assistance for title holder with land (including land with structure)	500,000	480	240,000,000

Subtotal (A)			3,306,935,000
2. Loss of Structure (house, shop, building or Immovable property or assets attached to land)			
Type of Structure	Rs. Per Sqm	Area Sqm	
Pucca	16,666	7,446.00	124,095,036
Semi Pucca	12,000	9,186.72	110,240,640
Kutchra	3,000	21,102.00	63,306,000
Tin Shed	1,600	9,347.33	14,955,728
Subtotal (B)			312,597,404
100% Solatium for Structure (C)			312,597,404
3. Loss of Residence			
Shifting Assistance to displaced family	50,000.00	53	2,650,000
Transitional Allowance	50,000.00	53	2,650,000
One Time Resettlement Allowance	50,000.00	53	2,650,000
Subtotal (D)			7,950,000
4. Loss of Shop/trade commercial structure			
Subsistence Allowance	50,000.00	6	300,000
Transitional Allowance	50,000.00	6	300,000
One Time Resettlement Allowance	50,000.00	6	300,000
Subtotal (E)			900,000
II. Impact to Squatters/ Encroachers (Nontitle holder)			
1. Loss of Residence			
House Construction Assistance of Rs. 50,000	50,000.00	410	20,500,000
Shifting Assistance to displaced persons	10,000.00	410	4,100,000
One time Subsistence Allowance of Rs. 18,000	18,000.00	410	7,380,000
Subtotal (F)			31,980,000
2. Loss of Shop/trade/commercial structure			
Shop Construction Assistance of Rs. 20,000	20,000.00	112	2,240,000
Shifting Assistance to displaced persons	10,000.00	112	1,120,000
One time Subsistence Allowance of Rs. 18,000	18,000.00	112	2,016,000
Subtotal (G)			5,376,000
3. Loss of commercial Kiosk/vendor			
Special onetime Assistance of Rs. 18,000	18,000.00	51	918,000
Subsistence Allowance for 3 months @ Rs. 3000/month livelihood	9,000.00	51	459,000
Subtotal (H)			1,377,000
III (a). Impact to Vulnerable Household			
One time Assistance who have to relocate	25,000.00	777	19,425,000
III (b). Impact on ST and SC HHs			
Additional onetime assistance to SC (224 PAHs) and ST (546 PAHs) families who are displaced from the project	50,000.00	770	38,500,000
Subtotal (I)			52,200,000
IV. Other Impacts in Private land (Trees/Ponds/Tube wells/Hand pump)			
Trees (Mainly rubber plantation/beetle nuts)	8,000	37,156	297,248,000
Ponds	80,000	68	5,440,000
Tube wells	10,000	13	130,000
Hand pump	5,000	3	15,000
Subtotal (J)			302,833,000
V. Common Property Resource			
Religious Structures (Temple & Church)	250,000.00	10	2,500,000

School/Hospital/Community Property	500,000.00	17	8,500,000
Govt./Panchayat Buildings	300,000.00	14	4,200,000
Subtotal (K)			15,200,000
Total (A to K)			4,355,670,808
VI. Unforeseen Impact			
Contingency of 10%	Total of (A To K)	10%	435,567,080
Subtotal (L)			435,567,080
VII. Implementation of RAP			
Support for implementation of RAP (lump sum)	1,00,00,000		10,000,000
M&E consultant lump sum)	10,00,000		1,000,000
Budget for livelihood enhancement training and capacity building	97,00,000		9,700,000
Subtotal (M)			20,700,000
Total(N)= (A to M)			4,811,937,889

Source: DPR & Census Survey on November- December 2020

The total Resettlement and Rehabilitation Budget is Rs. **4,805,640,389**.

7.9.17 Monitoring and Evaluation

(1) Introduction

Monitoring is a periodic assessment of planned activities providing midway inputs, facilitates changes and gives necessary feedback of activities and the directions on which they are going, whereas Evaluation is a summing up activity at the end of the project, assessing whether the activities have actually achieved their intended goals and purposes. In absence of an effective monitoring strategy it would be impossible to ensure that all anticipated benefits and entitlements reach PAPs in time and in an efficient grievance free manner. It will be a systematic and continuous process of collecting and analysing information about the progress of the project and a tool for identifying strengths and weaknesses within a project. Resettlement monitoring will include the collection, analysis, reporting and use of information about the progress of resettlement, based on the RAP. Monitoring in resettlement will focus on restoration of income and standard of living of the affected persons as the primary focus. Several key activities such as delivery of entitlements will also be monitored. EA will have two tiers (Internal and External) monitoring system.

(2) The Internal Monitoring

The internal monitoring will be handled by PMU and the engaged NGOs. A monitoring cell will be established in PMU with individuals having appropriate skills and capacity. A comprehensive and relevant database and management information system (MIS) will be established and updated periodically for monitoring various activities of the project. The RAP information generated through various surveys like census, baseline socio-economic, land and structures will become important input of the information system. Effective Monitoring will help accomplish this task and facilitate appropriate changes in resettlement implementation based on the information obtained, through routine collection of data. Therefore, EA will develop a monitoring plan that covers all essential stages of resettlement i.e. preparatory stage, relocation stage & rehabilitation stage.

PMU, EA will form independent monitoring cell which will work at the time of project implementation through NGO.

(3) Key Indicators of Monitoring

EA, considering the importance of the various stage of project cycle, will handle the monitoring at each stage as stated below:

(4) Preparatory Stage

During the pre-relocation phase of resettlement operation, monitoring is concerned with administrative issues such as, establishment of resettlement unit, budget, land acquisition, consultation with PAPs in the preparation of resettlement plan, payments of entitlements due, grievance redressal, and so on.

The key indicators for monitoring at this stage will be:

- Conduct of baseline survey
- Consultations
- Identification of PAP and the numbers
- Identification of different categories of PAPs and their entitlements
- Collection of gender disaggregated data
- Inventory & losses survey
- Asset inventory Entitlements
- Valuation of different assets
- Budgeting
- Information dissemination
- Institutional arrangements
- Implementation schedule review, budgets and line items expenditure

(5) Relocation Stage

Monitoring during the relocation phase covers such issues as site selection in consultation with PAPs, development of relocation sites, assistance to PAPs (especially to vulnerable groups) in physically moving to the new site. Likewise, aspects such as adjustment of PAPs in the new surroundings, attitude of the host population towards the new-comers and development of community life are also considered at this stage. The key indicators for monitoring will be:

- Payment of compensation
- Delivery of entitlement
- Grievance handling
- Land acquisition
- Preparation of resettlement site, including civic amenities '(water, sanitation, drainage, paved streets, electricity)
- Consultations
- Relocation
- PAPs who do not relocate
- Payment of compensation
- Livelihood restoration assistance.

(6) Rehabilitation Stage

Once PAPs have settled down at the new sites, the focus of monitoring will be on issues of economic recovery programmes including income generating schemes (IGSs), acceptance of these schemes by PAPs, impact of IGSs on living standards, and the ability of the new livelihood patterns. The key indicators for monitoring will be:

- Initiation of income generation activities
- Provision of basic civic amenities and essential facilities in the relocated area
- Consultations
- Assistance to enhance livelihood and quality of life

The most crucial components/indicators to be monitored are specific contents of the activities and entitlement matrix.

(7) Indicators

Input and output indicators related to physical progress of the work will include items as:

- Training of PMU, R0s and other staff completed
- Public meetings held
- Census, assets inventories, assessments and socio-economic studies completed.
- NGO recruited and trained.
- Meeting of DLCs
- Meeting of GRCs
- Grievance redresses procedures in-place and functioning.
- Compensation payments disbursed.
- Shops space allotted.
- Relocation of PAPs completed.
- Employment provided to PAPs.
- Community development activities completed.
- Infrastructure repaired, bus stands, water and sanitation facilities provided.
- Village roads repaired.
- Training of PAPs initiated and implemented.
- Income restoration activities initiated.
- Number of families displaced and resettled.
- Extent of government land identified and allotted to the PAPs.
- Monitoring and evaluation reports submitted.

(8) Reporting Mechanism

As stated earlier one of the main roles of PMU will be to oversee proper and timely implementation of all activities in RAP. Internal Monitoring will be a regular activity for PMU and Rehabilitation Manager will oversee the timely implementation of resettlement and rehabilitation activities. Internal Monitoring will be carried out by the PMU and its agents, such as NGOs and will prepare monthly/quarterly reports on the progress of RAP Implementation. PMU will collect information from the project site and assimilate in the form of monthly progress to access the progress and results of RAP implementation and adjust work programme where necessary, in case of delays or problems. Both monitoring and evaluation will form parts of regular activities and reporting on this will be extremely important in order to undertake midway corrective PAPs. The reports can broadly be classified as:

- Progress reports during Implementation of the RAP
- Qualitative reports highlighting the qualitative aspects
- Financial reports
- Evaluation reports based on benefits and impact of assistance provided.

(9) Resources Requirement and Database Management

For the PMU to function, EA will allocate adequate financial resource towards office space, computers, transport and staff budget. The following essential requirements will be planned:

- Annual budget for Monitoring
- Office space
- Tables, chairs and furniture.
- Computer dedicated to the monitoring unit
- Transport
- Administrative support staff
- Appropriate technical staff
- Add on database management

(10) External or Independent Monitoring

An independent external monitoring agency will be hired by NHIDCL to provide an independent periodic assessment of resettlement implementation and impacts to verify internal monitoring, and to suggest adjustment of delivery mechanisms and procedures as required. A social and economic assessment of the results of delivered entitlements and measurement of the income and standards of living of the PAPs before and after resettlement will be integral components of this monitoring activity.

To function effectively, the organization responsible for external monitoring will be independent of the governmental agencies involved in resettlement implementation. The agency will submit monthly and quarterly monitoring reports. Midterm and final evaluation will be done by the agency to find out if the resettlement and rehabilitation objectives have been achieved as against the performance impact indicators.

As an alternative, NHIDCL would appoint an general manager for land acquisition in the regional office as an monitor for reliable implementation and monitoring of land acquisition and RAP, in case if there is enough manpower in the regional office to assist the general manager of land acquisition to monitor land acquisition and RAP independently as his/her need.

(11) Scope of Work of External Monitor

- Examine and verify internal monitoring system and suggest changes.
- Prepare independent reports based on monitoring visits.
- Major recommendations for remedial actions.
- Major recommendations for policy changes.
- Maintenance of database.

(12) Detail Activities to be undertaken by External Monitor

The scope of activities will include but not be limited to:

- Verification of internal reports, by field check of delivery of the following:
- Payment of compensation including its levels and timing.
- Land readjustment.
- Preparation and adequacy of resettlement sites.
- House construction.
- Provision of employment, its adequacy and income levels.
- Training.
- Rehabilitation of vulnerable groups.
- Infrastructure repair, relocation or replacement.
- Enterprise relocation, compensation and its adequacy.
- Transition allowances.

(13) Property and demographic survey of the following affected persons

- 100% census survey of persons who were severely affected by Project works and have relocated either to group resettlement sites or preferred to self-relocate.
- 20% sample survey of persons who had property, assets, incomes and activities marginally affected by Project works and did not relocate.
- 20% sample survey of those affected by off-site project activities by contractors' subcontractors, including employment, use of land for contractor's camps, pollution, public health etc.
- Generate gender disaggregated socio-economic data, socio-economic condition, needs and priorities of women etc.

(14) Evaluation of Delivery and Impacts of Entitlements

- Identify the categories of impacts and evaluate the quality and timeliness of delivery of entitlements (compensation and rehabilitation measures) for each category of impact. He/she will ensure that how the entitlements were used and examine impact and adequacy to meet the specified objectives of the RAP.
- Ensure the quality, sufficiency of funds and on-time delivery of entitlements according to RAP. Also verify other monitoring reports prepared during implementation by an independent source.
- Establish by appropriate investigative and analytical techniques, the pre-and post- Project socio-economic conditions of the affected people. In the absence of baseline socio-economic data on income and living standards, and given the difficulty of PAPs having accurate recollection of their pre-Project income and living standards, develop some quality checks on the information to be obtained from the PAPs. Such quality checks could include verification by neighbours and local village leaders. The methodology for assessment should be very explicit.

(15) Evaluation of Consultation and Grievance Procedures

Identify, quantify and qualify the types of conflicts and grievances reported and resolved and the consultation and participation procedures.

(16) Declaration of Successful Implementation

Provide a summation of whether involuntary resettlement was implemented (a) in accordance with the RAP, and (b) in accordance with Policy on Involuntary Resettlement.

(17) Actions Required

- Describe any outstanding actions that are required to bring the resettlement into compliance with Policy on Involuntary Resettlement. Describe further mitigation measures needed to meet the needs of any affected person or families judged and/or perceiving themselves to be worse off as a result of the Project.
- Provide a timetable and define budget requirements for these supplementary mitigation measures and detail the process of compliance monitoring and final "signing off" for these PAPs.

(18) Reporting Cycle/Frequency

PMU is responsible for supervision and implementation of the RAP & will prepare monthly progress reports on resettlement activities. The external M&E expert will submit bi-annual review directly to EA and determine whether resettlement goals have been achieved, more importantly whether livelihoods and living standards have been restored/enhanced and suggest suitable recommendations for improvement.

(19) Participation of affected people in monitoring and evaluation

The general approach to be used is to monitor activities and evaluate impacts ensuring participation of all stakeholders especially women and vulnerable groups. Monitoring tools would include both quantitative and qualitative methods:

- Baseline household survey of a representative sample, disaggregated by gender and vulnerable groups to obtain information on the key indicators of entitlement delivery, efficiency, effectiveness, impact and sustainability. 20 per cent random sample of PAPs will be covered.
- Focused Group Discussions (FGD) that would allow the monitors to consult with a range of stakeholders (local government, resettlement field staff, NGOs, community leaders and PAPs).
- Key informant interviews: select local leaders, village workers or persons with special knowledge or experience about resettlement activities and implementation.
- Community public meetings: open public meetings at resettlement sites to elicit :-
- Information about performance of various resettlement activities.
- Structured direct observations: field observations on status of resettlement
- Implementation, plus individual or group interviews for crosschecking purposes.

- Informal surveys/interviews: informal surveys of PAPs, host village, workers,
- resettlement staff, and implementing agency personnel using non-sampled methods. In the case of special issues, in-depth case studies of PAPs and host populations from various social classes will be undertaken to assess impact of resettlement.

(20) Impact on Women

The project will have both positive and negative impact on the women of the region. The women enjoy a low privilege status in the society as compared to their male counterpart. Any negative impact of the project would have greater magnitude on this less privileged class of the society. It is imperative to have a continuous monitoring and evaluation of implication of RAP implementation on the women.

7.10 Action Plan for the Scheduled Tribe

7.10.1 A review of the Legal and Institutional Framework Applicable to Indigenous Peoples

(1) JICA Guidelines for Indigenous People

According to the JICA Guidelines for Environmental and Social Considerations, for projects that will require the measures for indigenous people, an Indigenous People Plan (IPP) must be submitted as well. According to the Guidelines, in principle, appropriate environmental and social considerations are undertaken, according to the nature of the project, based on the following:

8. Indigenous Peoples

- 1. Any adverse impacts that a project may have on indigenous peoples are to be avoided when feasible by exploring all viable alternatives. When, after such an examination, avoidance is proved unfeasible, effective measures must be taken to minimize impacts and to compensate indigenous peoples for their losses.*
- 2. When projects may have adverse impacts on indigenous peoples, all of their rights in relation to land and resources must be respected in accordance with the spirit of relevant international declarations and treaties, including the United Nations Declaration on the Rights of Indigenous Peoples. Efforts must be made to obtain the consent of indigenous peoples in a process of free, prior, and informed consultation.*
- 3. Measures for the affected indigenous peoples must be prepared as an indigenous peoples plan (which may constitute a part of other documents for environmental and social consideration) and must be made public in compliance with the relevant laws and ordinances of the host country. In preparing the indigenous peoples plan, consultations must be made with the affected indigenous peoples based on sufficient information made available to them in advance. When consultations are held, it is desirable that explanations be given in a form, manner, and language that are understandable to the people concerned. It is desirable that the indigenous peoples plan include the elements laid out in the World Bank Safeguard Policy, OP4.10, Annex B.*

The World Bank's Operational Policy on Indigenous Peoples (OP 4.10) aims at ensuring that the development process fosters full respect for the dignity, human rights and cultures of indigenous peoples, thereby contributing to the Bank's mission of poverty reduction and sustainable development. To achieve this objective, Bank-assisted projects which affect indigenous peoples provide them a voice in design and implementation, avoid adverse impacts where feasible, or minimize and mitigate them, and ensure that benefits intended for them are culturally appropriate.

The Bank recognizes that indigenous peoples are commonly among the poorest and most vulnerable segments of society and in many countries they have not fully benefited from the development process. It also recognizes that the identities, cultures, lands and resources of indigenous peoples are uniquely intertwined and especially vulnerable to changes caused by development programs. Because of this, issues related to indigenous peoples and development are complex and require special measures to ensure that indigenous peoples are not disadvantaged and that they are included in and benefit from these programs as appropriate.

World Bank for purposes of its OP 4.10, uses the term "Indigenous Peoples" in a generic sense to refer to a distinct, vulnerable, social and cultural group possessing the following characteristics in varying degrees:

- (a) self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;*
- (b) collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories*

- (c) *customary cultural, economic, social, or political institutions that are separate from those of the dominant society and culture; and*
- (d) *an indigenous language, often different from the official language of the country or region.*

Considering the above characteristics as requirements to define the scheduled tribe in the PAPs as the “Indigenous People” under the OP4.10, it seems they don’t fulfil one or some of the requirements. Concerning the above characteristic (b), collective attachment of the scheduled tribe in the PAPs of distinct habitat or ancestral territories in the project area is not established, as such habitat/territories would not exist in the existing highway and the project area. In addition, concerning characteristic (c), there would be no cultural, economic, social, or political institution separating the ST from the others in the project area, and also the lifestyle of the ST in the project areas is virtually identical with that of the non-tribal general population.

However, for appropriate assessment and mitigation of the impacts on the Scheduled Tribe in the PAPs of the Project, in this section “Action Plan for Scheduled Tribe” is formulated which follows the requirement of Indigenous People Plan under the OP4.10.

(2) Scheduled Tribes in Constitution of India

The Sixth Schedule of the Constitution makes separate arrangements for the tribal areas of Assam, Meghalaya, Mizoram, and Tripura. Article 244A was added to the constitution through the 22nd Constitutional Amendment Act, 1969. In January 2019, Cabinet approved amendment to Article 280 and Sixth Schedule of the Constitution to increase autonomy, financial resources and powers of the autonomous district councils in Assam, Meghalaya, Mizoram and Tripura. It empowers Parliament to establish an autonomous State comprising certain tribal areas of Assam and for local Legislature or Council of Ministers or both can create.

The President of India under Article 342 of the Constitution uses the following characteristics to define “Scheduled Tribes (ST),” (i) tribes’ primitive traits; (ii) distinctive culture; (iii) shyness with the public at large; (iv) geographical isolation; and (v) social and economic backwardness before notifying them as a Scheduled Tribe. Essentially, indigenous people have a social and cultural identity distinct from the ‘mainstream’ society that makes them vulnerable to being overlooked or marginalized in the development processes.

(3) Tripura Tribal Areas Autonomous District Council (TTAADC) Act 1979

Tripura Tribal Areas Autonomous District Council Bill, 1979 was unanimously passed by the Tripura Legislative Assembly on March 23rd 1979 under Schedule VI of the Constitution of India. The main objective of forming the District Council under Schedule VI is to remove within a short time the material disparities between the advanced and backward sections of the societies, to strengthen the bonds of unity between the tribal and non-tribal masses, to emancipate not only tribal people but all the deprived people from all types of injustice and exploitation. Tripura Tribal Areas Autonomous District consists of 7,132.56 sq. KM Tribal compact areas of the state of Tripura (approximately 2/3rd of the states area), with an aim to introduce internal autonomy and thereby protect the social, economic and cultural interests of the tribal population of the state. The main objective of TTAADC is to remove within a short time the material disparities between the advanced and backward sections of the societies, to strengthen the bonds of unity between the tribal and non-tribal masses, to emancipate not only tribal people but all the deprived people from all types of injustice and exploitation. Tripura Tribal Areas Autonomous District Council is a symbol of integrity, harmony and unity of the tribal and non-tribal people of the state and is involved in Agriculture, Education, Forestry, Village level development and many commercialisation activities.

(4) Institutional Framework of Scheduled Tribe in Tripura

Tripura being predominantly backward and with sizeable Tribal population has actively planned for the focused development of the areas dominated by Scheduled Tribes. The long-term goal of the State's interventions for the Scheduled Tribes is to improve their quality of life by increasing and ensuring their access to education, health care and income generation.

Department of Tribal welfare is the nodal department for overall policy planning and coordination of programmes for the development of the Schedule Tribes in the state. It's responsible for Economic Development, Protection from social exploitation, Promotion of education and preservation of culture and traditions, Promotion and development of voluntary efforts on tribal welfare, Safeguarding the constitutional and traditional rights and Ensure the rights of forest dwelling Scheduled tribes on forest land. The below figure presents organisational chart of TTAADC on the institutional framework available to ST's of the state.

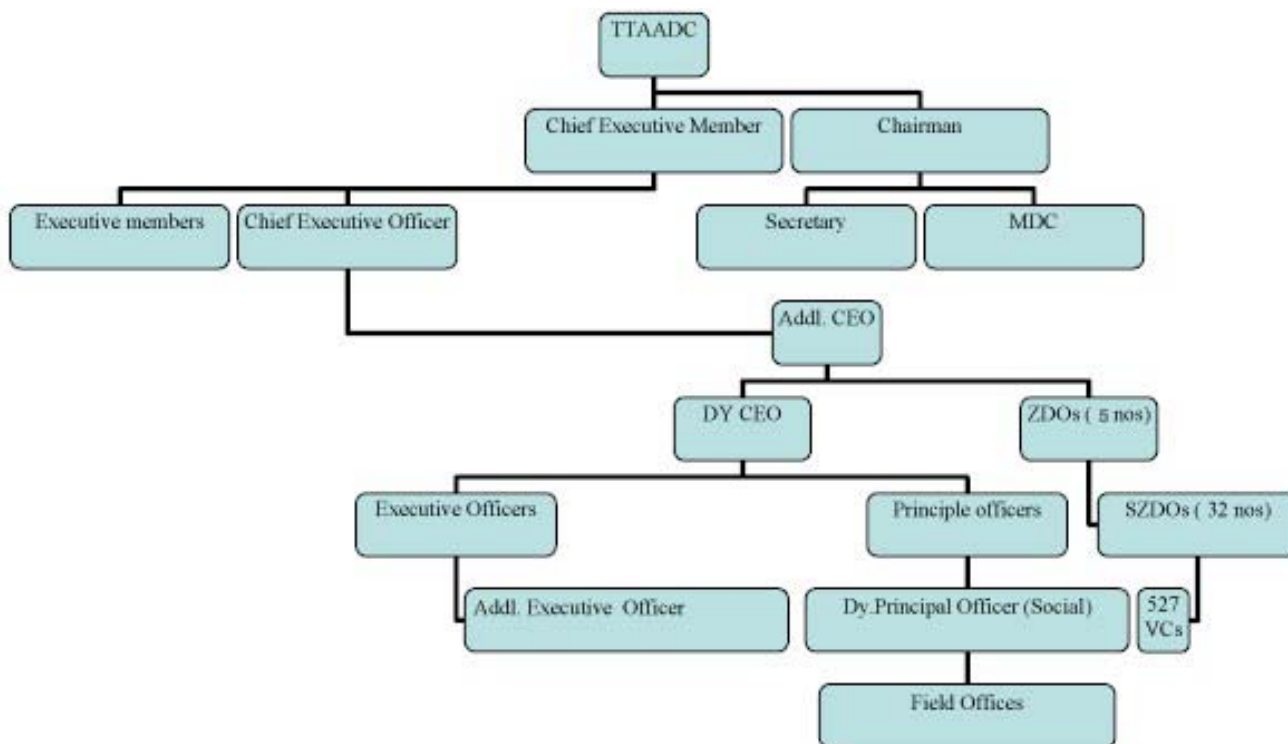


Figure 7-52: Organisation of TTAADC

Tripura tribal area autonomous development council (TTAADC) has been actively involved with tribal welfare and livelihood improvement since its inception. Most of the officers and staff comes from the tribal background itself and work on ground level engagements on the upliftment of the community at large.

7.10.2 Tribal Demography in Tripura

Approximately 50% of the state's population in Tripura consists of ST & SC population and though they're integrated in the mainstream most continue to live a very poor lifestyle with very limited means of livelihood earnings because of lack of infrastructure and industrial development and other livelihood earning opportunities. The below table provides information on rural and urban tribal population.

Table 7-97: Scheduled Tribe population in Tripura

State		Tribal Population	Male	Female
Tripura	Rural	1,117,566	563,908	553,658
	Urban	49,247	24,419	24,828
	Total	1,166,813	588,327	578,486

Source: Caste Census 2011

The people of the Scheduled Tribes (ST) comprise about one-third of the population. As per the census in 2011, ST population of the state was 1,166,813 which is 31.75% of the total population of the state. The total ST male was 588,327 and ST female was 578,486. There are 19 tribes among the ST population of the State with their own cultural identities, namely i) Tripuri, ii) Reang, iii) Jamatia, iv) Chakma, v) Lusai, vi) Mog, vii) Garo, viii) Kuki, ix) Chaimal, x) Uchai, xi) Halam, xii) Khasia, xiii) Bhutia, xiv) Munda, xv) Orang, xvi) Lepcha, xvii) Santal, xviii) Bhil and xix) Noatia.

7.10.3 ST in the three districts overlapping the project alignment

The existing road passes thru Khowai, Gomati & South Tripura. People are aware of authorities' plans of widening and strengthening of the road. Project alignment has approximately 40% tribal population. Below are the district wise population and percentage of SC and ST is presented below in the below table.

Table 7-98: District wise population and percentage of SC and ST

State / district name	ST	SC	Other	Total	% ST	% SC	% others
Tripura	1,166,836	655,060	1852,021	3673,917	31.76	17.83	50.41
Khowai	139,537	63,062	124,965	327,564	42.60	19.25	38.15
Gomati	188,554	74,430	178,554	441,538	42.70	16.85	40.45
South Tripura	162,463	74,020	216,596	453,079	35.85	16.33	47.82

Source: Census of India 2011

Scheduled Tribe Literacy: The Census-2011 data reveals that the overall Schedule Tribe literacy rate reached to 79.05% from earlier 56.50% in 2001. The ST literacy rate has significantly increased during intra-census period of 2001-2011 in the State, i.e., about 22.55%.

Scheduled Caste Literacy: The SC literacy rate has increased to 89.45% in 2011 from earlier level of 74.68% in 2001. During intra-census period of 2001-2011 an increase of 14.77 percent is noticed for SC literacy.

Breakdown of literacy rates of genders in ST and also SC are shown in the table below.

Table 7-99: Literacy rates in genders of SC and ST (PAPs)

SC Literacy Rate		ST Literacy Rate	
Men	Women	Men	Women
86%	77%	83%	76%

Source: JICA Study Team

7.10.4 Ethnicity of ST in Tripura

The alignment largely passes along existing road and hence tribal population in affected land corridor is significant. In most of the districts, the tribal are largely scattered all over the state and especially, in the districts of Khowai, Gomati and South Tripura.

There are 19 tribes in Tripura as per Government notification. The socio-economic and ethnic features of major tribes present in project districts along the alignment is presented in the below table.

Table 7-100: Socio- Economic and Ethnic characteristics of Scheduled Tribes

Tribes	Population	Ethnic Status
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Tripuri	592,235	Indo Mongloid Origin. Largest tribal community in Tripura Tripura was under rule of Tripuri Kings till it is merged with Indian dominion in the year 1949. Tripuri Society was controlled by regional social councils. Now they are under Village Panchayats and other legal bodies.
Reang	188,220	Reangs belong to Indo Mongloid racial stock Second Largest tribal community in Tripura Reang Society are controlled by Village Panchayats and other legal bodies Reangs are still a nomadic tribe and a large numbers among them maintain their livelihood involving Top Hill Jhum Cultivation
Jamatia	83,347	Jamatias have distinct features of Mongloid origin. Fourth Largest tribal community in Tripura Jamatias are the major strength of Royal army of Tripura Kingdom for which they were exempted from various taxes. Earlier jamatias had to live on Jhum cultivation but later on they had accustomed themselves with the plough cultivation. “Hoda Akra” is their supreme traditional social institute which has power to look after to preserve and promote their every social taboo.
Noatia	14,298	Noatias have 11 major clans. Noatias is not their actual tribe name. They were actually Tripuris. In due course Noatias took title as Tripura. They are treated as new comers, now they are under village Panchayats and other legal bodies.
Uchoi	2,447	Uchais and Reangs are of same origin and ethnically belong to Mongloid tribes. Uchai is a separate tribe, live in Tripura since time immemorial. They have migrated in Tripura from Arakan hills of Burma. Traditionally Uchais were Jhum cultivators and still practice jhum in high tillas and slopes. Uchais live in clustered villages. In one village there may be maximum 50 families live together. Uchais are accustomed in plough cultivation and settled in plain areas along with other tribes.
Halam	57,210	Halams live in typical “Tong Ghar” specially made of bamboos and Changrass. Halams are divided into several sub clans which is referred as “Barki – Halam” Apart from plain land cultivation, they still practice Jhum cultivation.
Mog	37,893	Mogs depend on Jhum cultivation Mogs are Arakan Tribes and migrated to Tripura through Chittagong Hill Tracts They have social administrative social council. Chief of this council is called as Chowdhury Mog communities by tradition famous for their folk medicine Mogs social culture and beliefs are centralized with Burmese culture.
Chakma	79,813	Chakmas are known to be a tribe of South East Asia. They have first migrated to Arakan hills of Burma and then to Chittagong Hills tracts to Tripura. Chakmas are one of the major tribes of Tripura according to their population Among Chakmas there are three major groups like Anokia, Tandugia and Magla. Economic activities of Chakma are centralized with Jhum cultivation, plain land cultivation and vegetables cultivation. A Considerable percentage of them are also government employees.

Garo	12,952	Ethnically Garos are a tribe of Tibeto Burman Linguistic family and under Mongloid racial stock. Garos are one of the immigrant tribe in Tripura. Original home land of Garos was Meghalaya and Assam. Garos are matrilineal tribe. During last 50 years many of them got converted to Christianity.
Chaimal	549	Their main concentration is at Ambassa of Dhalai District. They called themselves as Saimar. Chaimal is a smallest tribal group of Tripura Chaimals belong to Cocaso Mongloid origin. Chaimals live on Jhum cultivation as well use plain land cultivation.
Kukis	10,965	Kukis presently a small tribe in the state and socio-economically more advanced tribe. They have their own customary laws and village councils. Lal is term which means village chief. The village chief generally meets up all sorts of social and religious disputes. Kuki is a word pronounced by outside people to refer a group of tribes like Darlong and Lusai. They called them as Mizo. They never call them Lusai as word “Lu” means head and “Sai” means cutting (Head Hunter) Kukis presently form a small tribe in the state but socio economically more advanced tribe.
Lusai	5,384	Lusai is another tribe under Kuki Chin Group of tribes. Racially they are known to be under Mongloid origin Lusias live on Jhum cultivation and hunting of wild animal. Lusais are commonly known as Mizos and their culture is as like as mizos. Comparatively their literacy rate is higher than that of other minor tribes of Tripura.
Khasia	366	Khasias belong to Austro Asiatic racial stock. Basically they are Meghalayan Tribe. In true sense they have no ethnic relation with other Tripura tribes. They are used to plantation work and animal rearing.
Lepcha	157	Lepcha is a Himalayan Tribe and mostly reside at Meghalaya, Arunachal Pradesh, Bhutan, Sikkim and Darjeeling Lepchas are Mongloid Tribe. They are called as “Rong” Their main economic activity is cattle rearing and also agriculture with no horticulture.
Bhutia	28	Bhutias are Himalayan Tribe and negligible in Tripura. They are mostly in Royal army due to their warrior character and physical strength.
Munda	14,544	Mundas are central Indian tribe and an immigrant Tribe. Mundas are proto Australoid tribe. Mundas are mainly working in tea garden and brick fields and in spite of lots of changes in socio economic lives of Mundas , they are still living hand to mouth.
Orang	12,011	Orang is an immigrant tribe and migrated from Bihar, Madhya Pradesh and West Bengal. Orangs are plain tribe and their livelihood mainly depends on agriculture, tea plantation and brick field. Orang lives in clustered village. Village priest of Orangs are treated as Head of the family. .Among this tribe literacy rate is growing and economic consciousness is in progress. Orang are taking active part In the development phase of Tripura.

Bhil	3,105	Bhills are considered as one of the oldest tribe in India. Bhills could be identified as one of the Dravidian racial tribe of western India and belong to Australoid group of tribes. They speak a language of Dravidian origin. This tribe has migrated to Tripura from central India mainly from Bihar, and Madhya Pradesh. Their economy is centralized with tea garden, Agriculture and brick field. They are found in North Tripura and working in tea gardens.
Santal	2,913	Santhals are immigrant tribe of Tripura and belong to Austro Asiatic racial stock. Their main occupation is in Tea gardens. They also depend on agriculture and hunting of wild animals. They've their priest who works as religious head.

Scheduled Tribes and its clans living along the project area of NH 208 belong mostly to Tripuri, Reang, Chakma, Mog, Jamatia and Halam tribes and their sub clans. It's appropriate to say that STs in the area are well integrated with mainstream society while practicing their traditional customs.

7.10.5 ST population impacted along the Alignment

Indigenous People getting affected as per the Project Alignment whose land or structure or both are getting impacted are mentioned in the below table.

Table 7-101: PAs getting impacted as per the project alignment

Total PAHs	Total PAs	ST PAHs	ST PAs	ST Male	ST Female	Vulnerable HH
1,053	3,467	546	1,809	997	812	777

Source: Census survey by EIS Team, November - December 2020

The total displaced PAHs and project affected persons in the all three project benefits districts (Khowai, Gomati and South Tripura) are 1,053 and 3,467 respectively. Among them the ST PAHs are 546 and ST PAs are 1,809.

7.10.6 Socio-economic characteristics of scheduled tribe affected by the project

The overall profile of the tribal households in terms of their household profile, religious orientation, access to basic amenities, economic standards, perception about the project, project induced displacement has been assessed through Census and Socio-economic survey of the project affected persons among the scheduled tribe population. In addition, detail focus group discussion was carried out with the community to ascertain their stages of development, cultural practices, beliefs, educational level and skill training assessment, status of women in the tribal society was analysed This was based on field observations, consultations with the community leaders, and focus group discussions with the community.

Family size

Out of total ST families, around 32% of the households are small families with 3-4 members, 56% with 5-8 members and 12% with 9+ members.

Monthly income

Census Survey on the monthly income levels of each ST PAs in IPP district indicates that approx. 36% have income less than INR 5000, 37% of PAs have monthly income in the range of INR 5000-10000, 17% PAs have monthly income in the range of INR 10000-20000, 7% of PAs have income in the range of INR 20000-

50000, and 1% have monthly income in the range of INR 50000-1 lakh. Few people declined to comment on their Income status.

Expenditure pattern

Information collected during Census survey on expenditure pattern of ST PAPs in the district indicates that monthly expenditure of most of the households (41%) lie in the range of INR 5000-10,000, followed by 25% having an expenditure in the range of INR 10000-20000. Others refused to provide information on the month expenditure of their households.

7.10.7 Scheduled Tribe's Access to Public Services

Detailed information was collected from all the ST PAPs with respect to access to drinking water and sanitation facilities, source of light, available cooking medium during the Census survey. The results from the survey are presented in the following section.

Source of Drinking Water

Most PAPs rely on community borewell within villages for their daily water needs (approximately 60%). However 20% claimed to have pipeline supplied water to their homes. Few also mentioned about personal borewells for daily water needs.

It was widely suggested that the problem of water quality in affected habitations and to preserve the quality of water by institutionalising water quality monitoring and surveillance through a Catchment Area Approach and SHG participation of local communities.

Sanitation Status

Census survey indicated that approximately 90% PAPs have access to toilets and 7% of the PAPs still defecate in open. For PAPs with toilets, approximately 31% have individual pucca toilets within the households and 23% have Kutcha toilets and around 36% use community toilets. Few declined to comment on the status.

Electricity and Source of lighting

Assessment on electricity and source of lighting during the Census survey indicated that 90% PAPs have access to electricity and forms the source of light for them and only 8% use kerosene as source of lighting. Approximately 9% of PAPs use more than one source of light in their houses.

Cooking medium used by the Households

Assessment on the Cooking medium used by the PAPs during the census survey indicated that 78% of the PAPs use only LPG for cooking, 13% use only firewood for cooking, 2% use kerosene and balance use leaf straw or other medium for cooking.

7.10.8 Perception about the Project

Census survey also captured the perception of the ST PAPs on awareness of the project, perceived benefits from the project and concerns from the project. The details of the survey are presented in the following section.

Awareness about the Road Project

During the census survey, majority of the PAPs (88%) expressed their awareness about the road widening and strengthening; whereas only 9% expressed no awareness on the project. Almost everyone was happy with the widening and wanted an early completion to the project.

Perceived Benefits from the Project

Census survey also sought perception of the PAPs about the perceived benefits from the project. 37% PAPs did not perceive any benefit from the project and 21% indicated that the project would accrue positive benefits to them. Concerns expressed by the PAPs included loss of partial income, pressure on existing infrastructure, natural addition of population and conflict situations arising thereof.

7.10.9 Types of Resettlement and Rehabilitation

Details on type of resettlement and rehabilitation assistance sought by PAP were discussed during the census survey. Most of the PAPs (85%) indicated that cash grant equivalent to loss as the most preferred mode of resettlement and rehabilitation assistance and only 14% of the PAP wanted training for self-employment.

Special Safeguard needs for Vulnerable Groups

Vulnerability assessment has been done for the following for the ST PAPs. There are 777 vulnerable households including 546 ST PAHs and 548 non-ST BPL households.

7.10.10 Inventory of losses

A total of 3,467 PAPs including 1,809 ST PAPs comprising of houses, shops, cattle sheds, private temples, toilets, kitchens, storerooms. Some of the tribal families in project districts are apprehensive about the proposed project and believe that loss of land appears to be the main threat as it will lead not only to economic problems but also emotional attachment to the locality they've been living for long. The decrease in the level of economic security, whose affect will be a consequence for several factors, the most important of which include the following: loss of access to previously used resources on which they depend (water, agricultural land, common resources such as pastures, forests, common agricultural land, rivers). Some IPs believes that temporary financial compensations seem inadequate in relation to the long- term social, environmental, and economic costs, however they are happy that road is being widened and it'll bring better economic opportunities over period.

7.10.11 Free Prior Informed Consultation (FPIC) with ST

(1) Concept

The Free Prior and Informed consultations were conducted for the project to fully identify the views of affected community and ascertain their broad community support for the project in line with World Bank O.P. 4.10, Free Prior Informed Consultation (FPIC). These consultations have twin objectives such as (i) disseminating details about the proposed project, its adverse and favourable impact on the ST community and (ii) integrating the affected ST households with suitable development programmes (income generating, skill development or capacity building). Informed participation involves organized and iterative consultation through which the views of the affected communities on matters that affect them directly, such as proposed mitigation measures, the sharing of development benefits and opportunities and implementation issues, shall be incorporated into the decision-making process of the project. The concept is summarized as follows:

Free: The project shall not coerce, intimidate or unduly incentivize the affected communities to be supportive of the project. The project shall record the discussions with recognized community representatives, key informants, etc.

Prior: Consultation with affected communities shall be sufficiently early in the project planning process: (i) to allow time for project information to be interpreted and comments and recommendations formulated and discussed, (ii) for the consultation to have a meaningful influence on the broad project design options, (iii) for the consultation to have a meaningful influence on the choice and design of mitigation measures, the sharing of development benefits and opportunities, and project implementation.

Informed consultation: Consultation with affected communities shall give details about project operations and potential adverse impacts and risks, based on adequate and relevant disclosure of project information and using methods of communication that are inclusive, culturally appropriate and adapted to the communities' language needs and decision making, such that the community fully understand how the project will affect their lives.

(2) Identification of Stakeholders

In view of the baseline information on demographic, social, cultural and political characteristics of the affected tribal people and the legal and institutional framework applicable to tribal development, the key project stakeholders have been identified. These stakeholders will form integral part of the consultations during project preparation and implementation.

- Affected ST households;
- Village Sarpanch, Community leader;
- Women groups from project affected people
- Project Administrator (district level), Tribal Development Department; and Commissioner

(3) Methodology adapted for the consultation

As shown in Section,7.2.7 in advance of this study, under Phase 4 of the JICA Project , in order to ensure the process of free, prior, and informed consultation (FPIC) with tribal peoples and confirm their consent, NHIDCL formally invited the representatives of the concerned TTAADC officials and encouraged project affected tribal persons to participate the additional public consultation through the local TTAADC offices (for the part of Khowai- Teliamura) by distributing leaflet.

In this study, Free Prior Informed Consultation with ST for the project was achieved in the stakeholders consultations for the general PAPs reported in Section 7.11. A top-down approach was followed to take all precautions before conducting FGDs to make them successful and hassle free.

Meeting at Collector/ subdivisional district magistrate (SDM) level to inform them about the FGDs to be held at village level and take their opinion on this and discuss about Gram Sabha proceedings and expected timeline to complete the process. Collectors of Khowai, Gomati & South Tripura districts were met to seek cooperation, receive inputs and to take their opinion on conducting the FGDs and also to understand the official process to be followed for Gram Sabha at the concerned villages.

The project update was shared formally with all. All the presentations during public/stakeholder consultations were conducted in Bengali (local language) and Hindi. Questions and Answers were raised during meeting in Bengali & Hindi as well. The summary of the SIA & RAP is provided in local language Bengali and also in English to the stakeholders. The issues raised in the FGDs held in the study area are presented in the below table.

(4) Findings on the need assessment of ST

Broad Consensus among participants and project affected persons after the FGDs and almost all stakeholders agreed to support the project whole heartedly.

The key findings of the village level consultation with ST are mentioned below.
most of the people are having small pieces of land.

- Land holding size is small. For a small land holder, more likely chances of acquisition of his/her entire land.
- Lack of proper operating primary health care facility and emergency health care facility.
- The villagers demanded the compensation to be paid based on market rate, rather than on the circle rate. The reason cited was that circle rate is 4-5 times lesser than the market rate.
- There were a few households with small land parcel and houses on that, whose entire land parcel was coming within the alignment. These households demanded alternate land or houses to be given under the project. NHIDCL answered that compensation will be given as per as per RFCTLARR 2013.
- Some of the senior and widow women whose structure and houses were coming within the alignment expressed concerns on shifting and making arrangement for new house in the vicinity. They indicated that it was difficult to find land for new houses in the vicinity and getting a new house

constructed by them is also difficult. These women requested to shift the alignment. They also demanded alternate place to resettle in case of structure loss. NHIDCL official replied that compensation will be done as per RFCTLARR-2013 and all benefits of vulnerable family will be given, and the participants were satisfied with the answer.

- Compensation for fruit bearing trees affected from the project was also requested.
- The villagers also demanded government employment for one household member for the Project affected people specially for those who lose all of their land in possession.
- The villagers indicated that they would like to be trained on the handicraft and sewing and can take up contract with the companies operating in the region.
- Only owners are paid compensation for land and those in possession are not paid anything

7.10.12 Income restoration plan for ST

(1) Resettlement and Rehabilitation benefits for ST

As per the Clause 4 of Section 41 (**Special provision for schedule cast and schedule tribe**) under RFCTLARR, 2013, preparation of tribal development plan of the schedule tribes and the schedule caste families is required. The plan shall also contain a programme or development of alternate fuel, fodder and non-timber forest produce (NTFP) resources on non-forest lands within a period of five years sufficient to meet requirements of tribal communities who are denied access to forests.

The concerned gram sabha or the panchayats at the appropriate level in the Scheduled Areas under Schedule VI of the Constitution shall be consulted in all cases of land acquisition in such areas including land acquisition in cases of urgency, before issue of a notification under the RTFCLARR Act, 2013 or any other Act of the Union or a State for the time being in force under which land acquisition is undertaken, and the consultation shall be in accordance with the provisions of the Panchayats (Extension to the Scheduled Areas) Act, 1996 and other relevant laws.

Further, in cases of involuntary displacement of Scheduled Tribes families from the Scheduled Areas, TTAADC may also be consulted.

Each affected family of Scheduled Tribe followed by Scheduled Caste categories shall be given preference in allotment of land-for-land, if Government land is available in the resettlement area.

In case of land being acquired from members of the Scheduled Tribes, at least one-third of the compensation amount due shall be paid to the affected families at the outset as first instalment and the rest at the time of taking over the possession of the land.

Each Scheduled Tribe affected family shall get an additional one-time financial assistance equivalent to five hundred days minimum agricultural wages for loss of customary rights or usages of forest produce. Rs. 200 is the minimum wage as per Mahatma Gandhi National Rural Employment Guarantee Act 2005. There are 546 ST households in PAHs. Then the total amount of the one-time financial assistance to ST households is 546 times 500 times 200, Rs. 54,600,000, approximately Rs. 55,000,000.

The Scheduled Tribes affected families will be re-settled, as far as possible, in the same Schedule Area in a compact block, so that they can retain their ethnic, linguistic and cultural identity.

The resettlement areas predominantly inhabited by the Scheduled Tribes shall get land free of cost for community and religious gatherings, to the extent decided by the appropriate Government.

Scheduled Tribes affected families if resettled out of the district will get 25% higher rehabilitation and resettlement benefits in monetary terms.

Any alienation of tribal lands in violation of the laws and regulations for the time being in force shall be treated, as null and void. In the case of acquisition of such lands, the rehabilitation and resettlement benefits would be available to the original tribal land-owners.

The Scheduled Tribes and Scheduled Castes affected families enjoying reservation benefits in the affected area shall be entitled to get the reservation benefits at the resettlement area(s).

The affected Scheduled Tribes families, who were in possession of forest / lands in the affected area prior to January, 2013, shall also be eligible for the rehabilitation and resettlement benefits under this policy.

The sustainable approach to income restoration is based on the following principles:

- Active participation of PAP in planning and decision making to ensure proposed IRP reflects local conditions / priorities. IRP will be prepared by CALA and appointed NGO.
- Provide a wide range of income restoration including training choices so that they can select the best training and income restoration opportunity.
- Vulnerable households shall be provided targeted support during implementation of income restoration plan.
- Capacity building and training will be incorporated as part of income restoration activities to develop PAPs skills. Capacity building acknowledges the different needs of women, men, youth and vulnerable groups with respect to skills development.

Disclosure of IRP activities will happen at following three levels:

District Level	District level disclosure will involve dissemination of information on livelihood restoration options to the PAPs, community leaders, NGOs, government agencies and all other stakeholders. Stakeholder feedback from these activities will be incorporated into the detailed development of IRP programme.
Village Levels	At the village levels Community meetings and focus group discussions will be held to explain components of the IRP.
Individual Disclosure	Individual disclosure will involve engagement with individual PAPs so that the livelihood interventions address the specific needs of each household.

(2) Income Restoration Measures

The project affected persons losing their livelihood or place of generating income due to NHIDCL project will be supported with Short-term and Long-term ILRP measures:

Short-term Income and Livelihood Restoration Plan

Short-term ILRP will cover all PAP losing their livelihood resources or place of generating income due to planned project. The PAPs will be well supported by NHIDCL for subsistence during the transitional period. The entitlement matrix in RAP has adequate provisions for short term income and livelihood.

Long-term Income and Livelihood Restoration Plan

Long-term ILRP measure will ensure PAPs income and livelihood restoration through skill development training, land-based livelihood support, and providing special provision for the vulnerable group. It will be prepared by CALA and appointed NGO and will be designed through identification of target group beneficiaries and after assessing the needs and feasibility of potential income generating activities.

7.11 Stakeholders Consultations

7.11.1 Methodology

(1) Background

To ensure peoples' participation in the planning phase and aiming at promotion of public understanding and fruitful solutions of developmental problems such as local needs of road users and problem and prospects of resettlement, various sections of affected persons and other stakeholders were consulted through focus group discussions, individual interviews and formal and informal consultations. The vulnerable sections of PAPs and women were also included in this consultation process.

Consultation held with various government officials and local people from the fringe area of the project road. Divisional Forest Officers of all the three project districts were consulted during the field study along with higher officials from the Tripura Tribal Areas Autonomous District Council. Informal public consultations were held at six important locations of the project road covering all the three district. All of them welcomed the road development and improvement project. Suggestion received mainly on improved drainage system, adequate compensation, protection measures for water bodies (mainly ponds) and petty contracts for the local contractors during the construction phase of the project road.

Two stage Public/stake holder consultations have also been done in September and December, 2020 as per JICA guidelines.

(2) Objectives of the Stakeholders Consultation

Public Consultations or community participation is an integral part and process of any projects 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 to control over these initiatives, decisions and resources. Community consultations also help to avoid opposition to the project, which is otherwise likely to occur.

The overall objectives of the consultation program in preparing RAP were to disseminate project information and to incorporate public and PAP's views in Resettlement and Environmental Action Plans, which are guided by specific objectives like:

- Awareness amongst stakeholders by disclosing the updated. RAP. according to GOI's Involuntary resettlement policy.
- Improvement in project design minimizing potential conflicts and delays in Implementation.
- Facilitate development of appropriate and acceptable entitlement options.
- Increase project sustainability.
- Reduce problems of institutional co-ordination.
- Make the resettlement and rehabilitation process transparent and reduce leakage.
- Increase re-settler commitment, ensure effectiveness and sustainability of the income restoration strategies, and improve coping mechanisms.
- Creating sense of belongingness among the stakeholders.

(3) Identification of the stakeholders

The stakeholders are all the people getting affected by the project or are responsible for the project, whether directly or indirectly. The community participation programmes in social assessment ensured that information is disseminated to all the PAPs and other stakeholders in appropriate ways. The information dissemination has taken place in vernacular, detailing about the main project features and the entitlement framework. Due consideration has also been given to address the views of the vulnerable groups.

Certain issues conditioned the participation of the stakeholders, as follows:

- Who might be affected (positively or negatively) by the proposed development?
- Who are voiceless for whom special efforts may have to be made?
- Who are representatives of those which are likely to be affected?
- Who is responsible for what is intended?
- Who can make what is intended more effective through their participation or less effective by their non-participation or outright opposition?
- Who can contribute financial and technical resources?
- Whose behavior has to change for the effort to succeed?
- Both primary and secondary stakeholders were identified, based on the above criteria. They were invited to take part in the consultation series, and were solicited to participate in planning and implementation of the resettlement and rehabilitation programme.

Primary stakeholders included those affected negatively or positively by the project, like the PAPs, project beneficiaries and project implementing agencies. Secondary stakeholders included other individuals and groups, with an interest in the project, viz., the NHIDCL, the highway users etc.

(4) Disclosure of Project Information

The sharing of information is essential for sustainable development. It stimulates public debate on and broadens understanding of development issues, and enhances transparency and accountability in the development process. It also strengthens public support to improve the lives of people, facilitates collaboration among the many parties involved in development, and improves the quality of projects and programs. It is now accepted everywhere that the expanded access to information by the public will enhance the dialogue on development, and make an important contribution to efforts to reduce poverty and promote sustainable development.

In advance of each of the 1st and the 2nd stakeholders consultations, village heads were given the Executive Summary of the scoping results of the project in English and Bengali. The statement in the summary was explained to the village heads and other villagers so that they could disseminate the information at the individual PAH level. They were also informed about the dates of the meetings and regularly update the information. A mobile phone number of the head surveyor in the Survey Team was shared with the village heads and other villagers for satisfying mainly the PAPs and the villagers regarding any queries or complaints. Further newspaper advertisement was published in local language before second stage public consultation meetings confirming the date, time and location of the meeting.

30 days before the date of each of the 1st and 2nd stakeholders consultations, information disclosure was done. For reconfirmation, the advertisement in newspaper in both English and local language was published two days prior to the consultation.

A pamphlet describing summary of draft EIA and SIA was prepared for each of the 1st and the 2nd stakeholders consultations and distributed to the PAPs in advance of the consultations. The table of contents of the pamphlet distributed for both the 1st and 2nd consultations are as follows;

For SIA summary

1. *Project Background*
2. *Public/Stakeholders Consultation and Participation*
3. *Brief Summary of the Resettlement Impacts*
4. *Entitlement Matrix*
5. *Grievance Redress Mechanism*

For EIA summary

1. *Project Background*

2. *The Extent and Objective of the EIA Study*
3. *National Legal Frame Works & its Applicability to the Project and Gap Analysis against JICA Environmental Guidelines*
4. *Description of the Project Components*
5. *Baseline Environment*
6. *JICA Guidelines*
7. *Study of Alternative Options*
8. *Anticipated Environmental Impacts and Proposed Mitigation Measures*
9. *Public Consultation and Information Disclosure*
10. *Environmental Management Plan*
11. *Findings and Conclusion*

(5) Considerations of COVID-19

The stakeholders consultations of the project conducted in Sep. and Dec. 2020 then it coincided with the pandemic of COVID-19 in the world including India. It was conducted complying with the rules and regulations applied by the state and central government for prevention of COVID-19.

During implementation of the consultation, IFC's "Interim Advice for IFC Clients on Safe Stakeholder Engagement in the Context of COVID-19" was referred to, for some recommended alternative measures to complete stakeholders engagement while protecting the health and safety of those involved.

While it was difficult to hold large-scale meetings due to COVID-19, the study team gave consideration to ensure the participation of people who wish to express their opinions and to ensure sufficient time and opportunities for stakeholder discussions, adopting a method of Focus Group Discussion and Key Informant Interview with a small number of people, and establishing a consultation service after thoroughly disseminating information to the stakeholders.

(6) Gender

During public consultation following measures were taken for considerations of gender in the affected communities. Study Team contacted all the village heads falling along the alignment. The village heads and study team members along with women panchayat members also explained about the project to local female residents in their local language. The female ST members of the panchayat also further informed about the project and its benefits in detail to the local female residents.

(7) Consultations for Determining Principle

The consultation process is not only targeted at project information dissemination to the people but another important aspect covered is determining of principle for formulating an entitlement framework and eligibility policy for the project. The consultation process throws light of the people's expectations, aspirations etc. from the project as well as their expectations in terms of compensation and assistance from the project in case of adverse impacts.

(8) Participants at different levels

The extent or the likely level of adverse impacts was one of the major criteria in deciding locations for public consultation sessions. The consultation programme has been tiered and conducted at several levels, such as:

- Heads of the households, likely to be impacted
- Members of the households, likely to be impacted
- Clusters of PAPs
- Villagers
- Village Panchayats
- Local voluntary organizations and NGOs
- Government agencies and departments

(9) Levels of Consultation

The enactment of the participation and consultations with the stakeholders has been done at different levels throughout the project preparation stage. The Public Consultation was carried out at various stages of project preparation: Social Screening stage and Feasibility stage.

7.11.2 Stakeholders Consultations at the Scoping level

The first stage stakeholder consultation was conducted during first week of September, 2020 in six locations covering all the three benefits districts as per JICA guidelines. Disclosure of summary of draft EIA and SIA has also been done in proposed six locations as per the JICA guidelines through pamphlets and mobile phones communication. The entitlement matrix for RAP has also been shared with the PAPs.

Focus Group Consultations with various stakeholders were carried out during various phases of project preparation. Key person and focus group consultations at section of the society were arranged at the stage of project preparation to ensure peoples' participation in the planning phase of this project and to treat public consultation and participation as a continuous two way process. Aiming at promotion of public understanding and fruitful solutions of developmental problems such as local needs and problem and prospects of resettlement, various sections of PAPs and other stakeholders were consulted through focus group discussions and individual interviews. Photographs of first public/stakeholder meeting and attendance sheet are provided in Figure 7-53 and Figure 7-54 respectively. The record of the 1st stakeholder consultation with dates and locations of the meetings along with numbers of participants details are presented in Table 7-102.

Table 7-102: 1st stakeholder consultation at the scoping level

Sr. No	Date & Time	Locations	Nos. of participants			Occupation			
			Total	M	F	Farmers	Jobs including labour*	Business	Students/Unemployed
1.	04.09.2020 10.00 am to 12.30 pm	Near Community hall Bchaibari, Tripura	35	20	15	8	12	14	1
2.	04.09.2020 2.00 pm to 04.30 pm	Near Community hall Kalyanpur, Tripura	34	24	10	9	9	12	4
3.	05.09.2020 10.00 am to 12.30 pm	Near Community hall Lalgiri, Tripura	12	8	4	5	5	2	0
4.	05.09.2020 2.00 pm to 04.30 pm	Near Community hall, Suknachari, Tripura	21	14	7	8	4	7	2
5.	06.09.2020 10.00 am to 12.30 pm	Near Community hall, Rupaichari, Tripura	42	30	12	4	13	20	5

6.	06.09.2020 2.00 pm to 04.30 pm	Near Community hall, Harina, Tripura	40	25	15	5	10	21	4
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* People who live in the project affected area but commute to neighbouring towns/cities for work.

Source: JICA Study Team

Design considerations have been made to incorporate most of the suggestions and demands of the local people except those which are beyond the scope of project like extra advantage to the affected persons, health services etc. Issues and concerns raised, questions and answers in the public consultation conducted during September, 2020 presented in Table 7-103 and Table 7-104.

There was no declaration from participants against the project itself during the consultation. All their concerns, comments, newly detected impacts were discussed and reflected to the EIA report, EMP-EMoP, RAP, the action plan for Scheduled Tribe in this chapter. Photographs and attendance sheet of the stakeholder consultation at the scoping level at all the 6 locations are shown in Figure 7-53 and Figure 7-54 respectively.

Table 7-103: Issues and concerns raised in the 1st Public Consultation conducted during September, 2020

Name of Locations and date	Locations	Findings		
		[General]	[Issues]	[Institutions for income generations/ alternative livelihoods]
Kalyanpur (Khowai) 04.09.2020	Near Community hall Kalyanpur, Tripura	Except few shopkeepers, all the respondents are engaged in farming and do not have other alternative livelihoods. (Tea stalls/food stalls along the existing ROW getting impacted.	Possibility of the new road alignment which will affect cultivated lands and production. They hope that Land will be allocated to them for the land being acquired	The Mahatma Gandhi National Rural Employment Guarantee Scheme is implemented in this village and provides livelihood options at least for 100 days per year
Bachai Bari (Khowai) 04.09.2020	Near Community hall Bchaibari, Tripura	The main income generating activities in this village come from agriculture and small enterprises such as tea stalls, vegetable vendors, small grocery shops	The main constraints faced by the people of this village are the acquisition of private land and have concerns over the compensatory mechanisms. Short term benefits are the employment opportunities such as employment in road construction; make shift stalls and related activities.	There are existing women Self Help Groups (SHGs) that mainly assist members during special events that happen in the village. These SHGs do not take any financial help from other sources. The schemes that are available in this village are those of the PWD and MGNREGS. There is no existing or functioning NGO and no other schemes or trainings/capacity building have taken place in this village according to the Community
Lalgiri (Gomati)	Near Community hall	The main concern of the Community is the impact of livelihood	The main issue of the people in this village is that there are many	Schemes present are, the Mahatma Gandhi National Rural Employment Guarantee

05.09.2020	Lalgi, Tripura	since with the coming of the proposed Project as most of them have the community members are engaged in small scale enterprises (Tea stalls/food stalls along the existing ROW.	shops and commercial enterprises will be affected and this in turn will affect the source of livelihood of a number of the people within this village.	Scheme which is availed by many of the villagers here providing 100 days as daily wage workers.
Nutan Bazaar (Gomati) Women FGD 05.09.2020	Near Nutan Bazaar	The main income generating activities in this village come from agriculture, rubber plantation and small scale enterprises. Women mostly work in farms and support household livelihood.	The people are anxious to know about the compensatory mechanisms (how much, will it be paid in full etc).	Better health and Sanitations services. Activate SHG for Milk collection & distribution Provide skill trainings for handicrafts and Rubber based products for women entrepreneurs. Provide alternate place to settle in case of structural loss.
Rupaichari (South Tripura) 06.09.2020	Near Community hall, Rupaichari, Tripura	There are no Sacred Forests that are affected, no traditional land practice; fruit bearing trees as well as rubber plantation might get impacted.	The people are not against the proposed project as long as compensation of their land is made well in advance before the commencement of the Project.	There are no functioning NGOs that are operating in this village. TRLM (Tripura Rural Livelihood Mission) which is a government department is the only project that is providing Livelihood Opportunities apart from MGNREGS
Harina (South Tripura) 06.09.2020	Near Community hall, Harina, Tripura	There is no culturally important facet like the Sacred Forests or Monoliths. Some structures and Few plantations will get impacted.	The people in Harina have no specific issues with regard to the proposed project as long as the existing road is planned to be repaired and widened.	There were a number of organisations (SHG/NGO that were known to the villagers, but currently defunct and not active. Few groups are not government sponsored therefore making them illegible to implement any scheme(s) in the designated areas. The schemes that are available in the village are the Mahatma Gandhi National Rural Employment Guarantee Scheme.

Table 7-104: Questions and answers in the 1st Public Consultation conducted during September, 2020

S No	Public Hearing Comments	Response
	Kalyanpur, Khowai District	

1	Mr. Nilay Sutradhar told that the curves in the road result in accidents. What is the solution for it?	The revised alignment /bypass at such places will improve the horizontal geometry and eliminate the reverse curves which will reduce the accidents.
2	Mr. Souvik Chandra asked what amount of compensation will be provided for the land acquisition.	Compensation for land acquisition will be provided as per RFCTLARR- 2013 guidelines.
3	Mr. Sanjay Das asked can we built our shops on the side of road after it's constructed?	It will be decided as per local government rules and regulations.
4	Mr. Viswajeet Sheel (Farmer) asked will we get compensation for the trees that will be cut from our land?	Compensation will be provided as per RFCTLARR-2013 guidelines
Bachai Bari, Khowai District		
1	Mr. Chandra Kumar asked what is the width of the road that will be constructed.	The proposed road is two lane with paved shoulder having carriage width 7.0 m, paved shoulder 1.5, on both sides and earthen shoulder 1.0 and 1.0 RCC drain.
2	Mr. Bishwambar Dev Verma asked will jobs be provided to the people whose land will be acquired?	Compensation will be provided for the acquired land as per RFCTLARR- 2013 guidelines. However job preference will be given to the local people by contractor during construction period.
3	Mrs. Munda told that she has her vegetable shop on the road side. It will be destructed during road construction. Will compensation be provided?	Compensation will be provided as per RFCTLARR-2013 guidelines and as per entitlement matrix disclosed in executive summary.
4	Mr. Bisarod Dev Burma (Labour) asked will we get employment in the road construction work?	Local labour will be given preference in the road construction work by the contractor.
5	Mr. Kirid Dev Burma told that domestic / wild animals come on the road now and then which lead to accidents on the road. How it can be prevented?	Barriers will be provided along road side to prevent domestic / wild animals coming on the road in settlement area in consultation with local people/Forest dept.
Lalgi, Gombi District		
1	Mr. Indra Jamatia (Farmer) told that there are no provisions of shelter while waiting for local buses for travelling and to protect from rainfall. What can be done about it?	These facilities will be provided as per IRC guidelines.
2	Mr. Mani Chandra Jamatia (Tea shop owner) asked will toilets be made along road side for public?	These facilities will be provided as per IRC guidelines.
3	Mr. Rajhari Jamatia (Labour) told that during heavy rainfall potholes get created in the roads. What provisions will be provided to improve the drainage system.?	Road side drains will be provided for proper drainage. The road is maintained during operation period.
4	Mr. Amar Manik Jamatia told that he has a meat shop on the road side. It will be destructed during road construction. Will compensation be provided?	Compensation will be provided as per RFCTLARR-2013 guidelines.
5	Mr. Hriday Jamatia asked about the measures taken to reduce the air pollution during the construction phases of the road.	All necessary precautions such as regular water sprinkling, metal carrying trucks shall be covered, hot mix will be installed with pollution control measures and located away from the settlements. And regular ambient air quality monitoring to check the air pollution level.
Suknachari, Gombi District		
1	Mr. Nurwan Mokhri (Worker) asked what amount of compensation will be provided for the land acquisition?	Compensation for land acquisition will be provided as per RFCTLARR- 2013 guidelines.
2	Mr. Shibu Chakma (Student) asked will jobs / employment be provided during road construction?	Local people will be given preference in the road construction work
3	Mr. Sukamal Chakma (Shop owner) told that the curves in the road result in accidents. What is the solution for it?	The revised alignment /bypass at such places will improve the horizontal geometry and eliminate the reverse curves which will reduce the accidents.
Rupachari, South Tripura District		
1	Mr. Bipul Devnath (shop owner) told that there are no provisions of shelter while waiting for local buses for	These facilities will be provided as per IRC guidelines.

	travelling and to protect from rainfall. What can be done about it? He also asked about provision of toilets facilities along the roads.	
2	Mr. Narayab Devnath (Service personnel) asked completion period of this road?	The road will be completed approx. 2 to 3 year after getting final approval.
3	Mr. Bhatranjan Nath (Business) told that he has a shop on the road side. It will be destructed during road construction. Will compensation be provided?	Compensation will be provided as per RFCTLARR-2013 guidelines
4	Mr. Arnab Das asked will jobs / employment be provided during road construction.	Local people will be given preference in the road construction work
Harina, South Tripura District		
1	Mr. Nikhil Chandra Dey (Shop owner) asked what amount of compensation will be provided for the land acquisition.	Compensation for land acquisition will be provided as per RFCTLARR- 2013 guidelines.
2	Mr. Jagnath Bal (Farmer) asked will we get compensation for the trees that will be cut from our land also nos. of trees need to be cut in Government/Forest land? How the same will be compensated?	Compensation of trees in private land will be provided as per RFCTLARR- 2013 guidelines. The compensatory afforestation in Government/Forest land will be done at the ratio 1:10 or as per condition of forest dept.
3	Mr. Bajan Mallick (Service personnel) asked will jobs / employment be provided during road construction?	Local people will be given preference in the road construction work
4	Mr. Ashish Bhowmick (Driver) told that what road sides amenities will be provided?	The necessary road furniture like shelter, common toilets as per IRC guidelines.
5	Mr. Saikat Dey (Shop owner), Mrs. Basanti Debnath (House Wife), Mr. Haider Roy (Student) and Mr. Sushant Das (Driver) said they welcome the construction of new road as it will create employment opportunities and make travel easier.	Thanks for their appreciation for the proposed project.

Figure 7-53: Pictures of the Stakeholders Consultation at the Scoping Level











Figure 7-54: Participants in the Stakeholders Consultation at the Scoping Level

(N/A)

7.11.3 Stakeholders Consultations at the Draft Final Report level

The 2nd stage stakeholder consultation was conducted in six locations on 10.12.2020, 11.12.2020 and 14.12.2020 after informing stakeholders vide NHIDCL letters NHIDCL/BO Agt./DPR/12(6)/2016-17/1531-42 dated 02.12.2020 in district Khowai, NHIDCL/BO Agt./DPR/12(6)/2016-17/1578-89 dated 02.12.2020 in district Gomati, NHIDCL/BO Agt./DPR/12(6)/2016-17/1543-51 dated 02.12.2020 in district South Tripura covering all the three benefits districts as per JICA guidelines. The record of the 2nd stakeholder consultation with dates and locations of the meetings along with numbers of participants details are presented in the below table.

Disclosure of summary of draft EIA and SIA has also been done in proposed six locations as per the JICA guidelines through pamphlets and mobile phones communication.

Table 7-105: 2nd stakeholder consultation at the Draft Final Report level


Sr · No	Date & Time	Locations	Nos. of participants			Occupation			
			Total	M	F	Farm ers	Job s*	Busin ess	Stude nts/U nemp loyed
1.	10.12.2020 from 10.00 a.m. to 12.30 p.m	Khowai: Hachwkni Kharang Community Hall, Bachaibari, Khowai, Tripura	42	24	18	10	14	17	1
2.	10.12.2020 from 2.00 p.m. to 4.30 p.m.	Khowai: Kalyanpur Community Hall, Kalyanpur, Khowai, Tripura	45	40	5	9	16	18	2
3.	11.12.2020 from 10.00 a.m. to 12.30 p.m.	Gomati: Community hall Lalgiri, Tripura	42	30	12	9	14	17	2
4.	11.12.2020 from 2.00 p.m. to 4.30 p.m.	Gomati: Community hall, Suknachari, Tripura	55	41	14	13	19	22	1
5.	14.12.2020 from 10.00 a.m. to 12.30 p.m.	South Tripura: Rupaichari Community Hall Rupaichari, Tripura (India)	37	20	17	8	12	15	2
6.	14.12.2020 from 2.00 p.m. to 4.30 p.m.	South Tripura: Harina Bazar Community Hall, Harina, Tripura	69	48	21	16	23	28	2

* People who live in the project affected area but commute to neighbouring towns/cities for work.


Source: JICA Study Team

Official invitation letters were sent from NHIDCL to the local authorities. Copies of these invitation letters are shown in the below figures.

Figure 7-55: Invitation letter to the concerning authority for land acquisition



परिचालना प्रबंधन कार्यालय, तेल्लमुरा
राष्ट्रीय राजमार्ग और अवसंरचना विकास निगम लिमिटेड
(राज्य परिवहन और राजमार्ग विभाग, भारत सरकार)
PMU- Tellamur
National Highways & Infrastructure Development Corporation Ltd.
(Ministry of Road Transport & Highways, Govt. of India)



भारतमाला
राज्य परिवहन

निवेदन संख्या: 15131-42 **GOVT OF INDIA UNDERTAKING**

NHIDCL/BO Agt/ DPR/12(6)/2016-17/1531-42 Date: -02-12-2020

To,
The Competent Authority for Land Acquisition
(Addl. District Magistrate & Collector)
Khowal District- Tripura

Subj: Improvement/Widening of two lane with paved shoulder of Khowal to Sabroom section of newly declared NH - 208/JICA Funding/Public/Stakeholders Meeting-reg.

Sir,

National Highways Infrastructure Development Corporation Limited (NHIDCL) has decided to take up the development of various NH stretches/Corridors in the country where intensity of traffic increased significantly and there is a requirement of augmentation of capacity for safe and efficient movement of traffic. In pursue of the above, the present section of NH-208 has been considered for upgradation.

2. The proposed road alignment from Khowal to Sabroom is divided in to 2 sections i.e. Khowal to Tellamura (Section 1) and Tellamura to Sabroom (Section 2). The project road has design length of 134.71km. Both sections are part of the NH-208. The project road runs through Khowal, Gomati and South Tripura districts of Tripura.


3. The Public/Stakeholder hearing meetings in all the three project benefits districts will be carried out involving relevant stakeholders and Government Dept., before the commencement of the project. The objective of stakeholder consultation is to provide or disclose information about the proposed project to the public/stakeholders and to collect information, ideas, opinions and insights for environment point of view.

4. As a programme of Public/Stakeholders meeting, the following meetings have been fixed in South Tripura District:-

2nd Floor of Rani Das Building, AA Road, Tellamura, Khowal District, Tripura -799205
E-mail : gmtripura@nhidcl.com

Sl No.	Date & Time	Name of District	Venue of Public Hearing Meeting
1	10.12.2020 from 10.00 a.m. to 12.30 p.m.	Khowal	HachakraKharang Community Hall, Bachabari, Khowal, Tripura
2	10.12.2020 from 2.00 p.m. to 4.30 p.m.	Khowal	Kalyangpur Community Hall, Kalyangpur, Khowal, Tripura


5. Being a Stakeholder, You are requested kindly to attend the above meeting(s) or send your representative to make the Public Hearing meeting grand success.

Yours faithfully

(Trivendra Kumar)
General Manager (Project)


Copy to:-

1. The DM & Collector, Khowal District, Tripura for kind information.
2. The Superintending of Police, Khowal District, Tripura for kind information.
3. The District Forest Officer, Khowal District, Tripura for kind information. It is requested kindly attend the above meeting(s).
4. The Superintendent Engineer, PWD (NH), Gurkhabasti, Agartala for kind information. It is requested kindly attend the above meeting(s).
5. The Sub-Divisional Magistrate, Khowal for information. It is requested kindly attend the above meeting in your Sub-Division.
6. The Sub-Divisional Magistrate, Tellamura for information. It is requested kindly attend the above meeting in your Sub-Division.
7. The Sub-Divisional Police Officer, Khowal for information.
8. The Sub-Divisional Police Officer, Tellamura for information.
9. Enviro Infra Solutions Pvt. Ltd. 301,302 & 305 Sri Ram Business Centre, Plot No. INS-12, Sector -9, Vasundhara, Ghaziabad - 201012.
10. The Project Manager, Technocrats Advisory Services Pvt. Ltd. for information. It is also directed to attend the above meeting(s).
11. The Project Manager, CE Testing Pvt Ltd for information. It is also directed to attend the above meeting(s).

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परिचालना प्रबंधन कार्यालय, तेल्लमुरा
राष्ट्रीय राजमार्ग और अवसंरचना विकास निगम लिमिटेड
(राज्य परिवहन और राजमार्ग विभाग, भारत सरकार)
PMU- Tellamur
National Highways & Infrastructure Development Corporation Ltd.
(Ministry of Road Transport & Highways, Govt. of India)



भारतमाला
राज्य परिवहन

निवेदन संख्या: 1578-89 **GOVT OF INDIA UNDERTAKING**

NHIDCL/BO Agt/ DPR/12(6)/2016-17/1578-89 Date: -02-12-2020

To,
The Competent Authority for Land Acquisition
(Addl. District Magistrate & Collector)
Gomati District- Tripura

Subj: Improvement/Widening of two lane with paved shoulder of Khowal to Sabroom section of newly declared NH - 208/JICA Funding/Public/Stakeholders Meeting-reg.

Sir,

National Highways Infrastructure Development Corporation Limited (NHIDCL) has decided to take up the development of various NH stretches/Corridors in the country where intensity of traffic increased significantly and there is a requirement of augmentation of capacity for safe and efficient movement of traffic. In pursue of the above, the present section of NH-208 has been considered for upgradation.

2. The proposed road alignment from Khowal to Sabroom is divided in to 2 sections i.e. Khowal to Tellamura (Section 1) and Tellamura to Sabroom (Section 2). The project road has design length of 134.71km. Both sections are part of the NH-208. The project road runs through Khowal, Gomati and South Tripura districts of Tripura.


3. The Public/Stakeholder hearing meetings in all the three project benefits districts will be carried out involving relevant stakeholders and Government Dept., before the commencement of the project. The objective of stakeholder consultation is to provide or disclose information about the proposed project to the public/stakeholders and to collect information, ideas, opinions and insights for environment point of view.

4. As a programme of Public/Stakeholders meeting, the following meetings have been fixed in South Tripura District:-

2nd Floor of Rani Das Building, AA Road, Tellamura, Khowal District, Tripura -799205
E-mail : gmtripura@nhidcl.com

Sl No.	Date & Time	Name of District	Venue of Public Hearing Meeting
1	11.12.2020 from 10.00 a.m. to 12.30 p.m.	Gomati	Community hall Lakgin, Tripura
2	11.12.2020 from 2.00 p.m. to 4.30 p.m.	Gomati	Community hall, Suknagar, Tripura

5. Being a Stakeholder, You are requested kindly attend the above meeting(s) or send your representative to make the Public Hearing meeting grand success.

Yours faithfully

(Trivendra Kumar)
General Manager (Project)

Copy to:-

1. The DM & Collector, Gomati District, Tripura for kind information.
2. The Superintending of Police, Gomati District, Tripura for kind information.
3. The District Forest Officer, Gomati District, Tripura for kind information. It is requested kindly attend the above meeting(s).
4. The Superintendent Engineer, PWD (NH), Gurkhabasti, Agartala for kind information. It is requested kindly attend the above meeting(s).
5. The Sub-Divisional Magistrate, Amarpur, Gomati District, Tripura for information. It is requested kindly attend the above meeting in your Sub-Division.
6. The Sub-Divisional Magistrate, Karbook, Gomati District, Tripura for information. It is requested kindly attend the above meeting in your Sub-Division.
7. The Sub-Divisional Police Officer, Ompi, Gomati District Tripura for information.
8. The Sub-Divisional Police Officer, Amarpur, Gomati District Tripura for information.
9. The Sub-Divisional Police Officer, Karbook, Gomati District Tripura for information.
10. Enviro Infra Solutions Pvt. Ltd. 301,302 & 305 Sri Ram Business Centre, Plot No. INS-12, Sector -9, Vasundhara, Ghaziabad - 201012.
11. The Project Manager, Technocrats Advisory Services Pvt. Ltd. for information. It is also directed to attend the above meeting(s).



NHIDCL/BO Agt/DPR/12(6)/2016-17/543-51 Date: - 02-12-2020

To,
The Competent Authority for Land Acquisition
(Addl. District Magistrate & Collector)
South Tripura District
Tripura

Sub:- Improvement/Widening of two lane with paved shoulder of Khowai to Sabroom section of newly declared NH - 208/JICA Funding/Public/Stakeholders Meeting-reg.

Sir,

National Highways Infrastructure Development Corporation Limited (NHIDCL) has decided to take up the development of various NH stretches/Corridors in the country where intensity of traffic increased significantly and there is a requirement of augmentation of capacity for safe and efficient movement of traffic. In pursue of the above, the present section of NH-208 has been considered for upgradation.

2. The proposed road alignment from Khowai to Sabroom is divided in to 2 sections i.e. Khowai to Teliamura (Section 1) and Teliamura to Sabroom (Section 2). The project road has design length of 134.71km. Both sections are part of the NH-208. The project road runs through Khowai, Gomati and South Tripura districts of Tripura.

3. The Public/Stakeholder hearing meetings in all the three project benefits districts will be carried out involving relevant stakeholders and Government Dept., before the commencement of the project. The objective of stakeholder consultation is to provide or disclose information about the proposed project to the public/stakeholders and to collect information, ideas, opinions and insights for environment point of view.

4. As a programme of Public/Stakeholders meeting, the following meetings have been fixed in South Tripura District:-

Sl No.	Date & Time	Name of District	Venue of Public Hearing Meeting
1	14.12.2020 from 10.00 a.m. to 12.30 p.m.	South Tripura	Rupaichari community hall, Rupaichari, Tripura
2	14.12.2020 from 2.00 p.m. to 4.30 p.m.	South Tripura	Harina Bazar Community Hall, Harina, Tripura 799143

5. Being a Stakeholder, You are requested kindly attend the above meeting(s) or send your representative to make the Public Hearing meeting grand success.

Yours faithfully

(Trivendra Kumar)
General Manager (Project)

Copy to:-

- The DM & Collector, South Tripura District, Tripura for kind information.
- The Superintending of Police, South Tripura District, Tripura for kind information.
- The District Forest Officer, South Tripura District, Tripura for kind information. It is requested kindly attend the above meeting(s).
- The Superintending Engineer, PWD (NH), Gurkhabasti, Agartala for kind information. It is requested kindly attend the above meeting(s).
- The Sub-Divisional Magistrate, Sabroom, South Tripura for information. It is requested kindly attend the above meeting in your Sub-Division.
- The Sub-Divisional Police Officer, Sabroom, South Tripura for information.
- Enviro Infra Solutions Pvt. Ltd. 301,302 & 305 Sri Ram Business Centre, Plot No. INS-12, Sector -9, Vasundhara, Ghazalabad - 201012.
- The Project Manager, Technocrats Advisory Services Pvt. Ltd. for information. It is also directed to attend the above meeting(s).

2nd Floor of Rani Das Building, AA Road, Teliamura, Khowai District, Tripura -799205
E-mail : gmtripura@nhidcl.com

The Table 7-106 shows the schedule, locations, nos. of people attended public/stakeholders consultation and along with the observations.

All the presentations during public/stakeholder consultations were conducted in Bengali (local language) and Hindi. Questions and Answers were raised during meeting in Bengali and Hindi as well. Most questions were about land and livelihood impact and PAP's were curious to know the process of Land Acquisition, Compensation Timeline, vocational skills and training and any other Govt. schemes as maybe applicable. Questions raised during public/stakeholder with their replies are presented in Table 7-107.

There was no declaration from participants against the project itself during the consultation. All their concerns, comments, newly detected impacts were discussed and reflected to the EIA report, EMP-EMoP, RAP, the action plan for Scheduled Tribe in this chapter. Photographs and attendance sheet for the stakeholder consultation at the Draft Final Report level at all the six locations are shown in Figure 7-56 and Figure 7-57 respectively.

Table 7-106: Schedule, Locations, nos. of people attended Public/Stakeholders Consultation and along with the observations

S. No	Stake holder Meeting Location/Venue	Date and time	No of attendees	Area Coverage	Observations
1.	Khowai: Hachwkni Kharang Community Hall, Bachaibari, Khowai, Tripura	10.12.20 20 from 10.00 a.m. to 12.30 p.m.	42	District Khowai	Attendees including local representatives of various groups and individuals, Panchayat heads and members were well aware of widening and strengthening of the road. They all were keen to know about the compensations process and opportunities of upgrading livelihood by way of employment, Reskilling and better civic amenities
2.	Khowai: Kalyanpur Community	10.12.20 20 from 2.00 p.m.	45	District Khowai	Attendees including local representatives of various groups and individuals, Panchayat

	Hall, Kalyanpur, Khowai, Tripura	to 4.30 p.m.			heads and members were well aware of widening and strengthening of the road. They all were keen to know about the compensations process and opportunities of upgrading livelihood by way of employment, Reskilling and better civic amenities
3.	Gomati: Community hall Lalgiri, Tripura	11.12.20 20 from 10.00 a.m. to 12.30 p.m.	42	District Gomati	All the Attendees were well aware of the project and benefits of road widening. PAP's had similar questions as were asked at Khowai meetings and most of them were satisfied with the answers. Govt. officials presence made the stakeholder meeting interactive and fruitful.
4.	Gomati: Community hall, Suknachari, Tripura	11.12.20 20 from 2.00 p.m. to 4.30 p.m.	55	District Gomati	All the Attendees were well aware of the project and benefits of road widening. PAP's had similar questions as were asked at Khowai meetings and most of them were satisfied with the answers. Govt. officials presence made the stakeholder meeting interactive and fruitful.
5.	South Tripura: Rupaichari Community Hall Rupaichari, Tripura (India)	14.12.20 20 from 10.00 a.m. to 12.30 p.m.	37	District South Tripura	All the Attendees were very well aware of the project and benefits of road widening. PAP's had questions with the Govt. officials and most of them were satisfied with the answers. Govt. official's presence made the stakeholder meeting interactive and fruitful.
6.	South Tripura: Harina Bazar Community Hall, Harina, Tripura	14.12.20 20 from 2.00 p.m. to 4.30 p.m.	69	District South Tripura	All the Attendees were very well aware of the project and benefits of road widening. PAP's had questions with the Govt. officials and most of them were satisfied with the answers. Govt. official's presence made the stakeholder meeting interactive and fruitful.

Table 7-107: Questions raised during stakeholders consultation

S.No.	Questions	Reply
District Khowai		
1	My shop is being impacted by the road which is in urban area	Provisions as per RFCTLARR-2013 will be applicable and necessary compensation will be provided two times of circle rate.
2	We are farmers in this land since generations but don't have any papers of land.	The compensation will be disbursed as per RFCTLARR-2013 and for local rate, please check with your local SDM / ADM office.
3	My house is in forest land and I also have tree planted at my home premises, how I can be compensated.	The compensation will be given for structure & tree as per RFCTLARR-2013.
4	Rate of standing crops being damaged	Provisions as per RFCTLARR-2013 will be applicable and accordingly compensated
5	Our Rubber trees are being impacted which are on leased government land. Compensation is given for land or not	The compensation for Tree will be given not for land.
6	Any plan for training and reskilling of effected people?	NHIDCL conducts multiple training from time to time for local PAP in conjunction with local administration and contractors.
District Gomati		
1	We will face difficulties during road constructions, how our problems will be solved.	During constructions all precautions will be taken as per Environment Management and safety Plan. To address the issues ,A District level Grievance Redressal Committee will be formed to address any issue related to the project and compensation
2.	What is the width of road and proposed length of the project.	Information are disseminated in village panchayat ,however the width of the road is two lane (7m) with paved shoulders(1.5m on both side).The project length is approximately 134 Km. The RoW of road varies from 30 to 40 Meter.
3	A widow asked about that how her home will be rebuilt as she is the only survivor in her family.	NHIDCL official replied that compensation will be done as per RFCTLARR-2013 and all benefits of vulnerable family will be given, and the participants were satisfied with the answer.
4.	Lot of road side tree will be cut ,how these will be compensated.	The plantation will be done as per compensatory plantation programme in consultation with forest Department and NPV(Net present Value) will be given to forest department
District South Tripura		
1	Have non-title holder Patta for rubber plantation. What will be the methodology to arrive at suitable compensation for the rubber plantation?	The compensation will be given for plants not for land, however applicable benefits as per RFCTLARR-2013 will be given
2	How are we protected due to dust generated by road construction.	Regular water sprinkling will be done and environmental monitoring will be done to check air pollution during construction phase.
3	Have no title documents but have standing crop, Rubber Plants, what will be the compensation process?	NHIDCL officials and SDM, explained him the provisions of The Right to fair compensation and transparency in land acquisition, rehabilitation and resettlement act, 2013 (RFCTLARR 2013) will be applicable for livelihood impact.
4	My boundry wall is affected. Is there a provision for us to get compensation and rehabilitation as per policy?	Provisions as per the RFCTLARR-2013 Also, NHIDCL ensures that road, shoulder & ROW are maintained before any structure is

impacted/exempted. Compensation for wall will be given.

Figure 7-56: Photographs during the DFR level stakeholders consultation











Figure 7-57: Attendance sheet during second stage public/stakeholder consultation
(N/A)

7.11.4 Plan for further Consultation

(1) Plan for further Consultation in the Project

The effectiveness of the resettlement and rehabilitation program is directly related to the degree of continuing involvement of those affected by the Project. Several additional rounds of consultations with PAPs will form part of the further stages of project preparation and implementation. A local NGO will be entrusted with the task of conducting these consultations during implementation, which will involve agreements on compensation, assistance options, and entitlement package and income restoration measures suggested for the sub-project. The consultation will continue throughout the project implementation. The following set of activities will be undertaken for effective implementation of the plan:

- In case of any change in engineering alignment planning the PAPs and other stakeholders will be consulted in selection of road alignment for minimization of resettlement impacts, development of mitigation measures etc.
- Together with the NGO, the Project Management Unit (PMU) will conduct information dissemination sessions in the project area and solicit the help of the local community/leaders and encourage the participation of the PAP's in Plan implementation.
- During the implementation of , NGO will organize public meetings, and will appraise the communities about the progress in the implementation of project works, including awareness regarding road construction.
- Consultation and focus group discussions will be conducted with the vulnerable groups like women, SC, ST, and OBC's to ensure that the vulnerable groups understand the process and their needs are specifically taken into consideration.
- To make reasonable representation of women in the project planning and implementation they will be specifically involved in consultation.

The second stage stakeholder consultation will be done after completion of full census survey of the affected people and disclosure of summary for final draft SIA and resettlement and rehabilitation reports to the stake holders and in project affected villages.

(2) Information Disclosure

To keep more transparency in planning and for further active involvement of PAPs and other stakeholders the project information will be disseminated through disclosure of resettlement planning documents. The EA will submit the following documents to NHIDCL for disclosure on NHIDCL's website:

- The final resettlement plan endorsed by the EA after the census of displaced persons has been completed;
- A new resettlement plan or an updated resettlement plan, and a corrective action plan prepared during project implementation, if any; and
- The resettlement monitoring reports.

The EA will provide relevant resettlement information, including information from the above mentioned documents in a timely manner, in an accessible place and in a form and language(s) understandable to affected persons and other stakeholders. A resettlement information leaflet containing information on compensation, entitlement and resettlement management adopted for the project will be made available in local language (Hindi) and distributed to PAPs.

7.12 Climate Change Analysis

(1) Emissions of CO₂

Using the HDM4 model with the parameters of the prospected transport volumes and speeds, the analysis for the CO₂ emissions has been calculated from 2022-2041.

The result has shown that all the with emissions are less than without scenario. We can conclude that “with scenario” will contribute to the better environmental conditions of the area than “without scenario”.

Table 7-108 CO₂ emissions in 2022 -2041 (Tonnes)

	WITHOUT PROJECT	WITH PROJECT	Difference (With-Without)
	Carbon dioxide	Carbon dioxide	Carbon dioxide
	CO2 (tonnes)	CO2 (tonnes)	CO2 (tonnes)
2022	8,197	8,197	-
2023	8,831	7,047	- 1,783
2024	9,537	6,911	- 2,625
2025	44,679	30,777	- 13,902
2026	52,562	35,620	- 16,942
2027	63,099	41,306	- 21,793
2028	74,005	47,970	- 26,035
2029	86,576	55,776	- 30,800
2030	103,466	64,953	- 38,513
2031	108,707	68,225	- 40,482
2032	116,150	71,669	- 44,481
2033	123,368	75,286	- 48,082
2034	134,239	79,094	- 55,146
2035	145,293	83,106	- 62,187
2036	159,922	87,652	- 72,270
2037	176,538	91,445	- 85,093
2038	197,467	97,550	- 99,917
2039	228,834	102,561	- 126,273
2040	237,337	107,823	- 129,513
2041	241,840	113,143	- 128,697

Source: JICA Survey Team

(2) Adaptation measures

Reduction and destruction of operability of important road infrastructure facilities due to extreme weather

Closure of roads due to sediment landslides and mud flow into roads, and the consequent social impacts

Safety deterioration of roads due to inflow of sediment and landslide, and damage to infrastructure.

Closure of transportation instruments and reduction in return on investment due to road closures

Flooding causes river migrations in fans and flooding of roads

Thunderstorm rain and sea level rise in coastal areas

Progression of corrosion due to increased salinity

Road erosion, seawater inundation, or seawater influx into groundwater due to increased waves and floods, and the incidence of groundwater flooding associated therewith

Damage to coastal infrastructure protection equipments, including roads, due to the increase in storm surges and high waves. Induction of collapse of abutments and embankments.

Effects of temperature and precipitation pattern changes

Deterioration of construction efficiency due to shortage of water supply during construction

Penetration of water into the filler due to increase in groundwater content and the collapse of roads associated therewith

Permanent flooding of roads due to surface waters and groundwater flooding (increase water level)

Damage to bridges due to increased debris flow in the catchment of water

Damage to the infrastructure due to strong winds

Damage of vertical signs (signs, etc.) due to strong winds

Increase in accidents and road closures caused by fallen trees

The following are examples of adaptation options for hard and soft surfaces in the road sector.

Hardware Adaptation Options

Rehabilitation of infrastructure to ensure protection, redesign or relocation of road facilities

Protect roadway corridors by installing physical protection structures such as revetments and levees (such as revetment equipments)

Introduction of enhanced drainage systems that can cope with heavy rains and flooding

Consider future temperature changes when selecting asphalt cements and emulsions

Soft adaptive options

Provides road access to hospitals and shelters, and enables the distribution of medical supplies, especially in emergencies

Improve early warning systems and hazard maps for floods, storms, and soil engineering risks
When introducing it into the actual target area, consider the technical feasibility, cost-effectiveness,

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Chapter 8. Implementation Plan

8.1 Procurement Plan

8.1.1 Development of Procurement Model for Road Projects in India

The Government of India (GOI) has decided to build national highways with Public Private Partnership (PPP) scheme since 2005, and has been using the build-operate-transfer (BOT) model for the procurement contracts. However, the GOI faced problems such frequent cost and time overrun because of aggressive bidding, stretched financial position of road developers, and decelerating global and domestic economic growth.

Due to these problems, the GOI has frequently had unsuccessful biddings and contractual defaults which have led to a review of the contract models. Under such circumstance, MORTH has decided to shift from the PPP models to road construction using government funds.

In 1980's GOI ceased using the conventional contract model of design-bid-build (DBB) and instead, conducted research and developed the "Standard Agreement for Road & Bridge Works on Engineering-Procurement-Construction (EPC) Model" in 2012, referring to "Conditions of Contract for EPC/Turnkey Projects (1/1999)" by FIDIC. The EPC contract model has been being used for more than 80% of national highway projects since 2013.

8.1.2 Review of Model EPC Contract and Bidding Process

The EPC contract places overall responsibility for the design and construction of the project on the contractor. Therefore, it is used when the certainty of price and completion date is important. It allows the client to have greater certainty as to a project cost, while the contractor assumes greater time and cost risks.

ADB, WB, and JICA have been conferring with GOI on alterations of the Indian EPC Standard Agreement for financing national highway projects. In response to this, the GOI published a Modified RFP Document on January 16, 2017 and Modified Standard Agreement on January 17, 2017. In March, 2019, MORTH issues the circular amended standard EPC Agreement document incorporating various amendments made from time to time.

For national highway development project by NHIDCL, bidders are normally required to submit bids within 30 to 45 days from the notice of tender invitation which is too short and at least 75 to 90 days should be given to prepare proper proposal. NHIDCL adopts Single-Stage Two-Envelope System. In case of JICA loan projects, time for JICA concurrence in accordance with the Loan Agreement shall be considered at required steps.

(1) Review Bidding Process

(a) Standard Bidding Document

Bidding Process is stipulated in 'Standard RFP for NH and Centrally sponsored road works proposed to be implemented on EPC Mode' dated 5th March 2019 issued by Ministry of Road Transport & Highways of Government of India.

(b) Standard Bidding process

The Authority has adopted a single stage two part system for selection of the Bidder for award of the Project. Under this process. The bid shall be invited under two parts. Eligibility and qualification of the Bidder will be first examined based on the details submitted under first part (Technical Bid) with respect to eligibility and qualifications

criteria prescribed in RFP (the above Standard Bidding Document is amended to adopt particular project)

The Financial Bid under the second part shall be opened of only those Bidders whose Technical Bids are responsive to eligibility and qualifications requirements as per the RFP. Generally, the Lowest Bidder shall be the selected Bidder. Unless the Lowest Bidder withdraws or is not selected for whatsoever reason. The Authority shall annul the Bidding Process and invite fresh Bids in case the Lowest Bidder has withdrawn.

The First Part-Technical Bid. The following information shall be provided
In accordance with the Forms attached to the Bidding Document, but not limited

- i) Detail of Bidder
- ii) Technical Capacity
- iii) Financial Capacity
- iv) Annual Turnover
- v) Detail of Past Eligible Projects
- vi) Failed project List
- vii) Others such as JV information

(c) Brief Process up to Signing of Contract

1. Invitation of RFP (Request for proposal)
2. Authority receives queries
3. Pre-Bid meeting
4. Authority response to queries
5. Bidding with Bid Security
6. Opening First Part- Technical Bids (First Part)
7. Declaration of eligible /qualified Bidders
8. Opening Second Part- Financial Bid (Determination of the Lowest Bidder)
9. Letter of Acceptance
10. Submission of Performance Security
11. Signing of Agreement

Conclusion

The Bid process and the content of Instruction to Bidders is similar to ‘Option B-Two Envelope without Prequalification of Standard Bidding Document under ODA Loan’.

8.1.3 Selection of Consultant

Consultant for supervision services (Authority’s Engineer) will be procured by International Competitive Bidding (ICB) following the Guidelines for the Employment of Consultants under Japanese ODA Loans, April 2012. Selection of consultant starts from the announcement of Expression of Interest (EOI), then evaluation of EOI and shortlisting, issue of the Request for Proposal (RFP), evaluation of technical proposal, evaluation of financial proposal, contract negotiation and signing and award of the Contract. In each step, no objection from JICA should be obtained. The consultant service is to be one package only.

8.1.4 Packaging Plan and Selection of Contractors

The total design length of the Project is 54.154km which is divided into 5 construction packages, package no.1 on Srirampur side and package no. 6 on Dhubri side, and Local Competitive Bidding (LCB) is planned. It is NHDCL’s intention to encourage participation of local contractors from the Northeast region and therefore it is divided into smaller packages considering the capacity

and experience of local contractors. Summary of work item and quantities are indicated below. Tenders for all the package are planned to be implemented and construction works will commence at the same time. In each step of the bidding, no objection from JICA should be obtained in accordance with the Loan Agreement,

Table 8-1: Summary of Work Item and Quantities by Package

To be inserted.

Source: DPR, summarized by JICA Survey Team

8.2 Project Implementation Framework

8.2.1 Organization of NHIDCL

NHIDCL, as a fully owned company of MORTH was established on January 01, 2015 and it promotes surveys, planning, designs, constructions, operations, maintenance and improvements of national highways and strategic roads such as cross border roads sharing international boundaries with neighboring countries. NHIDCL is still young and is expanding with new recruitments to fill vacant planned positions.

NHIDCL headquarters is based in Delhi, and the operation of the organization is managed by the Board of Directors consisting of a Chairman, Managing Director, and Directors. Under the Board of Directors, there are the Executive Director, General Managers, Deputy General Managers, Managers, Deputy Managers and Office Assistant.

There is a regional office in Guwahati with Executive Director and Deputy General Manager. In each state, Office Manager and Deputy General Manager are assigned.

The financial status of NHIDCL is shown in the table below. Revenue from operation consists of agency charge (1% on compensation for land acquisition, forest clearance and utility shifting etc., 3% on DPR preparation, civil works and contingencies, and 9% on maintenance of highways). Other income includes interest income, other miscellaneous income and profit on sales of fixed assets. Total expenditure includes employee benefit, bank charges and other expenses such as rent, advertisement, outsources manpower, travelling, CSR etc. Profit after tax has been increasing and recorded approximately 776 million yen in FY 2019.

Table 8-2: Financial Status of NHIDCL

Particulars	FY19 in JPY. (1.4.2018-31.3.2019)	FY18 in JPY. (1.4.2017-31.3.2018)	FY17 in JPY. (1.4.2016-31.3.2017)	FY16 in JPY. (1.4.2015-31.3.2016)
Revenue from Operations	1,878,420,058	1,368,434,858	622,920,261	345,396,550
Other Income	125,908,665	97,126,677	104,955,018	133,910,462
Gross Receipts	2,004,328,723	1,465,561,535	727,875,279	479,307,012
Total expenses excluding depreciation*	817,365,000	584,767,433	401,800,293	218,293,543
Profit before Depreciation and Tax	1,186,963,723	880,794,102	326,074,986	261,013,469
Depreciation*	22,475,000	18,965,984	14,819,138	8,260,431
Profit after depreciation	1,164,488,723	861,828,118	311,255,849	252,753,038
Prior Period Expenditure*	57,275,000	144,884	2,738,583	-
Profit before Tax and after Prior Period	1,107,213,723	861,683,234	308,517,266	252,753,038
Provision for Tax including deferred tax*	330,310,000	299,213,152	109,072,502	89,937,536
Profit after tax	776,903,723	562,470,081	199,444,764	162,815,502

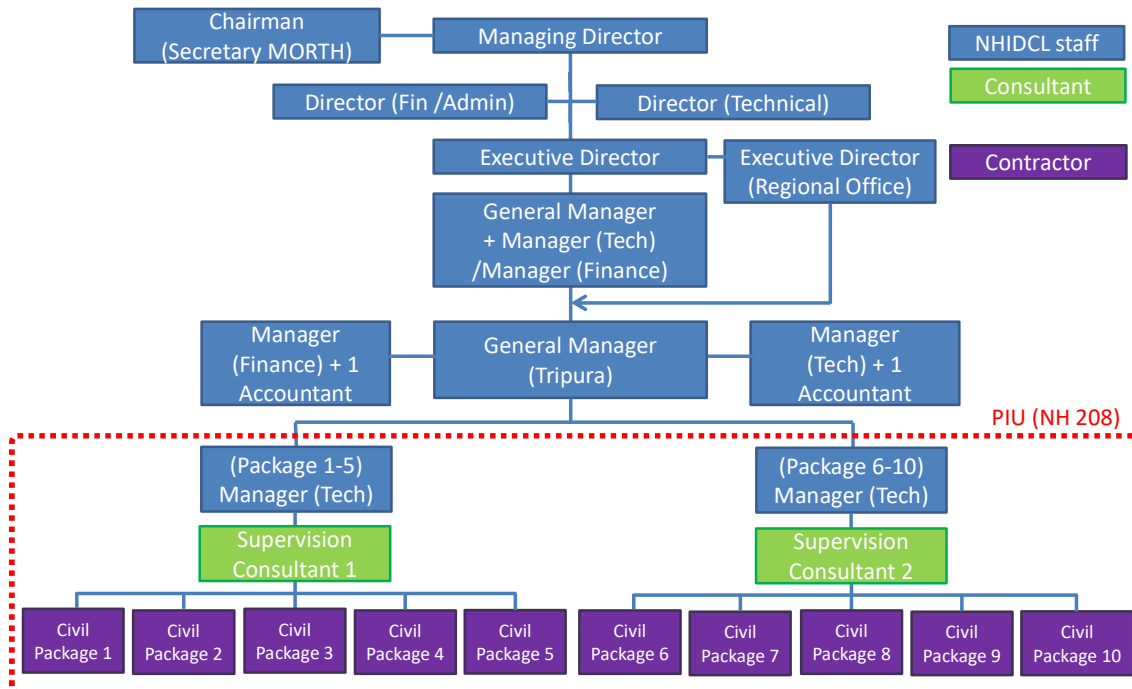
INR=1.45 JPY

Note: for items with * for FY19, rounded up figures are presented as the precise numbers were not available in the annual report

Source: JICA Study Team based on NHIDCL's annual report

8.2.2 Project Implementation Unit

The structure of proposed project implementation unit (PIU) is shown below. Under the supervision of NHIDCL HQ, GM of NHIDCL Tripura will be responsible for the PIU whose Manages (technical) will oversee the contractor and consultant for each package.



Source: JICA Study Team

Figure 8.1: Project Implementation Structure

8.2.3 Supervision Consultant

As mentioned in Section 8.1.3, the supervision consultant is expected in two package. Each team is lead by the Team leader, respective designers who will review and verify the Contractors' detailed design and the supervision team who will be responsible for all the packages as well as back support staff. For site supervision of each package, Resident Engineer/Highway Engineer and Material/QC Engineer as well as field engineers, surveyors, laboratory technicians and CAD engineers will be deployed. For the second package, Slope Protection Experts will be deployed. Proposed list of experts for each consultant service package is shown below.

Consultant Package 1 (Work Package 1-5)	Consultant Package 2 (Work Package 6-10)
IE1: Team Leader/Senior Highway Engineer	IE4: Team Leader/Senior Highway Engineer
IE2: Senior Environmental Expert	IE5: Senior Slope Protection Expert
IE3: Senior Safeguard Expert	IE6: Senior Environmental Expert
LE1: Highway Design Engineer	IE7: Senior Safeguard Expert
LE2: Geotechnical Engineer	LE13: Highway Design Engineer
LE3: Hydraulic Engineer	LE14: Geotechnical Engineer
LE4: Bridge/Structure Engineer	LE15: Slope Protection Engineer
LE5: Quantity Surveyor	LE16: Hydraulic Engineer
LE6: E&M Engineer	LE17: Bridge/Structure Engineer
LE7: Environmental Expert	LE18: Quantity Surveyor
LE8: Social Safeguard Expert	LE19: E&M Engineer
LE9: Senior Contract Expert	LE20: Environmental Expert
LE10: Resident Engineer/Highway Engineer x 5	LE21: Social Safeguard Expert
LE11: Material/QC Engineer x 5	LE22: Senior Contract Expert
LE12: Traffic survey and Analysis Expert	LE23: Resident Engineer/Highway Engineer x 5
SS1: CAD Engineer x 6	LE24: Material/QC Engineer x 5
SS2: Field Engineer x 15 (3 nos/package)	LE25: Traffic survey and Analysis Expert
SS3: Surveyor x 5 (1 no/package)	SS9: CAD Engineer x 6
SS4: Laboratory Technician x 5 (1 no/package)	SS10: Field Engineer x 15 (3 nos/package)
SS5: Office Manager	SS11: Surveyor x 5 (1 no/package)
SS6: Secretary x 6	SS12: Laboratory Technician x 5 (1 no/package)
SS7: Accountant	SS13: Office Manager
SS8: Office Boy x 6	SS14: Secretary x 6
	SS15: Accountant
	SS16: Office Boy x 6

Source: JICA Survey Team

8.3 Project Implementation Schedule

A proposed implementation schedule for the Project is shown below. Assuming that the loan agreement will be signed by December 2020, the construction work can commence from March 2022 and completed by February 2024.

Month	2020	2021	2022	2023	2024	2025	2026	2027	2028
Approval	1								
Pledge	1								
Signing of Loan Agreement	1								
Procurement of Consultant	12								
- Preparation of RFP	3								
- No Objection by JICA	1								
- Advertising	2								
- Technical Bid Evaluation	1								
- No Objection by JICA	1								
- Price Bid Evaluation	1								
- No Objection by JICA	1								
- Contract Negotiation	1								
- No Objection by JICA	1								
0	0								
Consulting Services (Package 1-5 and Package 6-10)	84								
1) SF For Package 1-5	6								
Detailed Design Review	6								
Construction Supervision (24 units)	24								
Maintenance Period (5 years)	60								
2) SF For Package 6-10	6								
Detailed Design Review	6								
Construction Supervision (24 units)	24								
Maintenance Period (5 years)	60								
Detailed Design Review	6								
Construction Supervision (24 units)	24								
Maintenance Period (5 years)	60								
Procurement of Contractor (Package 1-10)	11.5								
Preparation of Bidding Document (2M)	2								
Bidding Document Preparation & Submission (2M)	2								
Technical Evaluation (2.5M)	2.5								
Financial Evaluation (1M)	1								
Contract Negotiation (1M)	3								
JICA Consensus to Contract (1M)	3								
Land Acquisition	16								
Package 1	24								
Package 2	24								
Package 3	24								
Package 4	24								
Package 5	24								
Maintenance	60								
Shifts of Utilities	12								
Environment Mitigation and Monitoring	24								

Source: JICA Study Team

Figure 8.2: Proposed Implementation Schedule

The timing of each process of the implementation schedule is based on the following assumptions:

(1) Signing of Loan Agreement

The signing of the Loan Agreement between GOI and GOJ will be done by the end of December, 2020.

(2) Bid Document Preparation

The bid documents have already been drafted by the DPR consultants, and it will be finalized by NHIDCL by the end of May, 2021.

(3) Resettlement, Land Acquisition & Compensation

A consultant for RAP (Resettlement Action Plan) will be procured by NHIDCL and the Tripura State Government will complete the resettlement, land acquisition and compensation by the end of June 2022. According to a circular notice from MORTH, land acquisition of ROW must be reach 80% before the public announcement of the bidding and 90% before awarding the civil works.

(4) Consultant Procurement

NHIDCL will commence the procurement of a consultant service for construction supervision services (authority’s engineer) after the loan agreement is signed between GOI and GOJ. It can start after the pledge of the yen loan to GOI is made by JICA if GOI wishes to expedite. The awarding of the consultant service should be done by the end of February, 2022.

The procured consultant will assist NHIDCL in all stages during construction supervision service including the five years of maintenance period.

(5) Civil Works

The procurement of the contractors for civil works will be completed by February, 2022 and the contractors will commence the detailed engineering design followed by the physical works. The construction period including detailed design is 24 months for all packages until February, 2024. Five (5) years of maintenance period will follow the completion of the works until February, 2029.

8.4 Operation and Maintenance Plan

The EPC contractors of each package will be responsible for the maintenance of the road for 5 years after the completion of the construction works. The contractor will be obliged to prepare (in consultation with the engineer of NHIDCL) a maintenance program prior to the month in which the O&M will commence. The contractor will also be obliged to conduct a road inspection together with the authority's engineer. The required maintenance level shall be based on the Schedule-E Maintenance Requirement of the contract. The contractor's obligation based on the contract will include the following items during the period of the maintenance.

- Permitting safe, smooth and uninterrupted flow of traffic on the Project Highway
- Undertaking routine maintenance including; prompt repairs of potholes, cracks, joints, drains, embankments, structures, pavement markings, lighting, road signs and other traffic control devices
- Undertaking repairs to structures
- Informing the Authority of any unauthorized use of the Project Highway
- Informing the Authority of any encroachments on the Project Highway
- Operation and maintenance of all communication, patrolling, and administrative systems necessary for the efficient maintenance of the Project Highway in accordance with the provisions of the contract

Besides the fund from GOI including MDoNER, SARDP etc., NHIDCL also receives fund for maintenance and repair of highway such as special repair funds (SRF). The amount of SRF has been increasing and was 168 Crore INRs in 2017-18 and 89 Crore INRs in 2018-19. NHIDCL also outsource routine maintenance works of the existing road and so far according to the annual reports, such contracts have been awarded in states like Manipur, Andaman and Nicobar islands, Uttarakhand, Sikkim, Jammu and Kashmir.

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Chapter 9. Economic Analysis

9.1 Overview

In this chapter, economic analysis of NH208 Teliamura to Sabroom (Tripura) was carried out. The analysis took into consideration, among other things, the demand forecast, project scope, project cost, and implementation schedule. Economic internal rate of return (EIRR) was used as an indicator of the analysis which was calculated using the costs and benefits of the Project estimated by comparing the with- and without-project cases. The evaluation period was set at 20 years from the estimated start of the Project in 2022 to 2041. The methodology and results are presented below.

The result of the analysis indicates that the estimated economic return is high enough to justify the implementation of the Project for improvement of NH208 (Tripura) from the perspective of India's national economy.

9.2 Methodology

In the economic analysis, costs and benefits were estimated by comparing the with- and without-project cases. Two types of benefits quantified in the economic analysis include travel time cost (TTC) savings, and vehicle operating cost (VOC) savings, both of which were generally used in road projects. These benefits were calculated using the equations below:

$$(\text{TTC Savings}) = \text{TTC}_o - \text{TTC}_w$$

$$\text{TTC}_i = \sum_j \sum_i (Q_{js} \times T_{ijs} \times \alpha_j) \times 365$$

$$(\text{VOC Savings}) = \text{VOC}_o - \text{VOC}_w$$

$$\text{VOC}_i = \sum_j \sum_i (Q_{js} \times L_{is} \times \beta_{ij}) \times 365$$

Where

TTC _i	: Travel time cost in case <i>i</i> (Rs./year)
VOC _i	: Vehicle operating cost in case <i>i</i> (Rs./year)
Q _{js}	: Traffic volume of vehicle type <i>j</i> on section <i>s</i> (vehicle/day)
T _{ijs}	: Travel time of vehicle type <i>j</i> on section <i>s</i> in case <i>i</i> (hr)
L _{is}	: Length of section <i>s</i> in case <i>i</i> (km)
α _j	: Unit value of TTC of vehicle type <i>j</i> (Rs./hr-vehicle)
β _{ij}	: Unit value of VOC of vehicle type <i>j</i> in case <i>i</i> (Rs./vehicle-km)
<i>i</i>	: Without-Project case (<i>O</i>) and With-Project case (<i>W</i>)
<i>j</i>	: Vehicle types
<i>s</i>	: Section

9.3 EIRR Estimation

9.3.1 Cost

Based on the following assumptions, the economic costs of the investment were calculated for each year.

- **Project cost:**
 - The Project cost is a total of construction costs, costs for shifting of utilities and environmental mitigation, consulting services cost, physical contingencies, land acquisition cost, and administration/agency costs. Taxes and duties as well as resettlement costs are excluded from economic costs as these are transfer payments.⁵⁸ Land acquisition cost is initially added as Project cost but in the last year, 2041, deducted from the cost along with residual cost.
 - A total of these Project costs is calculated for each year during 2022-2023 (estimated 2-year construction period).
 - Maintenance cost during Defect Liability Phase, taken as 2.5% of the construction costs, is included by splitting it over the span of 5 years from 2024 to 2028.
 - The residual value of the Project road is estimated assuming that the average economic life of the road is 35 years.
 - A standard conversion factor of 0.85 is assumed to convert local currency portion of the financial costs to economic costs to account for price distortion.⁵⁹
- **Post-Project Road Maintenance Costs:**
 - The maintenance costs after the Project period are assumed to be generated equally in the with- and without-project cases, and therefore will offset one another. This is based on the assumption that, with road widening improvement, the surface area would be larger in the new/rehabilitated road than the existing road, while the existing road would require relatively large maintenance associated with the outdated infrastructure in the future.⁶⁰

9.3.2 Benefits

Both travel time cost (TTC) savings and vehicle operating cost (VOC) savings were estimated for each year using Highway Development and Management Model (HDM-4) version 2.1. Both TTC and VOC savings were calculated for normal traffic and diverted traffic (as discussed in Chapter 4 Traffic Survey, Analysis and Forecast), and the benefit was estimated as the sum of these savings. Major input figures by vehicle type used as basis for calculation of TTC and VOC savings for NH208 Tripura are presented in Table 9-1 and Table 9-2.

⁵⁸ Resettlement costs were not included following JICA, *IRR Calculation Manual*, September 2017.

⁵⁹ This was set based on Detailed Project Report (DPR) of each section prepared by the local DPR consultant. The Conversion Factor of 0.85 can be justified based on “*IRC:SP:3-2009 Manual on economic evaluation of highway projects in India*” and “*ADB Madhya Pradesh District Connectivity Sector Project (RRP IND 47270)*”.

⁶⁰ This assumption follows the assumption employed in JICA, Basic Information and Data Collection Study on Connectivity Improvement in North Eastern Region of India, Final Report – National Highway 208 (Kailashahar-Teliamura), February 2020.

Table 9-1: Unit Values for VOC by Vehicle Type for NH208 Tripura

(Unit: INR)

Vehicle Type	New Vehicle/ Purchase Cost	Replace Tyre	Fuel (per litre)	Lubr. Oil (per litre)	Maint-Labour (per hr)	Crew Wages (per hr)	Annual Overhead
Motorcycle	35,000	3,000	75.00	100.00	20.00	20.00	8,000
Small Car	350,000	4,000	70.00	100.00	30.00	60.00	25,000
Mini Bus	3,000,000	15,000	70.00	100.00	30.00	40.00	90,000
Heavy Bus	3,000,000	15,000	70.00	100.00	30.00	60.00	150,000
LCV	600,000	15,000	70.00	100.00	30.00	40.00	40,000
2-Axle truck	3,500,000	15,000	65.00	100.00	30.00	60.00	180,000
3 Axle truck	4,000,000	15,000	65.00	100.00	30.00	60.00	180,000
Multi Axle	4,500,000	20,000	65.00	100.00	30.00	40.00	90,000

Source: HDM-4 Input Data from Phase 4 JICA Survey

Table 9-2: Unit Values for TTC by Vehicle Type for NH208 Tripura

(Unit: INR)

Base Type	Passenger Work Time (per hr)	Passenger Non-Work (per hr)	Cargo Holding (per hr)
Motorcycle	100.00	30.00	0.00
Small Car	150.00	25.00	0.00
Mini Bus	60.00	10.00	0.00
Heavy Bus	50.00	10.00	0.00
LCV	0.00	0.00	15.00
2-Axle truck	0.00	0.00	60.00
3 Axle truck	0.00	0.00	60.00
Multi Axle	0.00	0.00	60.00

Source: HDM-4 Input Data from Phase 4 JICA Survey

Table 9-3: Vehicle Operating Speed

(Unit: km/hour)

Vehicle Type	Vehicle Operating Speed 2020	Vehicle Operating Speed 2025 ¹
Motorcycle	33	71
Small Car	33	72
Mini Bus	33	71
Heavy Bus	26	67
LCV	26	66
2-Axle truck	26	69
3 Axle truck	26	69
Multi Axle	26	68

Note 1: 2 years after estimated road improvement

Source: JICA Survey Team

9.4 Result of EIRR Estimation

Based on the above assumptions, economic costs and benefits were estimated for NH208 (Tripura), and an EIRR computed. Table 9-4 shows the calculation and results of the economic analysis. The EIRR is estimated at 17.18%, which exceeds the opportunity cost of capital that has often been assumed at 12% in India. This result indicates that the investment in the improvement of this Project section is economically viable and will benefit the national economy of India.

Table 9-4: Benefit and Cost Streams and EIRR for NH208 Tripura

(Unit: million INR)

Year	Project Cost	Project Benefit		Net Benefit Stream
		Motor Vehicles VOC saving	Motor Vehicles TTC saving	
2022	7,121	-	-	-7,121
2023	7,121	-	-	-7,121
2024	45	229.8	200.7	385
2025	45	1,019.2	289.8	1,264
2026	45	1,306.5	327.3	1,589
2027	45	1,775.5	382.0	2,112
2028	45	2,087.5	426.0	2,468
2029	-	2,432.6	486.8	2,919
2030	-	2,961.8	551.9	3,514
2031	-	3,082.5	588.3	3,671
2032	-	3,336.6	621.6	3,958
2033	-	3,528.9	663.9	4,193
2034	-	3,946.5	718.7	4,665
2035	-	4,276.1	768.5	5,045
2036	-	4,797.3	836.2	5,633
2037	-	5,160.0	907.6	6,068
2038	-	5,948.4	1,004.4	6,953
2039	-	7,132.1	1,120.0	8,252
2040	-	7,340.9	1,188.9	8,530
2041	-9,649	7,249.8	1,236.6	18,135

EIRR =17.18%

Source: JICA Survey Team

9.5 Sensitivity Analysis

The economic analysis involves the inevitable uncertainty concerning the precise values of key variables. Therefore, to examine the impact of changes in cost and benefit on the EIRR estimate, a sensitivity analysis was conducted. Table 9-5 shows the sensitivity of the EIRR for NH208 (Tripura) with respect to changes in the Project cost and benefit.

Table 9-5: Sensitivity of EIRR

Case	EIRR
(a) Base Case	17.18%
(b) Project Cost: 10% up	16.58%
(c) Benefit: 10% down	15.96%
(d) Combination of (b) and (c)	15.40%

Source: JICA Survey Team

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Chapter 10. Project Evaluation

10.1 Project Description

The existing road alignment of NH208 Khowai-Sabroom section is very poor, mostly single lane with poor riding quality. The target road starts at the future connecting point between the Khowai bypass and the NH108B in Khowai Districts of Tripura and ends at Harina near Sabroom. The Project alignment is separated at Teliamura with two separate sections with different chainages namely CH00+000 through CH108+670 and CH101+200 through CH127+319.

The first section ends in Trishabari before connecting to NH-44 (current NH-8) at Teliamura. Then the second section restarts from Ompi chowmuhani (T-Junction with NH-08 at Teliamura). To avoid congestion in Teliamura, a bypass of 1.3 km is proposed that starts at NH-08 (1.24 km from Khowai chowmuhani, towards Agartala) and merges at the existing CH2+580 of the Teliamura – Sabroom section. The Survey Road runs parallel to the international border (India – Bangladesh) for some portion of its length.

The total length is 26.119 km between Khowai and Teliamura and 108.670 km between Teliamura and Sabroom. The road will be improved to the 2 lane national highway standard, with 7 bypasses (22.600 km long in total) at Teliamura, Twidu, Ompi Nagar, Amarpur, Nutan Bazar, Jatan Bari, and Karbook.

The establishment of Tripura's first Special Economic Zone in Sabroom and the proposed link of Sabroom and Chittagong port in Bangladesh is expected to increase the traffic volume along NH208 and its importance for the regional connectivity.

A synergy with Phase 4 project by JICA is also anticipated in terms of regional connectivity improvement as the target road is extension of Phase 4 section.

10.2 Project Evaluation

10.2.1 Relevance of the Design

The original DPR had many issues especially the geometric design which was not in compliant with the IRC guidelines. The JICA Survey Team reviewed all aspects of the DPR in detail and assessed the potential landslide risks along the target road. Based on the result of the review and discussions with the DPR consultants, geometric design as well as all the other design components were modified and finalized.

The JICA Survey Team confirmed that the final design of NH208 Khowai-Sabroom section in the revised DPR has been properly conducted as per the relevant design guidelines and viable. Brief Summary of each design component is described in this section.

(1) Road Design

The DPR used IRCSP73-2015 for geometric design of the Survey Road which was modified as per IRCSP73-2018. With regards to the shoulder width, a circular titled "Width of shoulder (Paved and Earthen) for two laning of National Highways" issued by MORTH on 17 July 2020 is followed. Terrain classification confirmed as Mountainous are the three sections of CH4+850-CH12+000, CH13+600-CH15+200, CH85+100-CH98+000, and the remaining sections as Plain and Rolling.

The design speed should be the ruling 100 km/h and the minimum 80 km/h in plain/rolling terrain and the ruling 60 km/h and the minimum 40 km/h in mountainous terrain. The minimum speed

shall only be adopted where site conditions are restrictive and sufficient land width is not available, and such stretches (design speed other than ruling speed) shall be indicated as deviation in Schedule 'D' of the Concession Agreement.

As per IRCSP73-2018, Right of Way (ROW) of 30 m shall be acquired by the Authority for 2 laning highway, and for bypasses, ROW shall be 45-60 m depending upon the provision of the carriageway. The existing and proposed ROW shall be indicated in Schedule 'A' of the Concession Agreement. DPR designs show many sections with narrower ROW but the JICA Survey Team was informed by the DPR consultant that the proposed ROW has been confirmed and agreed with NHIDCL.

There are 27 horizontal curves that has smaller radius than the minimum radius stipulated by IRCSP73-2018, for which the DPR consultant presented justification. JICA Survey Team has found them acceptable.

On the vertical alignment design in the DPR, the JICA Survey Team pointed out i) longitudinal gradient of less than 0.3% is observed, ii) longitudinal gradient of more than Limiting Gradient of 6% is observed, and iii) frequent change of gradients is observed. All these have been corrected in the final design.

There are 4 proposed major at-grade intersections and 34 minor at-grade intersections on Khowai-Teliamura section, while there are a total of 451 junctions on Taliamura-Sabroom section out of which 191 junctions are retained and 260 junctions are to be newly constructed. All intersections are at grade. The DPR design is in compliant with relevant IRC guidelines.

The pavement design was in compliant with IRC 37-2018 and IRC SP37-2018. For Khowai-Teliamura section, the design traffic of 20msa and the design CBR of 8% are applied. The pavement structure is 30 mm thickness bituminous surface course with the unbounded base layer, Dense Bituminous Macadam (DBM) of 90 mm thickness, Wet Mix Macadam (WMM) of 250 mm thickness and Granular Sub-Base (GSB) of 200 mm thickness. For Teliamura-Sabroom section, the pavement structure is 30 mm thickness bituminous surface course with DBM of 50 mm thickness, Jhama Brick Base (JBB) of 150 mm thickness and Jhama Brick Sub Base (JBSB) of 200 mm thickness.

(2) Landslide issues and Slope Protection measures

The stratigraphy of target section consists from three types, namely i) the Dupitila Group which is distributed in the valley bottom plain like fluvial terraces and unconsolidated deposits, ii) the Tipam Group which is distributed in the undulating plain and weakly consolidated deposits, and iii) The Surma Group composed of soft rocks. The topographic survey by the stereo-view of satellite images in the hilly area revealed that the design alignment passes through landslide area at CH89+800 to CH90+500 and CH91+100 to CH91+600. To avoid the risk of landslide, the road alignment was modified not to pass through these areas.

Hydroseeding is suggested for slope protection measures in the DPR. However, it is to be noted that the Surma Group has some problems of long-term stability if cut slopes show dip slope structure and large scaled cut slopes are planned, and hydroseeding is not applicable for such conditions.

(3) Bridges and Structures

All the 32 existing bridges are out of the planned alignment and will be retained. The 46 additional bridges are proposed to be newly constructed on the realignment and bypass, with bridge length of between 10m to 75m. The design loads and stresses are considered as per IRC:6 including seismic forces, and all components of the structures are designed for a service life of 100 years

except for appurtenances. DPR design of superstructure and substructure including carriage way cross section, vertical clearance, scouring depth calculation and foundation design, etc. are in compliant with IRC guidelines.

At the time of construction, the fabrication yard and transport route need to be considered for PSC-T and RCC-T girders. Also, detailed arrangements need to be considered for attaching pipes (e.g., water pipes, electric cables) on bridges.

(4) Drainage Design

There are 232 nos. of existing culverts (162 pipe culverts, 51 slab culverts and 19 box bridges) along the target road. Among them 207 culverts are proposed to be reconstructed as box bridge and the remaining ones are omitted due to realignment. In addition, 34 new box bridges are proposed. The shapes of the box culverts are determined from the capacity calculation of the identifiable crossing channel. Based on the calculation, box culvert type is adopted for the cross drainage.

For the road drainage, the followings are designed.

- Footpath cum cover drain of 2.0m width has been proposed in built up area.
- Cover drain of 1.0m width has been proposed in ROB approaches for service road
- Brick Masonry drain has been proposed on hill side
- Catch water drain has been proposed on hill side for proper drainage purpose.

(5) Road Safety Measures and Appurtenances Plan

On the existing road, traffic signs are missing at many locations. No warning signs are installed before the approach of a junction and approach of curves. Directional signs are installed only at a few locations. To improve the safety and also the environmental conditions of the target road, the road appurtenances including metal beam crash barriers, guard posts, delineators, boundary stones, traffic signals, lightings, tree plantation etc. will be installed as per the relevant IRC guidelines.

10.2.2 Relevance of the Project

The project follows upper-level road network development plans of the Government of India. Economic analysis was conducted based on the traffic forecast and the estimated project cost and the EIRR is estimated at 17.8% as a base case, which indicates that the project is economically viable and will benefit the national economy.

10.3 Effectiveness of the Project

(1) Quantitative Effect

Keeping in view the indicators used up to Phase 4, the table below summarizes the performance indicators for this Project. Based on the traffic analysis and economic analysis, the performance parameters were estimated for the current year (2020) and the target year 2025, two years after the estimated completion of the improvement works.

Table 10-1: Project Evaluation Indicators

Performance Indicators	Baseline Value (2020)	Target Year Value (2025)
Average Travel Time (min)	245	90
Traffic Volume* (PCU/Day)		

<i>Km 42.300 (near Rangamati)</i>	1,600	3,600
<i>Km 88.000 (near Ailmara)</i>	200	3,100
<i>Km 132.800 (near Harina)</i>	250	,5000
<i>[Motorized Vehicles only + incl. diverted traffic]</i>		
Average Travel Cost (Rs./vehicle/km)		
<i>Passenger Car</i>	23.50	15.84
<i>2-Axle Truck</i>	58.62	42.04
No. of Passengers (000 Pax/year)		
<i>Km 42.300 (near Rangamati)</i>	1,815,000	2,664,000
<i>Km 88.000 (near Ailmara)</i>	224,000	328,000
<i>Km 132.800 (near Harina)</i>	257,000	377,000
<i>[incl. diverted traffic]</i>		
Freight Volume (000 tonne/year)		
<i>Km 42.300 (near Rangamati)</i>	338,000	968,000
<i>Km 88.000 (near Ailmara)</i>	48,000	859,000
<i>Km 132.800 (near Harina)</i>	43,000	1,352,000
<i>[incl. diverted traffic]</i>		

Source: JICA Study Team

(2) Qualitative Effect

The improvement of NH208 and link between Sabroom and Chittagong Port in Bangladesh is expected to improve the road network of the region and contribute not only in making more efficient and economical transportation of the goods across the North Eastern states but also in the regional/cross border movement for the local people and communities. In particular, the road can be beneficial for the tribal people to improve their access to the markets or nearby villages/towns to sell their products.

The horizontal alignment of the road was designed with the basic principle of best utilizing the existing alignment in order to minimize the land acquisition and resettlement. To ensure the road safety, importance of safety measures was emphasized and considered in the design by installing necessary safety facilities as per the relevant guidelines.

The project road includes mountainous terrain section and potential risk of landslides were identified. Road alignment was modified to avoid such area and by applying appropriate slope protection measures to other cut slopes, road safety can be ensured and prevent roadblock or accidents.

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Chapter 12. Conclusions and Recommendations

12.1 NH208 in Tripura

Tripura is a landlocked state in India and lies in a geographically disadvantaged location, as only one major highway, the National Highway 208 (NH208), connects it to the rest of the country. Five mountain ranges run north to south with intervening valleys. Agartala, the capital, is located on a plain to the west. The state has a tropical savanna climate, and receives seasonal heavy rains from the southwest monsoon. Forests cover more than half of the area, in which bamboo and cane tracts are common. Due to its geographical isolation, economic development in the state has been hindered.

The NH208 crosses Tripura state and extends to Chittagong, the second largest city in Bangladesh and the largest port city in Bangladesh. The NH208 is often called the lifeline of Tripura; however, the highway is single lane and of poor quality; landslides, rains or other disruptions on the highway often cut the state off from its neighbors. Tripura's geographical characteristics have long impacted its industrial development and economic growth due to: (i) isolation from the rest of the North Eastern India and Mainland India, (ii) vast forest coverage and mountainous geography, (iii) poor transport infrastructure, and (iv) a long international border shared with Bangladesh.

After the improvement of NH208, the JICA Survey Team expects that the Survey Corridor will not only receive diverted traffic from existing alternative routes but also new cross-border traffic. This new traffic is expected as a result of establishment of Tripura's first Special Economic Zone in Sabroom (announced in 2019) and because the Survey Corridor is considered as one of the planned freight transportation routes under the World Bank's Bangladesh Regional Connectivity Project 1 (expected completion in 2023) that connects Sabroom with Chittagong Port.

12.2 Detailed Project Report

The project road starts from Ompi Chowmuhani (T-Junction with NH-08 at Teliamura) and passes through Twidu, Sonacherra, Amarpur, Nutan Bazar, Karbook, Silachari, Ropaichari and ends at Harina (T-Junction with NH-08, 8.1 km away from Sabroom), traversing plain, rolling, and mountainous terrain. The Survey area lies in Khowai, Gomati and South Tripura districts. The existing length of the project road is 132.882 km and the design length will be 108.191 km after geometric improvement.

According to the final report of NH208 (Kailashahar–Teliamura) which was reported last year, the cut slopes composed of the Tipam⁶¹ and Dupitila Group are stable with gradients of 0.5H : 1V, while the topsoil collapses are often recognized. But the Surma Group, which is distributed on the hilly and mountainous terrains, is soft rocks composed of alternating siltstone and shale. The cut slopes with dip slope structure have a long-term stability problem. Furthermore, landslide prone topographies are found along the project road.

The NH208 is designed along the hilly and mountainous terrain surrounded mainly by agricultural areas. The construction involves upgrading of the existing roadway and new construction of bypasses. Traffic management of both residents and construction vehicles and protection of the natural and social environment are crucial during construction to smoothly proceed with road construction work. Special attention should be paid to drainage of road surface and construction site. The construction period should be carefully examined with respect to the rainy season when the earth work is difficult or impossible.

⁶¹ Refer to Chapter 5, 5.1.3 Geological Survey

Major features of NH208 Tripura design have summarized as the following:

- Geometric design of the project road has followed the required design standard. Some curves use minimum radius with safety facilities along the road.
- All the 32 existing bridges are out of the planned alignment and will be retained. The 46 additional bridges are proposed to be newly constructed on the realignment and bypass. Two major bridges were proposed at CH 53+500 and CH 60+450.
- Drainage system has been evaluated in consideration of the catchment area, and estimated flow at each point by hydraulic calculation. Existing pipe culverts will be replaced due to lack of capacity and for widening.
- There are difficult construction sites along the mountain topography. Construction periods need to be reviewed due to the difficult construction and weather.
- Some negative environmental impacts are expected during construction and operation, they must be adequately managed and monitored by EMP and EMoP. Forest land depletion is limited to the minimum in the project alignment. The impacts on nearby protected areas will be effectively monitored.
- Social impact includes large-scale land acquisition and involuntary resettlement. The impacts can be mitigated based on the Resettlement Action Plan.
- The EIRR is estimated at above 12% in India. This result indicates that the investment in the improvement of this Project section is economically viable and will benefit the national economy of India.

12.3 Conclusions and Recommendations

While there are regional as well as state level initiatives and policies to boost industrial development, one of the main bottlenecks hindering industrial growth and expansion in Tripura has been the lack of inter-regional and inter-state connectivity due to its geographical isolation. Isolation from the rest of India and lack of adequate intra-state connectivity generate several supply-side issues such as: limited access to marketing links, high costs associated with transportation of goods, inability to produce and deliver large orders in time, and operational inefficiencies.

Limited road connectivity has not only led to unrealized industrial and economic potential but also wasted goods and resources. Despite Tripura's comparatively limited arable land, the state has seen considerable growth in yields of agricultural produce with surplus production of paddy (rice), fruits, and vegetables compared to other states within North Eastern India.⁶² The surplus rice production is often wasted as a result of limited access to processing units and lack of post-harvest skills among farmers leading to low quality rice production.

With industrial parks and development centers being actively set up in Tripura, the missing link for acceleration of industrial development is regional and state level road connectivity to such facilities which the NH-208 under this Project will provide. Moreover, NH208 would provide an alternative route to the existing NH-8 and help promote efficient transportation of surplus agro-food products from Tripura to neighboring North Eastern states like Assam where demand of such goods are more than can be supplied within the state.

⁶² Roy, A. et al.. "Food Security in North-East Region of India – A State-wise Analysis." Agricultural Economics Research Review, vol. 28, 2015, pp. 259-266.

The social benefits that arise from the upgrading of the NH208 project will become evident as improved accessibility to various services such as easy access to markets, health facilities, schools, workplace etc. increases the income of the locals, and ultimately elevates their standard of living. Improvement of the road network will not only link the village communities to better markets, but also open up wider work opportunities in distant communities. These benefits are:

- The immediate benefits of road construction and improvement will come in the form of direct employment opportunities for the construction industries and suppliers of raw materials.
- Safety measures for Highway signs, Pavement marking, Traffic signals, Truck lay-bys, Bus stops and Bus bays
- Improvement of geometric deficiencies (both Horizontal & Vertical).
- Provision of Pedestrian passes.
- Provision of crash barrier at Bridge approaches.
- Improvement of all Major and Minor Intersections.
- Facilities for public amenities such as Restrooms, Telephone booths, Toilets, shops etc,

The upgrading of the NH208 gives an immense scope of development of the region with regards to easy accessibility between the state of Tripura and other states like West Bengal. Other than the development of the industrial sector, there would be easy accessibility for the agricultural surplus of the region and the finished industrial products with the rest the country. The socio-economic status of the region is been changing drastically with inflow venture and human capital. Infrastructure investments such as the National Highway would remove the bottlenecks of development and help in taking a huge positive leap of sustainable socio-economic growth for the region.

The recommended next steps to promote economic growth of Tripura are:

- The Sabroom ICP should be completed, and a “co-location border post” may be considered between Sabroom and Ramgarh (Bangladesh)
- The agreement to allow the transport of goods between Chattogram (Chittagong) Port and India should be implemented, to include the Sabroom/Ramgarh-Chattogram route
- A free trade agreement should be developed between India and Bangladesh.

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