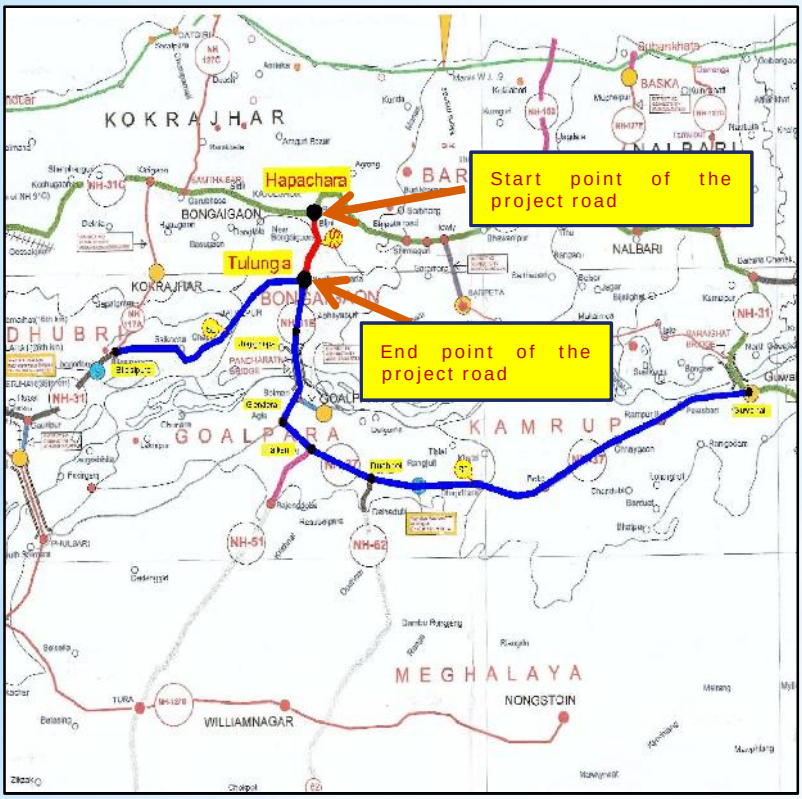
Consultancy Services for preparation of DPR for development of Economic Corridors, Inter Corridors and Feeder Routes to improve the efficiency of freight movement in India under Bharatmala Pariyojana (Lot-1) Package 1A (Hapachara – Tulungia Road (Length 14.000 km) in the State of Assam)

FINAL DETAILED PROJECT REPORT

VOLUME-IV: ENVIRONMENTAL ASSESSMENT REPORT INCLUDING ENVIRONMENTAL MANAGEMENT PLAN (EMP) & RESETTLEMENT ACTION PLAL(RAP)



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ENVIRONMENTAL ASSESSMENT REPORT INCLUDING ENVIRONMENTAL MANAGEMENT PLAN (EMP)

Executive Summary

A. Project Background

National Highways and Infrastructure Development Corporation Ltd. (NHIDCL) has been entrusted with the project management including preparation of feasibility study / detailed project report for widening to 4-lane with paved shoulder from “Hapachara to Tulungia” in the state of Assam.

B. Project Road

The Project Road stretched from Hapachara to Tulungia is a part of Economic Corridors, Inter Corridors and Feeder Routes to improvethe efficiency of freight movement in India under Bharatmala Pariyojana and it originates from Hapachara and passes through the villages /localities namely Jiyaguri, Sidalsati, Kakaijana, before terminates at Tulungia. The project road lies in Bongaigaon district of Assam. The length of the project road as per topographic survey comes out as 14.050 km.

C. Need of the Project

The project Road will provide better connectivity as it reduces the travel time. Additionally, the project road will enhance economic development; provide employment opportunities to the locals.Development of this stretch would give relief to the people of Assam due to inconvenience caused during frequent disruptions in neighbouring state,West Bengal.The development of the Stretch which is a part of Bharatmala Pariyojana will enhance the connectivity of Bongaigaon district.

D. Policies, Legal and Administrative Framework

D.1. Institutional Setting

The project has been initiated and is being carried out by the Bharatmala Pariyojana. The primary responsibility of the project rests with the NHIDCL providing encumbrance free ROW to the concessionaire who will implement the project.

D.2. Clearances

As part of the project preparations, the Project Proponent shall take the following clearances and NOCs:

- Tree felling permission has to be taken from the respective Divisional Forest Officer. For road projects, 5 trees are planted for each tree felled.

Apart from the clearances required to be obtained by the Project Proponent, the concessionaire and contractor shall also obtain following clearances, NOCs and licenses prior to the commencement of construction. These are:

- NOC and Consents under Air, Water, EP Acts & Noise rules of SPCB for establishing and operating hot-mix plants, batching from SPCB.
- NOC under Hazardous Waste (Management and Handling) Rules, 1989 from SPCB
- PUC certificate for use of vehicles (including JCB, tractors, etc.) for construction from Department
  of Transport
- Quarry lease deeds and license and Explosive license from Dept. of Geology and Mines & Chief controller of explosives
- NOC for water extraction for construction and allied works from Ground Water Authority

Apart from the above clearances, the concessionaire also has to comply with the following:

- Clearance of Engineer for location and layout of Worker's Camp, Equipment yard and Storage yard.
- Clearance of Engineer for Traffic Management Plan for each section of the route after it has been handed over for construction.
- An Emergency Action Plan should be prepared by the contractor and approved by the Engineer for accidents involving fuel & lubricants before the construction starts.
- Submit a Quarry Management Plan to the Engineer along with the Quarry lease deeds.

E. Baseline Environmental Profile

E.1. Physical Environment

Climate- The climate of the project districts Bongaigaonclimate is warm and temperate. The summers are much rainier than the winters in Bongaigaon. The average annual temperature in Bongaigaon is 24.3 °C. Precipitation here averages 3159 mm. The Wind is predominantly blowing from South-East(SE), East-South-East (ESE) and North West (NW).

Land- The district has a Plain Topography; however, it is also having some hillocks and hilly areas in some parts of the district. The mighty river Brahmaputra flows along the southern part of the district and its tributary Aie river flows through the district besides many small rivulets and streams. Assamcomes under the seismic zone V because earthquake is a real and potential danger in this region. It is a low-lying hilly area and during the rainy season lasting from May to September, it is observed that due to the unstable rock materials, land-slides have been taken place.

Soil- The soil of Bongaigaon District is generally characterized by its acidity. The formation of the hills and the higher ground consists of red ochreous earth and large blocks of granite, intermixed with sand stone. The latter is subject to disintegration from exposure to the atmosphere. In the plain the soil is composed either of tenacious clay or of clay more or less mixed with sand. Along the great river there are large tracts of alluvial formation

Baseline Study-The findings of the baseline environmental status regarding land (topography, geology, soil quality, land use pattern), meteorology (Temperature, Relative Humidity, rainfall, wind speed, wind rose), air (ambient air quality- SPM, PM10, PM2.5, SO2, NOX.), water (surface water, groundwater), noise level, ecological environment (flora & fauna), socio economic conditions (demographic profile and households condition) were presented and interpreted with reference to environmental standards.

Flora & Fauna - Careya arborea, Dillenia scabrella, D. pentagyna, D. indica are some common plant in the forest area.Wild animals mostly represented by elephants, Rhinoceros, bisons, buffaloes, tigers, leopards and deer were found in large numbers in this region in the past but at present most of above varieties of animals have disappeared from this region Post 30th September, 2019 required data will be collected from the field survey.

F. Public Interactions and Consultation

Public Interactions and consultations will be conducted during the site visit after 30th September, 2019.The main purpose of these consultationsare to know the community's reaction to the perceived impact of proposed project on the people at individual and settlement level. According to the previous observation from the secondary data, discussed issues of the most concern were related to rehabilitation and resettlements and have been dealt in social assessment report. It was also felt during the public consultation process that people living along the project corridor are aware about the project; while most of them did not anticipate any environmental problems due to the project, some people were concerned

about air and noise pollution. Other concerns raised during public consultation were demand for submergence of project road and safety problems. Public Hearing for the project shall be conducted and the issues raised by the public have been duly incorporated in project design.

G. Environment Impact Assessment

The environmental components are mainly impacted during the construction and operational stages of the project and have to be mitigated for and incorporated in the engineering design. Environmental mitigation measures represent the project's endeavour to reduce its environmental footprint to the minimum possible. These are conscious efforts from the project to reduce undesirable environmental impacts of the proposed activities and offset these as far as practicable. Enhancement measures are project's efforts to gain acceptability in its area of influence. They reflect the pro-active approach of the project towards environmental management. Post 30th September, 2019 required data will be collected from the field survey.

G.1. Impact on Climate

Project Highway is located in a largely monsoon climate with high humidity level. Though no change in the macro-climatic setting (precipitation, temperature and wind) is envisaged due to the project, the microclimate is likely to be temporarily modified by vegetation removal and the addition of increased pavement surface. There will be an increase in daytime temperature on the road surface and adjacent soil due to loss of shade and big trees, which in turn might lead to formation of hotzones, especially along the inhabited sections.

G.2. Impact on Land

In Construction phase during the improvement works for the road section, the cutting of hill slope, filling, the cutting of trees, stone quarrying, and construction of structures, the micro-level topography
may change.

The project road comes under the seismic zone V and hence, falls under a very high damage risk zone.

G.3. Contamination of Soil

Soil contamination may take place due to disposal of solid waste from the labour camp set up during pre-construction stage. This can be considered as a short-term negative impact.

In construction stage, the sites where construction vehicles will be parked and serviced are likely to be contaminated because of leakage or spillage of fuel and lubricants. Contamination of soil can also occur in hot-mix plants from leakage or spillage of asphalt or bitumen. So, Contamination of soil during construction might be a major long-term residual negative impact.

During the operation stage, soil pollution due to accidental spills or leaks from vehicle is a low probability as one of the main objective of the project whichis to reduce accidents.

G.4. Impact on Air Quality

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

Adverse air quality impacts during construction are likely to result from three main sources: (i) emissions from construction equipment, including delivery trucks; (ii) fugitive dust from earth-moving operations and demolition; and (iii) increased traffic congestion in construction areas. It is expected that air quality will be affected to some minor extent by dust and particulate matters generated by construction, vehicular movements, site clearance, earth filling and

material loading and unloading. The impacts are expected to be localized, temporary and confined to construction areas.

Operation phase impact to ambient air will be primarily because of exhausts from vehicles plying on the project road.

G.5. Impacts of green House gas (GHG)

In a road project, construction phases the GHG emissions are primarily due to: a) Transport emissions, b) Material emissions and c) Machines emissions. It is estimated that this project may result in emission of approximately 1447.15t CO_2eq of GHG during construction phase.

As per the calculationof GHG emission in the operation phase, Total CO_2 Emission (t CO2 /day) would be 26.71, 45.68 and 82.04 in the respective years of 2019, 2030 and 2042.

G.6. Impact on Water Resources and Quality

No modification in surface flow of rivers / streams is envisaged during pre-construction period.

During construction phase, contamination of surface water may be taken place due to spills of construction materials, oil, grease, fuel and paint, improper sanitation, and waste disposal from construction camps etc.

Enhancement of existing drainage structures and installation of new cross-drainage structures, as part of this project, are likely to result in positive impacts, during operation phase. Further, a number of ponds located near the project road, will be strengthened as part of this project.

G.7. Impact on Noise Levels

Impact to noise environment during pre-construction stage will be limited to activities such as setting of construction camp, unloading of materials, etc,

Based on the calculations, it is anticipated that during the construction phase in any zone other than industrial, the ambient noise level will be exceed the statutory level at a distance of 50m away from the construction zone, if no barrier is put.

Noise during the operation phase in the project area, will be solely due to plying of vehicles.

G.8. Impact on Ecological Resources

The project will have a significant, direct and long-term impact on roadside trees in the pre-construction stage. The construction of new road will involve removal of topsoil and clearing of vegetation cover and cutting of trees though the losses of these trees are an irreversible andhaving the long-term impact.

The loss of the roadside plantations will be compensated in accordance with the principles of the Forest (Conservation) Act. The operation phase is envisaged to have significant long-term positive impact with regard to roadside plantation as the tree coverage is expected to increase significantly. Another impact from road construction activities and deriving from the cutting of hillsides, quarrying, preparation & transfer of stone chips and other earthwork will be the accumulation of dust on the surrounding vegetation.

There is likelihood of slight impact to local domestic animals, which graze in the area especially after the road is constructed. There is no negative impacts are envisaged on the aquatic ecology during the operational phase. As there is no wildlife reported in the project area hence, no impact is anticipated.

H. Mitigation Measure

A number of specific mitigation and enhancement measures have been proposed to mitigate identified adverse environmental impacts. The construction workers camp will be located at least 1km away from thehabitations. The construction yard, hot mix plants, crushers etc. will

also be located at least 1 km away from the habitations and in downwind directions below nearby habitations. Adequate cross drainage structures have been planned to maintain hydrological regime. In order to compensate negative impacts on flora due to cutting of trees the project plans compensatory plantation in the ratio of 1:5 i.e. for every tree to be cut, 5 trees will be planted. The project shall also witness the plantation of trees for providing aesthetic beauty and shade.

The plantation of trees shall be done subject to availability of space in the proposed ROW. The project will take an opportunity to provide environmental enhancement measures to improve aesthetics in the project area. The planned environmental enhancement measures will include enhancement of water bodies also. In order to avoid contamination of water bodies during construction sedimentation chambers, oil and grease separators, oil interceptors at storage areas and at construction yard have been planned.

I. Environmental Management Plan

Project specific environmental management plan has to be preparing for ensuring the implementation of the proposed measures during construction as well as operation phases of the project. The implementation and supervision responsibilities, sufficient allocation of funds, timeframes for anticipated activities etc. have been dealt with in this document, The EMP will eventually form a part of the Contract documents between the NHIDCL and the Concessionaire.

J. Conclusion

Based on the EIA study and surveys conducted for the Project, it can be safely concluded that associated potential adverse environmental impacts can be mitigated to an acceptable level by adequate implementation of the measures as stated in the EIA Report. Adequate provisions shall be made in the Project to cover the environmental mitigation and monitoring requirements, and their associated costs as suggested in environmental budget. The proposed project shall improve Road efficiency. In terms of air and noise quality, the project shall bring considerable improvement to possible exposure levels to population.

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List of Abbreviations

AAQ	:	Ambient Air Quality
AAQMS	:	Ambient Air Quality Monitoring Station
ASI	:	Archeological Survey of India
BOD	:	Biochemical Oxygen Demand
BOQ	:	Bill of Quantities
CD	:	Cross Drainage
CO	:	Carbon Monoxide
Ch.	:	Chainage
COD	:	Chemical Oxygen Demand
CoI	:	Corridor of Impact
CPCB	:	Central Pollution Control Board
DFO	:	Divisional Forest Officer
DLC	:	District Level Committee
DPR	:	Detailed Project Report
EAC	:	Expert Appraisal Committee
EIA	:	Environmental Impact Assessment
EMP	:	Environmental Management Plan
GO	:	Government Order
GoI	:	Government of India
GWQMS	:	Ground Water Quality Monitoring Station
HC	:	Hydrocarbons
HD	:	Highways Department
HQ	:	Head Quarters
IAR	:	Indian Archaeological / Historical / Religious Features
IMO	:	Indian Meteorological Organization
IS	:	Indian Standard
LHS	:	Left Hand Side
MoEF	:	Ministry of Environment and Forests
MoRT&H	:	Ministry of Road Transport and Highways
NAAQS	:	National Ambient Air Quality Standards
NGO	:	Non Governmental Organisations
NH	:	National Highway
NOC	:	No-objection Certificate
NO_x	:	Oxides of Nitrogen
PAF	:	Project Affected Family
PAH	:	Project Affected Household

PAP	:	Project Affected Person
PAPUs	:	Project Affected Property Units
PD	:	Project Director
PF	:	Protected Forest
PCU	:	Passenger Car Unit
PIU	:	Project Implementation Unit
PPP	:	Public Private Partnership
PWD	:	Public Works Department
R&R	:	Resettlement and Rehabilitation
RAP	:	Resettlement Action Plan
RF	:	Reserved Forest
RHS	:	Right Hand Side
ROW	:	Right of Way
SO_2	:	Sulphur Dioxide
SOS	:	Strategic Options Study
SPCB	:	State Pollution Control Board
PM	:	Particulate Matter
SWQMS	:	Surface Water Quality Monitoring Station
TDS	:	Total Dissolved Solids
VEC	:	Value Ecosystem Components

Symbols and Units

µg/Nm^3	:	Microgram per Normal Cubic Meter
mg/l	:	Milligram per Litre
dB(A)	:	A-weighted decibel
m	:	meter
$PM_{2.5}$ or PM_{10}	:	Particulate Matter of 2.5 micron or 10 micron size
ha	:	hectare
Leq	:	equivalent continuous noise level

1 Introduction

The National Highways and Infrastructure Development Corporation Ltd.(NHIDCL) has been entrusted with the assignment of consultancy Services for preparation of DPR for development of Economic Corridors, Inter Corridors and Feeder Routes to improve the efficiency of freight movement in India under Bharatmala Pariyojana.

National Highways & Infrastructure Development Corporation Limited (NHIDCL) has been entrusted with the assignment of Consultancy Services for Feasibility Study, Preparation of Detailed Project Report and providing pre-construction services for up gradation Hapachara-Tulungia (Length 14.050 km)in the state of Assam.

Following due tendering process,National Highways & Infrastructure Development Corporation Limited (NHIDCL)awarded this work to M/s CE Testing Pvt. Ltd., who in turn engaged M/s Bongs Prayukti International Pvt. Ltd. (Prayukti) to conduct the environmental feasibility report, environmental impact assessment (EIA) and develop the environmental management plan (EMP) for this project.

1.1 Brief description of the Project

The Project Road starts at Rakhaldubi (junction with NH-27) in Hapachara and ends at Tulungia (junction with NH-17).The Starting co-ordinate of the project road is 26°29’13.78"N and 90°38’35.29"E and the ending co-ordinate is 26°22’32.50"N and 90°38’7.56"E. Development of 4 lane divided carriageway with paved shoulder has been framed considering 45 m proposed right of way in rural & built up section. The project road lies in Bongaigaon district of Assam. The length of the road comes out as 14.050 km (As per Survey).

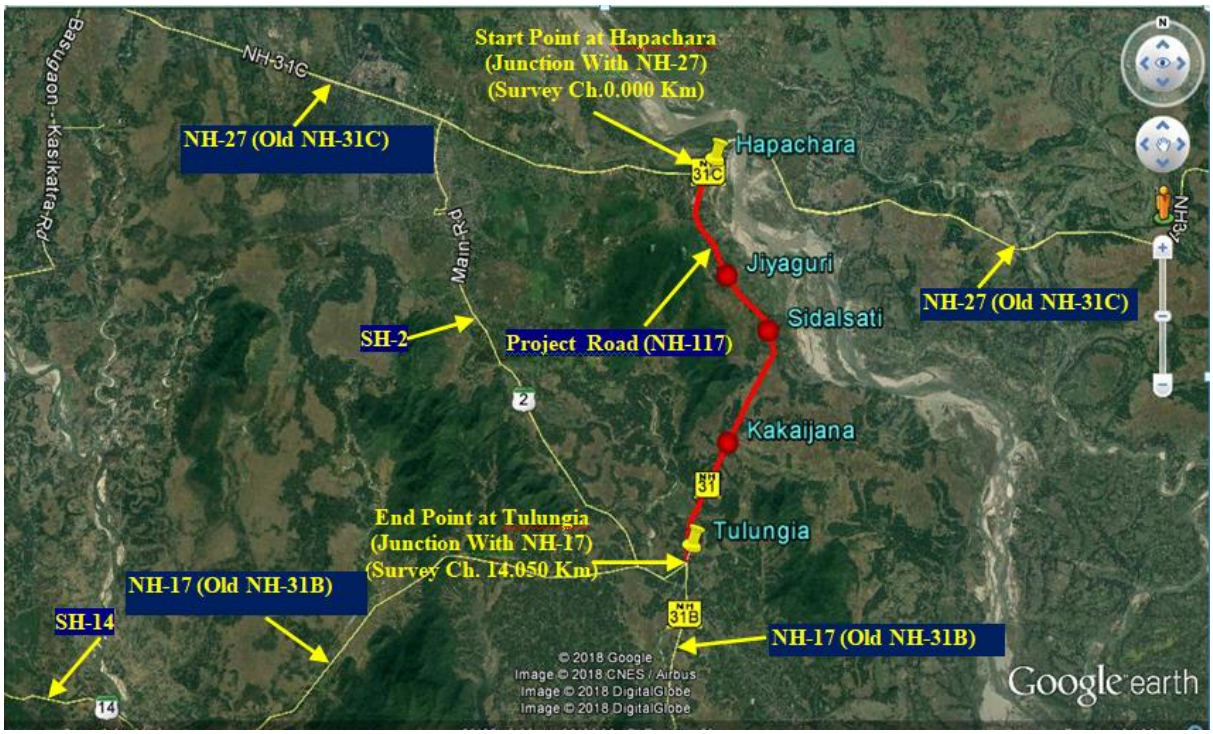

Figure 1-1: The proposed project road

1.2 Purpose of the project

Development proposal from Hapachara to Tulungia is recommended as 4-lane with paved shoulder configuration. The salient proposal for up-gradation and improvement of 4 lane project road is classified into the following aspects.

- This project road provides the connectivity to nearby state West Bengal through NH-27 (Old NH-31C) at Rakhandubi Chariali (start point of project road). NH-27 starts from Porbandar and ends near Silchar in the state of Assam.
- It provides important connectivity to Dhubri through NH-17(Old NH-31) via. Tulungia i.e. end point of the project Road(NH-17 starts from Sevok in the state of West Bengal and ends near Guwahati in the state of Assam).
- It provides direct connectivity to important villages/market areas of Hapachara, Jiyaguri, Sidalsati, Kakaijana & Tulungia.

1.3 Project name and Size

Consultancy Services for preparation of DPR for development of Economic Corridors, Inter Corridors and Feeder Routes to improve the efficiency of freight movement in India under Bharatmala Pariyojana (Lot-1) Package 1A (Hapachara – Tulungia Road (Length 14.000 km) in the State of Assam)

The length of the project as per design is 14.660 Km.

1.4 Objective of EIA

The objectives of the EIA include:

- Collection and analysis of baseline environmental data on various components of the environment
- Identification of impacts and determination of the magnitude of environmental impacts so that due consideration is given to them during design, construction and operational phases of the road project
- Identification of areas and aspects, which are environmentally or socio-economically insignificant.
- The main objective of environmental impact assessment study is to identify the adverse and positive impacts due to project implementation, and to suggest avoidance, mitigation and enhancements measures in project design and to prepare Environmental Management Plan (EMP) for pre-construction, and construction and operation phases of the project.
- Environmental assessment of project from the environmental point of view and preparation of environmental budget for implementation of mitigation measures.
- Development of the road alignment in such a way that the environment and the settlement areas are affected the least.
- Presentation of public view on various aspects of environment and the project.

1.5 Proposed Improvements

The Project road starts at Rakhaldubi (junction with NH-27) in Hapachara and passes through village / localities namely Rakhaldubi, Hapachara, Garugaon-1, Garugaon-2, Jiyaguri, Sidalsati, Kakaijana, Beltoli, Kadamtola and ends at Tulungia (junction with NH-17).

- The entire alignment follows the existing road. In general eccentric an concentric widening has been proposed in majority portion of road length.
- At start and end point of the project road where proposed road forms 3 legged intersections with NH-27(old NH-31C) and NH-17(Old NH-31B) respectively, grade separation has been proposed for conflict free traffic movement

- The proposed improvement aims at improving the road quality to improve journey speed and reduce congestion
- New cross-drainage structures would be provided on the new 4 lanes carriageway

1.6 Approach to EIA

Environmental Impact Assessment (EIA) is an assessment of the possible impact positive or negative-that a proposed project may have on the environment, together consisting of the natural, social and economic aspects. Its purpose is to identify, examine, assess and evaluate the likely and probable impacts of a proposed project on the environment and, thereby, to work out remedial action plans to minimize adverse impact on the environment.

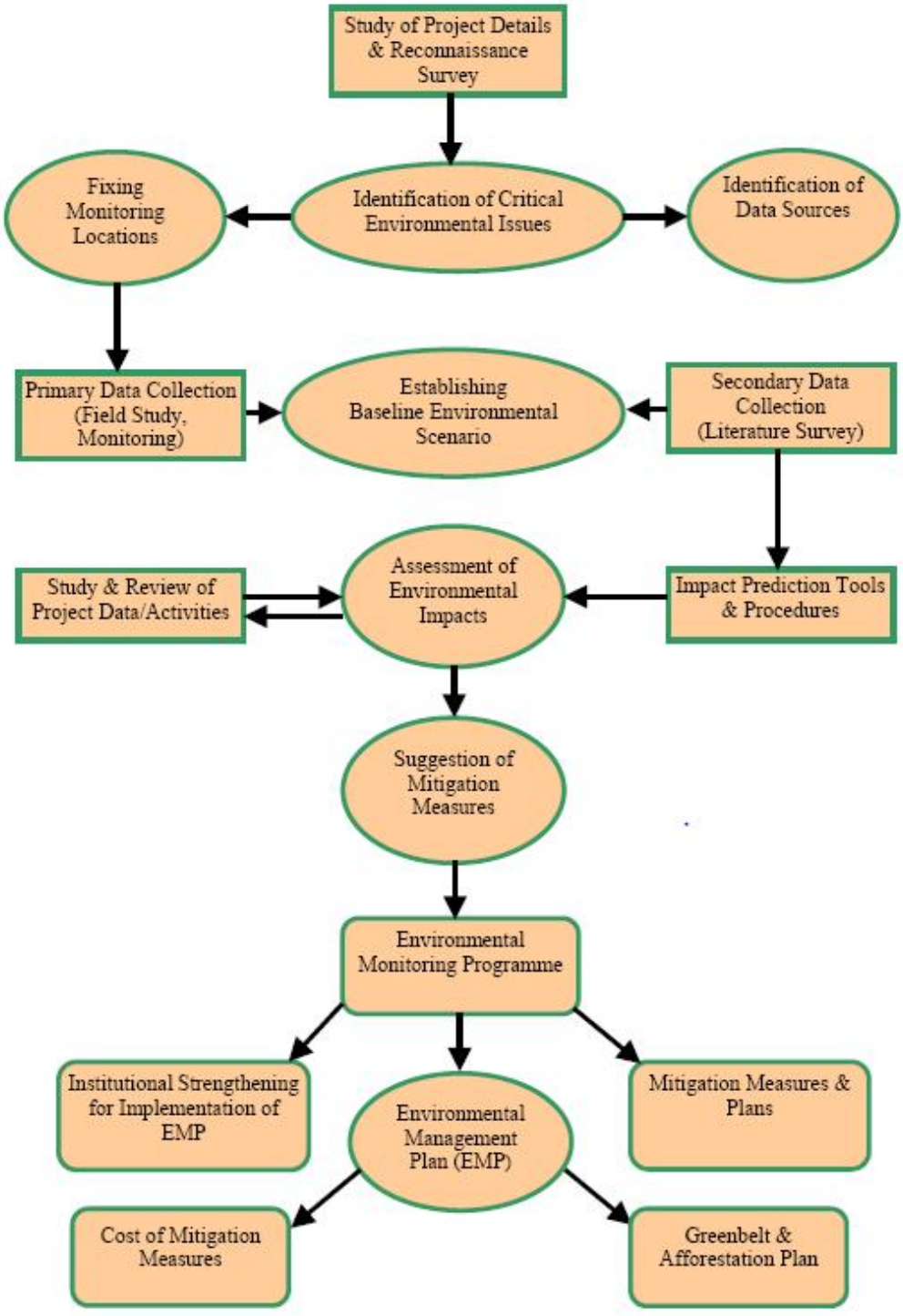

Figure 1-2: Methodology of EIA

1.6.1 Preliminary Environmental Screening

The environmental experts of Prayukti conducted the environmental screening to identify the hot spots along the project road. A Rapid Assessment Survey (RAS) was undertaken within the Corridor of Impact (COI) defined as 100m on either side of the proposed centre line, to identify the Valued Ecosystem Components (VECs) during the feasibility stage and were categorised into various environmental components for screening and to assess their subsequent impacts due to the project as per the table below.

Table 1-1: Various environmental components for screening

Sl. No.	Environmental Attributes	Valued Ecosystem Components
1	Topography	Plain terrain
2	Land Use	Forest, Settlement, Grazing, Fallow, Agriculture (mostly Un-irrigated), no development zone, etc
3	Water resources	Water bodies like rivers, canals, lakes and ponds – Crossings as well as water bodies within COI
4	Forests & Wild Life	Native, rare and endangered species
5	Road side Plantations	Strip Plantation
6	Settlements	Villages abutting the road corridor
7	Sensitive Receptors	Sensitive receptors such as educational and health facilities, Religious Structures within COI
8	Drinking water Source	Total number of drinking water source (wells, hand pumps, taps etc) within study area
9	Cultural	Number (total) of cultural properties (protected/ unprotected archaeological monuments) within 500m from the road
10	Market Places	Number (total) of weekly market places / haats; grain / fruit /vegetable / fish market; cattle market within COI
11	Common Property Resources	CPRs such as pastures / grazing lands; seating areas of the community; cremation/burial grounds etc. within / along the RoW (All CPRs other than religious structures, drinking water sources and bus stops) within COI
12	Other Features	Flood plains; soil erosion prone areas; stone quarries etc.

1.6.2 Review of Applicable Environmental Regulations

Applicability of various environmental regulation and guidelines was reviewed for the project activities.

1.6.3 Assessment of Baseline Environmental Profile

The baseline conditions of the project area will study after 30th September. Data pertaining to all facets of environment which include physical, ecological, and socioeconomic environment

both through the secondary sources were collected. Key relevant information sources has been summarised in Table 1-2.

Ambient air & noise monitoring was conducted as well as ground and surface water samples will be collected from various locations identified along the corridor. The monitoring and analysis for each component were carried out as per MoEF and CPCB guidelines. The results of the analysis were compared with the relevant national standards.

As part of the baseline environmental profile, a detailed tree inventory along the RoW has been carried out based on their chainage, species, girth and distance from the carriageway. All trees with a girth size more than 30cm that are falling within the proposed ROW shall be marked on the ground. Based on the survey a tree schedule will be prepared for submission to the authorities.

Table 1-2: Primary and Secondary Information Sources

Sl. No.	Report Components	Information Sources
1	Project objectives, Technical information on existing road features	ToR, Design Report
2	Inventory of road features like water Bodies, Community structures, environmentally sensitive locations areas, congested locations etc.	Ground Physical surveys
3	Climatic Condition & Meteorological data	Envis and other websites, reports on studies conducted in this area, primary data collection
4	Geology, Seismicity, Soil and Topography	State of Environment report published by SPCB, government websites and primary data collection
5	Land Use/ Land cover	Survey of India (SoI) Toposheet, Satellite maps and Observation during surveys
6	Drainage Pattern	Survey of India Toposheet, District Groundwater Brochure of CGWB, field observation and local people
7	Status of forest area and Compensatory afforestation norms etc	Divisional Forest Office
8	Air Quality, Noise, Soil and water	Ambient air quality monitoring along the project road Noise level measurements along the project road. Soil type and it characteristics, soil erosion and land slide problem, geology of the area. Quality of ground water recourses and surface water sources
9	Borrow Areas, Quarries and other construction	Material Surveys and public

Sl. No.	Report Components	Information Sources
	material source	consultations
10	River geo-morphology, hydrology, drainage, flood patterns	Engineering reports and information from local people, field observations
10	Socioeconomic Environment	Official websites maintained by state Govt., Census of India 2001 & 2011 and Public Consultation during the Field survey

1.6.4 The Legal Framework and the Legal Stipulations

The Government of India has formulated various policy guidelines, acts and regulations aimed at protection and enhancement of environmental resources. The clearances/ permissions/ approvals under various acts, rules, and guidelines are required for proposed project during pre-construction and construction phases.

1.6.5 Analysis of Alternatives

With and without project alternatives have been assessed for this project. Analysis of alternative for the project road included, advantage and disadvantage of each option, summary of adverse impacts of each alternative, mitigation measures proposed for each alternative and selection of alternative.

1.6.6 Anticipated Environmental Impacts and Mitigation Measures

The environmental assessment conducted in accordance with the requirement of the state government and Government of India. The collected primary and secondary data compiled and analyzed to establish a comprehensive database and assess the existing baseline environmental conditions.

Impact assessment has been carried out after establishing the baseline status of the study corridor and analysis of the project data/activities. At this stage, the data analysis and impact assessment would be performed. Wherever practicable, a quantitative analysis would be performed. Suitable computer models, if applicable, would be used; otherwise, the impact assessment would be quantified through mathematical computation. The projects activities will be linked with the existing baseline environmental conditions in order to short list the affected environmental parameters and assess the likely impacts on such parameters. Compliance of the project with national standards will be duly checked. Following aspects will be given due importance during assessment of impacts and recommending remedial measures:

- Alignment of the project road and topographical changes
- Roadside drainage to avoid water logging, erosion & environmental degradation
- Loss of trees
- Noise level and dust concentration near construction sites
- Water requirement during construction and sources
- Nature, quantity and disposal of construction spoils
- Environmental hazards/damages associated with landslide
- Public health & sanitation, and occupational health & safety of construction workers
- Road safety features to avoid accidents
- Air & noise pollution in operation phase due to vehicular emissions & noise
- Population affected including weaker sections

1.6.7 Public Interaction

Public consultations meetings have been carried out to get perceptions of people about the project. Findings of consultation meetings have been incorporated in project road design.

Consultations with community members, PAPs Focus Group Discussions with women groups and others community were carried out. The feedback generated through these meetings has been incorporated as far as possible in the design and construction of the road. The consultation process shall continue even during the implementation stage to gauge the general opinion.

1.6.8 Environment Management Plan

Environmental Management Plan (EMP) is the key to ensure a safe and clean environment. The desired results from the environmental mitigation measures proposed in the project may not be obtained without a management plan to assure its proper implementation and function. The EMP envisages the plans for the proper implementation of mitigation measures to reduce the adverse impacts arising out of the project activities. The following issues will be addressed in the EMP:

- Preventive, mitigation, compensatory & enhancement measures for minimization & abatement of the undesirable impacts caused during the construction and operation stage.
- Details of management plans (compensatory plantation, solid waste management plan, borrow area management plan, occupational safety and health plan etc.) including their implementation schedule and supervision programme.
- Identified/recommended institutional set up for implementation of the EMP including institutional requirements, staffing and training
- Environmental monitoring programme during construction and operation phase including parameters, locations and frequency of monitoring, monitoring mechanisms, performance indicators, implementation programme and cost.
- Expenditures & budget for environmental protection measures and implementation of the EMP.

1.6.9 Environmental Monitoring Programme

Environmental monitoring plan for construction and post construction phases of the project road have been formulated to ensure effectiveness of implemented environmental mitigation measures. Cost of Environmental Monitoring Plan for construction and post construction phase of the project has been worked out.

1.7 Structure of Environmental Impact Assessment

The EIA report has been structured into the following chapters:

Chapter – 1: Introduction, This chapter gives the basic information about the project and project area. It also discusses the justification of the project and the purpose of the EIA study including the scope of the study.

Chapter – 2: Project Description describes the existing features and also discusses the various feature and various proposed improvement programmes of the proposed highway project.

Chapter – 3: Policy, Legal and Administrative Framework reviews the existing set-ups relevant to the project, at the National and the State levels;

Chapter – 4: Analysis of Alternatives discusses systematic comparisons of feasible alternatives for the proposed project site, technology, and operational alternatives. Alternatives have been compared in terms of their potential environmental impacts, capital and recurrent costs and suitability under local conditions

Chapter – 5: Baseline Environmental Profilefor assessing various baseline environmental components in the study area prior to the commencement of the project has been identified in this chapter. The various parameters of present environmental status are identified under different aspects, which include location and regional setting of the area, topographical aspect which include land use, land cover and soil quality of the study area. Drainage aspect consists of surface and ground water quality. Meteorological aspect contains all the climatic factors and ambient air quality of the study area. Ecological environment describes the flora and fauna of the region. Human aspect includes the demography features, socio-economic environment and infrastructure facilities of the area.

Chapter – 6: Public Consultation describes consultations carried out and people's perceptions of the project benefits and the potential impacts;

Chapter – 7: Impacts Assessment& Mitigation MeasuresThis chapter provides the details of the Environmental Impact Assessment of the project during construction and operation stages. It ascertains the impacts of the proposed project on the various components of environment. The mathematical modeling exercises pertaining to ground level concentrations of air pollutants have been presented in this chapter with suitable mitigation measures.

Chapter – 8:Implementation Arrangements & Monitoring Schedule gives a brief about the present implementation arrangements for environmental components of the project, compliance monitoring and reporting mechanisms

Chapter-9: Project Benefits, This chapter describes the improvements, physical infrastructure, social infrastructure, employment potential, and other tangible benefits

Chapter – 10:Environmental Management Plan details both the generic and specific EMPs for the project road. This chapter also includes the Environmental Budget

Chapter – 11: Borrow area management provides the details of the borrow areas required for mining of soil / earth for the project.

2 Project Description

This chapter describes the project road and discusses the various improvement measures proposed as part of the project. The project description includes details of existing condition of project road, existing and proposed traffic, pavement conditions, road inventory, safety and community facilities

2.1 Existing Road Features

2.1.1 Alignment

The major portion of the project road is passing through the plain/rolling terrain areas. The Project road starts at Rakhaldubi (junction with NH-27) in Hapachara and passes through village / localities namely Rakhaldubi, Hapachara, Garugaon-1, Garugaon-2, Jiyaguri, Sidalsati, Kakaijana, Beltoli, Kadamtola and ends at Tulungia (junction with NH-17).

- The Starting co-ordinate of the project road is 26°29'13.78"N and 90°38'35.29"E and the ending co-ordinate is 26°22'32.50"N and 90°38'7.56"E.The entire road lies in Bongaigaon district of Assam
- The topography of the project area is mostly rural in nature
- The existing road is mostly two Lane (Except starting 586m the same is 4 lanes) with granular/earthen shoulder.
- The existing pavement condition along the road is basically fair to poor. Various types of pavement distresses encountered in poor pavement stretch are Cracking, Potholes, Raveling, Edge drop, Rutting and Patching.

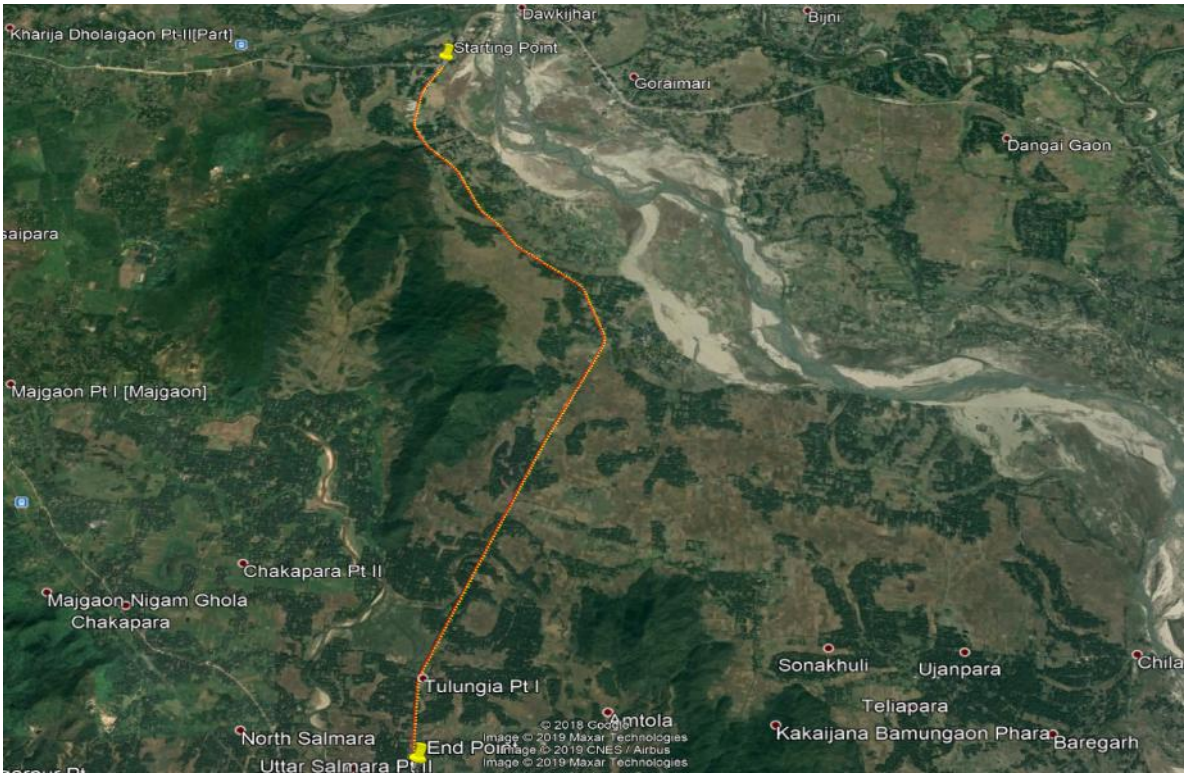

Figure 2-1: Existing project road

2.1.2 Right of way

The existing ROW of the project stretch varies from 7 m to 53 m with an average right of way 31.0 m as per collected revenue maps .Development proposal of 4 lane divided carriageway with paved shoulder has been framed considering 45 m proposed right of way in rural & built up section. Therefore, additional land will be required throughout the corridor to accommodate the future proposal, geometric improvement and development of intersection with other project facilities.

2.1.3 Existing Carriageway

The existing road is mostly two Lane (Except starting 586m the same is 4 lanes) with granular/earthen shoulder. The carriageway width of the existing road varies from 6.8 – 10.0 meter (Except starting 586m the same is 17.7 m). Width of shoulder varies from 0.40 – 3.00 meter on each side of the project road. Total formation width varies from 9.00 – 12.80 meter (Except starting 586m the same is 23.2m.

The existing pavement condition along the road is basically fair to poor. Various types of pavement distresses encountered in poor pavement stretch are Cracking, Potholes, Raveling, Edge drop, Rutting and Patching. Table 2-1 shows the chainage wise road configuration.

Table 2-1: Details of the Carriageway width

Chainage(km)		Length (km)	Carriageway width (m)	Type of pavement surface
From	To			
0.000	0.200	0.200	17.7	Cement Conctrete (LHS) Bituminous (RHS)
0.200	0.400	0.200	18.0	
0.400	0.600	0.200	17.7	
0.600	1.000	0.400	6.8	Bituminous
1.000	2.000	1.000	7.0	Bituminous
2.000	3.000	1.000	6.8	Bituminous
3.000	4.000	1.000	7.0	Bituminous
4.000	5.000	1.000	6.8	Bituminous
5.000	5.800	0.800	7.0	Bituminous
5.800	6.000	0.200	6.8	Bituminous
6.000	6.400	0.400	7.0	Bituminous
6.400	6.600	0.200	8.3	Bituminous
6.600	7.200	0.600	7.0	Bituminous
7.200	7.400	0.200	8.0	Bituminous
7.400	8.000	0.600	7.0	Bituminous
8.000	8.200	0.200	7.2	Bituminous
8.200	8.600	0.400	10.0	Bituminous
8.600	9.000	0.400	9.8	Bituminous
9.000	9.400	0.400	10.0	Bituminous
9.400	9.600	0.200	9.6	Bituminous
9.600	11.200	1.600	9.8	Bituminous
11.200	11.800	0.600	9.9	Bituminous
11.800	12.200	0.400	10.0	Bituminous
12.200	12.600	0.400	9.8	Bituminous
12.600	13.200	0.600	9.9	Bituminous
13.200	13.400	0.200	9.8	Bituminous
13.400	13.600	0.200	9.9	Bituminous
13.600	14.050	0.410	9.8	Bituminous

2.1.4 Road inventory

There are 71 intersections on project road. There are 3 numbers of existing Major Junction and 27 numbers of existing Minor Junction (39 nos-3-legged) on the project stretches. Chainage wise details of the major junctions are Table 2-2.

Table 2-2: Details of Major junction along the project road

Sl.No.	Survey Chainage(km)		Location	Type of Intersection	Cross Road Leads Towards	At grade
	From	to				
1	0.000	0.000	Rakhaldubi	3-legged intersection with NH-27	Alipurduar(RHS) Guwahati(LHS)	Yes
2	6.581	6.581	Sidalsati	3-Legged	Forzer Dewan park, RHS	Yes
3	14.050	14.050	Tulungia	3-legged intersection with NH-17	Dhubri (RHS) Guwahati(LHS)	Yes

Figure 2-3: 3-Legged Intersections at Tulungia (Ch.14.050 km)

2.1.5 Existing Bridges and Culverts

There are 5 numbers of minor bridges are observed along the project road. 12 nos existing culverts are observed along the project road stretch out of which 7 nos. are slab culverts & remaining 5 nos. are pipe culvert. List of existing bridges are given below in

Table 2-3: List of the existing minor bridges

Sl.No.	Survey Chainage (Km)	NAME OF RIVER/ STREAM	TYPE OF BRIDGE	SPAN ARRENGEMENT (EXP.JOINT TO EXP. JOINT) (m)	CLEAR ROADWAY WIDTH BETWEEN KERBS(m)	TOTAL OUTER WIDTH OF BRIDGE
1	0.152	Nallah	RCC Slab	1 X 7.00	23.00	23.60
2	2.386	Nallah	Slab	1 X 6.40	10.40	11.40
3	3.751	Nallah	Slab	1 X 6.40	11.40	12.40
4	9.686	Kanyapari	Slab	1 X 6.84	7.30	8.30
5	10.741	Nallah	Slab	1 X 7.65	7.50	8.30

2.1.6 Traffic

The average daily traffic was counted in one location along the project road as given below. The AADT relates to traffic volume on the existing road for the year 2018.

Table 2-4: Average Daily Traffic on the project road

Sl. No.	Description	Homogeneous Section
1	Location	Km 0.000 to Km 14.050 (existing road)
2	AADT in number	7420
3	AADT in PCU	9443

2.2 Proposed Road Features

2.2.1 Alignment

- The proposed road starts at Rakhaldubi (junction with NH-27) in Hapachara and terminates at Tulungia (junction with NH-17)
- The length of the proposed project road is 14.660 km
- Proposed Road has been designed as per 4-Lane with Paved shoulder configuration
- No realignment and bypass is required for the project.

However, at start and end point of the project road where proposed road forms 3 legged intersections with NH-27(old NH-31C) and NH-17(Old NH-31B) respectively, grade separation has been proposed for conflict free traffic movement.

2.2.2 Right of way

To minimize the land acquisition and social impact, proposed project design has been accommodated in the existing Right of Way (ROW). A list of proposed ROW along the project road is presented in

Table 2-5: List of the proposed ROW

Sl no	Chainage (m)		Length (m)	TCS Type	ROW Width (m)
	From	To			
1	0	600	600	TCS 1	45
2	600	6075	5475	TCS 2	45
3	6075	7150	1075	TCS 3	45
4	7150	13650	6500	TCS 2	45
5	13650	14500	850	TCS 3	45
6	14500	14660	160	TCS 2	45
Total Length=			14660		

2.2.3 Road inventory

There are 3 number of major junction and 27 numbers of minor junction along the project road. All the major and minor junctions have been improved during the project development.

2.2.4 Cross Section Details

Different types of typical cross-section have been proposed as per site requirement and conforming with the relevance IRC standards. A list of TCS has been given in Table 2-6.

Table 2-6: Typical cross section

TCS Type	Description
TCS 1	Typical cross section of 4 lane divided carriageway with paved shoulder in rural area (concentric widening)
TCS 2	Typical cross section of 4 lane divided carriageway with paved shoulder in rural area (Eccentric widening)

TCS 3	Typical cross section of 4 lane divided carriageway with paved shoulder in grade-separator approaches with both side service road

2.2.5 Bridge and Culverts

There are 5 numbers of minor bridges found along the project road. Out of the 5 numbers of existing minor bridges 4 no bridges have been replaced by additional 2-lane bridges and 1 no bridge has been retained. Improvement proposal of proposed additional 2-lane bridges is given below inTable 2-7

Table 2-7: Improvement proposal of the minor Bridges

Sl.No.	Design Chainage (Km)	NAMEOFRIVER/ STREAM	TYPE OF BRIDGE	SPAN ARRANGEMENT	TOTAL OUTER WIDTH OF BRIDGE(m)
1	2.396	Nallah	Slab	1 x 6 x 3_RCC	12.5
2	3.758	Nallah	Slab	1 x 6 x 4_RCC	12.5
3	9.687	Kanyapari	Slab	3 x 6 x 4_RCC	12.5
4	10.739	Nallah	Slab	2 x 6 x 4_RCC	12.5

A total of 34 RCC box culverts are proposed to be provided for the throughout the project road. The additional culverts are proposed at locations where discharge capacities of existing culverts were inadequate.

Table 2-8: Total cross drainage structure along the project road

Sl. No.	Major bridges	Minor bridges	Culverts	Total
1.	0	5	34	39

2.2.6 Bus Bay & Passenger Shelter

1 numbers of Bus Bay and Passenger Shelters has been proposed in the project stretch. Details of Busbay & Passenger Shelter locations are given below in Table 2-9

Table 2-9: List of Bus-Bay and Passenger Shelter

Sl. No.	Design Chainage (km)	Location	Side
1	12.500	Near Tulungia	Both

2.2.7 Road Side Drain

At present excavated road side drains at few places are provided. But they are in poorcondition. Now following provisions are made in this project for road side drains. Roaddrainage network has been developed considering the location of cross drainage structurelocation and ground profile between two cross drainage structures, starting point of drain tofollow ground slope as far as possible to minimize the depth of drain.RCC Cover drain of3850 m has been proposed for the project road.

2.2.8 Proposed VUP

Three VUPs have been proposed along the project road at Ch. 0.000 Km, at Ch. 6.581 Km, at Ch. 14.063 Km, Details of VUP is given below in Table 2-10.

Table 2-10: List of VUP

Sl No	Design Chainage (km)	Span Arrangement (no x span) in m	Type of Structure	Carriageway Width (m)	Total Width (m)
1	0.000	2 x 30m	PSC T Girder	9.5	21.5
2	6.581	1 x 30m	PSC T Girder	9.5	21.5
3	14.063	2 x 30m	PSC T Girder	9.5	21.5

2.2.9 Projected Traffic

Projected traffic for the project road is given below.

Year	Two Wheeler	Car/Jeep/ Van/Taxi/ Auto	Mini / RTVs Bus	Stand. Bus	LCV	2-Axle	3 -Axle	Multi-Axle	Total in Numbers	Total in PCU
2030	3932	2982	47	250	1375	859	1025	439	10909	15459
2042	7061	5355	85	449	2470	1543	1841	788	19592	27762

2.2.10 Road Markings/Signage/Road Furniture

Proper Traffic signs throughout the whole project stretch along with intersections with other roads and other facility location will be provided for giving proper direction and warning to the driver, as well as direct them the route they want to follow.

Road Signs: Traffic signs are important features of traffic control devices and transmit visually vital information to drivers and ensure increased safety and efficiency in free flow of traffic. All these signs shall be of informatory nature. All signs shall be retro-refectories type. Quantification for road signs have been done based on the locations of intersections and other features along the corridor.

Road Markings would be done with thermoplastic paints with reflective bands. It will consist of lane line and edge line. The details of Lane markings are shown Drawings volume.

The other items covered under this sub-head are road furniture like km stones, 5th km stones, Hectometer stones, delineators, and boundary stones. They are to be laid as per IRC specifications over the entire length of the road

Delineators have been proposed depending upon the proposed radii of the horizontal alignment and height of embankment or valley site. The delineator posts have been proposed near all curves of radii less than 1000m, with spacing given as per IRC. The delineators, guard posts/pillars will be painted with alternate black and white paint bands and reflectors will be provided in each post

2.2.11 Enhancement of Inventories

Apart from developing the existing road, the project has also proposed several other enhancements such as bus-bays, truck lay-byes and Rest areas with Restaurant, toilet facilities, ATM facility, Emergency First Aid, Repair / Maintenance facility, parking provisions for trucks and cars, PCO and Police outposts.

2.3 Cost Estimate

The cost of the road portion has been worked out based on the cross-sections, plan and profile and other drawings for widening and strengthening of the project road.

The analysis of rate based on "Standard Data Book", published by ministry of road transport and highways, Government of India (MoRTH). For the details cost estimate refer to Volume 1 in main report.

3 Policy, Legal and Administrative Framework

This chapter reviews the existing institutional and legislative set-up pertaining to the project at the National and state levels. The chapter also elaborates on the various clearances and permissions required for the project from Government of Assam, Ministry of Environment and forests, Government of India

3.1 Institutional Setting

The project has been initiated and is being carried out by the National Highways and Infrastructure Development Corporation Ltd.(NHIDCL). The primary responsibility of the project rests with the NHIDCL in providing encumbrance free ROW to the concessionaire who shall implement the project. The main government agencies who uphold the implementation of the various environmental legislations are:

- Ministry of Environment and Forests, Government of India (MoEF), New Delhi formulates and regulates all country level legislations besides giving prior environmental clearances through a committee for category A projects, wild life clearances and forest diversion clearances.
- State Level Environmental Impact Assessment Authority (SEIAA), in the states gives prior environmental clearances to category B projects.
- Central Pollution Control Board (CPCB) monitors and implements pollution related legislations
- State Pollution Control Board monitors and implements pollution related legislations in the state besides giving NOC for establishing and operating plants under air and water acts
- State Department of Forests gives permission for forest diversion and felling of trees

3.2 The Legal Framework

The Government of India and the Governments of Assam have formulated a host of policy guidelines, acts and regulations aimed at protection and enhancement of environmental resources. The following sections discuss the various legal issues associated with the project.

3.2.1 Country Level Environmental Legislations

The Government of India has formulated various legislatures for protection and enhancement of environmental resources. The following table summarises the relevant legislations as well as clearances required for the project.

Sl. No.	Law / Regulation / Guidelines	Relevance	Applicable Yes / No	Reason for application	Implementing / Responsible Agency
1	The Environmental (Protection) Act. 1986, and the Environmental (Protection) Rules, 1987-	Umbrella Act. Protection and improvement of the environment. Establishes the standards for emission of noise	Yes	All environmental notifications, rules and schedules are issued under the act	MoEF. (Govt. of Assam) State Gov. SPCB

Sl. No.	Law / Regulation / Guidelines	Relevance	Applicable Yes / No	Reason for application	Implementing / Responsible Agency
	2002 (various amendments)	in the atmosphere.			
2	The EIA Notification, 14th September 2006 and subsequent amendments	To accord environmental clearance to new development activities listed in schedule of EIA notification.	No	1. This notification is applicable for NH, SH and Expressways only – this project relates development of Economic Corridors, Inter Corridors and Feeder Routes 2. Although the project road is >100km but does not involve additional right of way greater than 40m in existing alignment and 60 m in bypass and realignment section.	MoEF. SEIAA
3	Notification for use of Fly ash, 3rd November 2009	Reuse large quantity of fly ash discharged from thermal power plant to minimize land use for disposal	No	No thermal power plants within 100 km	MoEF
4	Office memorandum dated 18.05.12 by MoEF in view of Apex Court order dated 27.2.2012	Conserve top soil, aquatic biodiversity, hydrological regime etc. by haphazard and unscientific mining of minor minerals	Yes	In case of renewal of quarries and opening of new borrow areas	SEIAA
5	National Environment Appellate Authority Act (NEAA) 1997	Address Grievances regarding the process of environmental clearance.	No	Grievances are dealt with, within this act.	NEAA
6	Forest Conservation Act (1980)	To check deforestation by restricting conversion of	Yes	Road widening and improvement work requires diversion of significant forest land	Tree removal will be guided as per state government

Sl. No.	Law / Regulation / Guidelines	Relevance	Applicable Yes / No	Reason for application	Implementing / Responsible Agency
		forested areas into non- forested areas			rules.
7	Air (Prevention and Control of Pollution) Act, 1981	To reduce air pollution by controlling emission of air Pollutants as per the prescribed standards.	Yes	For construction; for obtaining NOC for establishment of hot mix plant, Diesel Generator, etc	SPCB
8	Water Prevention and Control of Pollution) Act1974	To reduce water pollution by controlling discharge of pollutants as per the prescribed standards	Yes	This act will be applicable during construction for (establishments of hot mix plant, effluent disposal, etc.	SPCB
9	Noise Pollution (Regulation and Control Act) 1990	The standards for noise for day and night have been promulgated by the MoEF for various land uses.	Yes	This act will be applicable as vehicular noise on project routes is required to be assessed for future years and necessary protection measure need to be considered in design.	SPCB
10	Public Liability and Insurance Act 1991	Protection form hazardous materials and accidents.	Yes	Contractor need to stock hazardous material like diesel, Bitumen, Emulsions etc.	SPCB
11	Explosive Act 1984	Safe transportation, storage and use of explosive material	Yes	Blasting may be involved in some locations	Chief Controller of Explosives
12	Minor Mineral and concession Rules	For opening new quarry.	Yes	Regulate use of minor minerals like stone, soil, river sand etc.	District Collector
13	Central Motor Vehicle Act 1988 and Central Motor Vehicle	To check vehicular air and noise pollution.	Yes	These rules will be applicable to road users and construction	Motor Vehicle Department

Sl. No.	Law / Regulation / Guidelines	Relevance	Applicable Yes / No	Reason for application	Implementing / Responsible Agency
	Rules1989			Machinery.	
14	National Forest Policy1952 National Forest Policy(Revised) 1988	To maintain ecological stability through conservation and restoration of biological diversity.	Yes	This policy will be applicable as project intervention requires forest land to be acquired.	Forest Department, GoI and Govt. of Assam
15	The Mining Act	The mining act has been notified for safe and sound mining activity.	Yes	The construction of project road will require aggregate through mining from riverbeds and quarries	Department of mining. State Govt. of Assam
16	The Building and Other Construction Workers (regulation of employment and conditions of service) Act, 1996	To regulate the employment and conditions of construction workers and to provide for their safety, health and welfare measure and for other matter incidental thereto	Yes	A large number of construction workers skilled, semiskilled or unskilled will be employed temporarily during Construction Phase of the project	Ministry of Labor and Employment
17	Hazardous Wastes (Management and Handling) Rules, 1989	Protection to the general public against improper handling and disposal of hazardous wastes	Yes	Hazardous wastes such as used oil, batteries, paint residues, etc. will be generated during the project.	SPCB

3.3 Applicability of EIA Notification, 2006 and Amendments

According to the Environmental Impact Assessment Notification, dated 14th September 2006 (amended till date) various development projects and activities require prior Environmental Clearances. All these projects and activities are categorized into two categories - Category A and B, based on the spatial extent of potential impacts on human health, natural and manmade resources.

The requirements for highway projects are specified in schedule item 7(f) of the Notification.

Project or Activity		Category with Threshold Limit		Conditions, if any
		A	B	
(1)	(2)	(3)	(4)	(5)
7	Highways	(i) New National	(i) All New State Highway Projects;	General Condition shall apply.

(f)		Highways; and (ii) Expansion of National Highways greater than 100 km involving additional right of way or land acquisition greater than 40m on existing alignments and 60m on re-alignments or by-passes.	and (ii) State Highway expansion projects in hilly terrain (above 1000 MSL) and/or ecologically sensitive areas.	General Conditions: Any project or activity specified in Category 'B' will be treated as Category 'A', if located in whole or in part within 10km from the boundary of: i) Protected Areas notified under Wild Life (Protection) Act, 1972; ii) Critically Polluted areas as notified by the Central Pollution Control Board from time to time; iii) Notified Eco-sensitive areas; iv) Inter-state boundaries and international boundaries. Note: Highways include Expressways.

The project road is passing through few habitation areas and length of the project road is 14.050 km. However, this project road is not situated above 1000MSL and not passing through any notified eco-sensitive area. Therefore, the project does not belong to Category 'B' projects. Hence, this project does not require 'Environmental Clearance' as per EIA Notification, 2006 and amendments made thereafter.

3.3.1 State Level Environmental Legislation

Clearances for setting up hot-mix plants, batching plants, etc., under the Air and the Water Acts, establishing new quarries and establishment of new tube-wells / bore-holes to be procured from SPCB, State Department of Mining and Sate Ground Water Boards / Authorities respectively.

3.3.2 Other Legislations Applicable to Road Construction Projects

The concessionaire shall ensure that other legislations like Child Labour (Prohibition and Regulation) Act; 1986, Minimum Wages Act; 1948, The Factories Act; 1948, The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 etc. are properly followed.

3.4 Clearance Requirements for the Project

The summary table showing time requirements for agency responsible for obtaining clearance, and a stage at which clearance will be required is given below.

Sl. No.	Type of clearance	Statutory Authority	Applicability	Project stage	Responsibility
1	Prior Environmental Clearance	MoEF	Not Applicable	Pre construction	-
2	Permission for Activities near archaeological protected area	Archaeological survey of India / the state department of Archaeology	Applicable, if relics are found	Pre construction	Contractor/ PIU

Sl. No.	Type of clearance	Statutory Authority	Applicability	Project stage	Responsibility
3	Clearance for working / diversion of sanctuary land	Chief Wild Life Warden	Not applicable	Pre construction	-
5	Forest Clearance	State Department of Environment and Forest and MoEF	Applicable	Pre construction	Contractor/ PIU
6	Tree felling permission	Forest department	Felling of trees	Pre construction	Contractor/ PIU
7	NOC And Consents Under Air , Water, EP Acts & Noise rules of SPCB	State Pollution Control Board	For establishing hot mix/ batching plants	Construction (Prior to work initiation)	Concessionaire / Contractor
8	Permission to store Hazardous Materials	State Pollution Control Board	Storage and Transportation Of Hazardous Materials and Explosives	Construction (Prior to work initiation)	Concessionaire / Contractor
9	Explosive license	Chief controller of explosives	Storage of explosive materials	Construction (Prior to work initiation	Concessionaire / Contractor
10	NOC under Hazardous Waste (Management and Handling) Rules, 1989	State Pollution Control Board	Disposal of hazardous wastes	Construction (Prior to work initiation)	Concessionaire / Contractor
11	PUC certificate for use of vehicles for construction	Department of Transport	For all construction vehicles	Construction (Prior to work initiation)	Concessionaire / Contractor
12	Quarry lease deeds and license	Dept. of Geology and Mines	Quarrying and borrowing operations	Construction (Prior to work initiation)	Concessionaire / Contractor
13	NOC for water extraction for construction and allied	Ground Water Authority	Ground water extraction	Construction (Prior to work initiation)	Concessionaire / Contractor

Sl. No.	Type of clearance	Statutory Authority	Applicability	Project stage	Responsibility
	works				

3.5 Conclusion

The project requires permission for cutting the trees within the proposed ROW. In addition to the above, the concessionaire would require the following NOCs & licenses from the authorities during construction:

- NOC & Consents under Air, Water, EP Acts & Noise rules for establishing & operating plants from SPCB
- PUC certificate for use of vehicles for construction from Department of Transport
- Quarry lease deeds and license and Explosive license from Dept. of Geology and Mines & Chief controller of explosives
- NOC for water extraction for construction and allied works from Ground Water Authority

Apart from the above clearances, the concessionaire also has to comply with the following:

- Clearance of Engineer for location and layout of Worker's Camp, Equipment yard and Storage yard
- Clearance of Engineer for Traffic Management Plan for each section of the route after it has been handed over for construction
- An Emergency Action Plan should be prepared by the contractor and approved by the Engineer for accidents responding to involving fuel & lubricants before the construction starts
- Submit a Quarry Management Plan to the Engineer along with the Quarry lease deeds

4 Analysis of Alternatives

The consideration of alternatives is one of the more proactive sides of environmental assessment enhancing the project design through examining options to avoid or minimize impacts that would be inevitable if technically (based on design speed and geometrics) best-fit alignment is followed. This calls for the systematic comparison of feasible alternatives for the proposed project site, technology and operational alternatives. Alternatives are compared in terms of their potential environmental, social impacts, capital and recurrent costs, suitability under local conditions, and institutional, training and monitoring requirements. The environmental costs and benefits are quantified to the extent possible, economic values are assessed where feasible on the basis for the selected alternatives are stated.

4.1 Alignment Selection due to Environmental Considerations

The selection of the alignment / widening options along various sections has been worked out based on continuous interaction between the engineering design team and environmental study teams. Various alignment improvement alternatives for the project road have been analyzed along entire project road considering rural sections, urban sections, forest areas and junctions.

The factors considered for evaluation of alternatives are:

- Flora and fauna likely to be impacted;
- Productive agricultural land likely to be impacted;
- Impacted water resource and surface water bodies;
- Environmental quality to be impacted;
- Land availability;
- Land use along the alignment;
- Residential / Commercial structures Impacted;
- Utilities likely to be impacted;
- Common property resources likely to be impacted;
- Religious structures affected;
- Impact on sensitive, cultural and community properties;
- Impact on air and noise quality

4.2 Safety Aspects

In assessment of the impacts of the project, safety of the road users and the roadside communities has been found to be a major concern. A number of measures have been proposed to reduce the risk of traffic accidents. The safety measures taken are:

- Improvement of existing Deficient horizontal Curve,
- Improvement of existing Deficient Vertical Curve
- Provision of Adequate Traffic Signage,
- Provision of Breast Wall and Retaining Wall
- Widening of Bridge
- Improvement of Existing Highway Junction

4.3 With And Without Project Alternatives

The 'with Project' scenario includes improvement of the project road starts from Rakhaldubi (junction with NH-27) in Hapachara and ends at Tulungia (junction with NH-17). The proposed road will be 4-lanes with paved shoulder configuration.). The project will have multiple benefits.

The 'with project' scenario has been assessed to be economically viable and will alleviate the existing conditions. To avoid the large-scale acquisition of land and properties, the project envisages the widening of road to two lanes and mostly along the existing tracks to minimize the loss of properties and livelihood.

With project scenario project road will reduce travel time substantially. In addition this project road will provide further benefit 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 industries, agriculture and handicrafts;
- Development of tourism and pilgrimage;
- 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

In the case of 'without project' scenario, the existing road is a narrow road without carriageway will be considered as it is. Considering the present traffic volume and potential growth in near future, the capacity of the present road is insufficient for handling expected traffic volume and calls in for immediate improvements.

To avoid the acquisition of land and properties, the project envisages the development within the existing ROW. In spite of the various development benefits likely to accrue due to the project, the project would be accompanied by certain impacts on the social and environmental components. The potential impacts on the various environmental components can be avoided through good environmental practices. Wherever avoidance of negative impact is not possible, appropriate mitigation and enhancement actions will be worked out to effectively offset the environmental damages inflicted due to the project. Action Plan has been worked out to improve the well-being and livelihood of the people to be impacted.

The "with" and "without" project scenarios are analysed with respect to the development of the state by the back-drop of requirement of reliable quality infrastructure for sustained growth economy and consequent well-being of its citizens. The comparison of both the scenario is presented at

Table 4-1: Comparison "with" and "without" project scenario

Sr. No	Parameters	Without Project Impacts		With Project Impacts	
		Positive	Negative	Positive	Negative
1.	All weather Accessibility		Due to improper drainage system &bad conditions of road except small section, road get blocked for traffic during heavy rains	Road will be accessible throughout year since drainage will be improved along all sections.	
2.	Road Safety/ Accident rate		There is insufficient road safety signee at present and due to this sometimes road accidents take place at habitation areas and at critical road sections.	Proposal includes Sufficient safety provisions at highly populated areas and critical sections, so road accidents definitely will reduce.	
3.	Transportation / Vehicle maintenance /operating cost		Operating and maintenance cost of vehicles running on project road is very high as pavement condition is very bad and also more wear & tear because of frequent application of sudden brakes.	Operating and maintenance cost of vehicles will significantly reduce with smooth road and more comfortable driving at critical sections due to section improvement .	

Sr. No	Parameters	Without Project Impacts		With Project Impacts	
		Positive	Negative	Positive	Negative
4.	Travel time / increasedspeed		Travel time is more due to less speed & congestion.	Reduction in travel time and speed will increase.	
5.	Loss of Property and livelihood		There are no commercial establishments in area due to bad connectivity.	Project may provide job/ livelihood opportunities to people through commercial establishment in area due to good connectivity with other cities and towns.	Some people will lose their property and livelihood due to land acquisition for bypass and realignment for approaches of minor bridges and for geometrical improvement. Where ROW is not sufficient to accommodate improvements.
6.	Change in Environmental quality during construction		Slow speed of vehicles on rough road emit high level of particulate matters and gases which cause air pollution and drivers use horn during congestions which lead noise pollution.	-	1. Temporary degradation ofair qualitybecause of hotmix plant, stonecrusher,generator and other machineryduringconstruction 2. Machinerywill cause noisepollution 3. Constructionspills, wastes,degradedmaterials willcausedeterioration ofsoil quality andsurface water.
7.	Change in Environmental quality after construction		Deterioration of air quality through dust, gasses and noise pollution because of vehicles speed and congestions.	Less Noise pollution because of ease in congestion and diversion of traffic through bypass.	
8.	Loss of vegetative	No felling of	The old trees may become a	Vegetative cover will be	Compensatoryplantation willenhance vegetative

Sr. No	Parameters	Without Project Impacts		With Project Impacts	
		Positive	Negative	Positive	Negative
	cover	trees.	safety hazard to the road users with passage of time.	removed within corridor of Impact.	coverof area
9.	Access to basic facilities such as Markets, schools, Hospitals etc.		Difficulty in accessing the basic facilities due to heavy traffic.	Easy access to basic facilities due to fine road	
10.	Employment opportunities & local economy growth.		Very limited business opportunities. Very poor economic condition of local public	Business opportunities will create and life style will improve due to well connectivity with state capital and other areas	
11.	Others (Fuel consumption, Tourism)		Increase in fuel consumption, dust pollution because of rough road	1. Fuel consumption will be reduced due to smooth road 2. Tourism opportunity may be developed after road improvement	

Base on analysis of “with” and “without” project scenario presented at Table 3.1, “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 have definite advantage to area in development of its economy and progress for its people.

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

construct project road. This construction will result in loss of private properties and loss of living.

4.4 Engineering / Technological Alternatives

As per IRC:SP 48-1998 (Hill Road Manual) rigid pavement option is not recommended for the road located in hilly terrain considering the following aspects:

a) High initial cost.

b) Large scale difference in day and night temperature causes thermal stresses.

c) Practical construction and maintenance problem as road construction period available in high altitude and snow fall areas is very limited due to the following:

- Very high rainfall (reaching as high as 1200-1500 mm annually in certain area) spread over six months or so with very high intensity for short duration which creates problem of drainage of pavement, erosion and instability.
- Some regions in high altitudes in winter resulting extreme cold temperature, issues like repeated freezing and thawing create problems of design, composition, construction, drainage and maintenance of pavement.

Therefore, Flexible pavement option is recommended for its lowest cost. The other point of the circular has been considered during the preparation of DPR.

4.5 Conclusion

The analysis of alternatives for the Hapachara-Tulungia Project alignment indicates that the socioeconomic and environmental considerations have been given due weightage in the finalisation of the alignment. The minor adverse impacts would be manageable to an acceptable level by implementing Environmental Management Plan and the unavoidable loses will be compensated as per the applicable R&R guiding principles.

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5 Baseline Environmental Profile

This section deals with the description of existing environmental settings in study area. The environmental baseline data comprises the features present within the proposed ROW as well as a strip of 500m on either side of the existing road. This area is referred to as study area/project area in the report. It includes environmental features such as forest areas, conservation areas, water bodies (rivers, lakes, ponds and reservoirs), cultural properties, industries, and places of historical importance, tourism etc. The scope of this chapter is limited to only those issues, which are of concern in the environmental Impact assessment. The data/features documented here under have been collected through field investigations, interactions with local population, desk research and published data sources.

EIA is a formal process for identifying the likely effects of particular activities or projects on the environment and human health and welfare. EIA also encompasses the development of mitigation measures to address these impacts and suggested approaches for implementation of mitigation and monitoring measures. EIA is not to be regarded as an academic exercise as this has to ensure that environmental values and factors have to be integrated into the decision-making process. EIAs convey information about environmental effects of a project to decision makers at a stage when such information can materially affect the output.

5.1 Project Area

The Project road starts at Rakhaldubi (junction with NH-27) in Hapachara and passes through village / localities namely Rakhaldubi, Hapachara, Garugaon-1, Garugaon-2, Jiyaguri, Sidalsati, Kakaijana, Beltoli, Kadamtola and ends at Tulungia (junction with NH-17). The entire alignment follows the existing road. In general eccentric and concentric widening has been proposed in majority portion of road length. The existing length of the project stretch comes out as 14.050Km. After necessary geometrical improvements the proposed length comes out as 14.660km.

5.2 Methodology

5.2.1 Study area:

Project Influence Area: As per guidelines of EIA Notification-2006 and MoEF Environmental Impact Assessment Guidelines Manual for Highways, the Project Influence Area has been defined as 10 km on either side from boundary of road for collection of secondary data, including impacts due to ancillary sites like borrow areas, quarry, material storage and disposal areas.

Direct Impact Zone (DIZ): The primary baseline data has been collected within the right of way as well as area falling within 500 m on either side of existing right of way. The overall project's direct impact has been identified for the areas coming under Direct Impact Zone, which is the proposed ROW that is 45 m for the project area.

Baseline Environmental Conditions: A detailed survey has been carried out and a strip plan has been prepared covering all environment features and components in the project stretch, within the project influence zone. The primary baseline data has been collected within the proposed ROW as well as area falling within 500m on either side of existing ROW. The secondary data has been collected within the 10 km of the existing centerline of highway. Primary data for ambient air quality, ambient noise status, water quality (Ground and surface) and soil quality will be generating after 30th September.

5.3 Physical Environment

5.3.1 Meteorology

The study of Meteorological and micro meteorological parameters is significant in a road project as these parameters regulate transport and diffusion of pollutants released into the atmosphere. The following sections describe the key elements of the climate, viz., temperature, wind, rainfall and relative humidity and evaporation.

5.3.2 Climate of Bongaigaon

The climate of the project district is almost same with that of other districts of Assam. The cold season starts in the district from the end of November when both the day and night temperature begin to fall sharply. The temperature generally goes down to the minimum points in the months of December, January and February. These three months are the coldest month of each year when the mean daily minimum temperature reaches between 12° centigrade to 20^0centigrade. From the end of February the mercury level slowly goes up and in July, August and September, the temperature reaches the maximum point. During these months, the mean maximum temperature does not come below 31° centigrade. These months can be treated as hottest months for the district in each year. The high percentage of moisture in the atmosphere makes the weather irritating. The percentage of relative humidity in these months is between 85 and 88 percent. In the month of October, the temperature generally comes down and the nights become more pleasant in the district.

Most of the rainfall in a year causes due to the prevalence of south west monsoon while winter rains, in scanty comes from the north east monsoon, occasionally associated with thunder showers due to westerly and local effect. The greatest amount of precipitation occurs in June, with an average of 759 mm. The average annual temperature in Bongaigaon is 24.3 °C. Precipitation here averages 3159 mm.

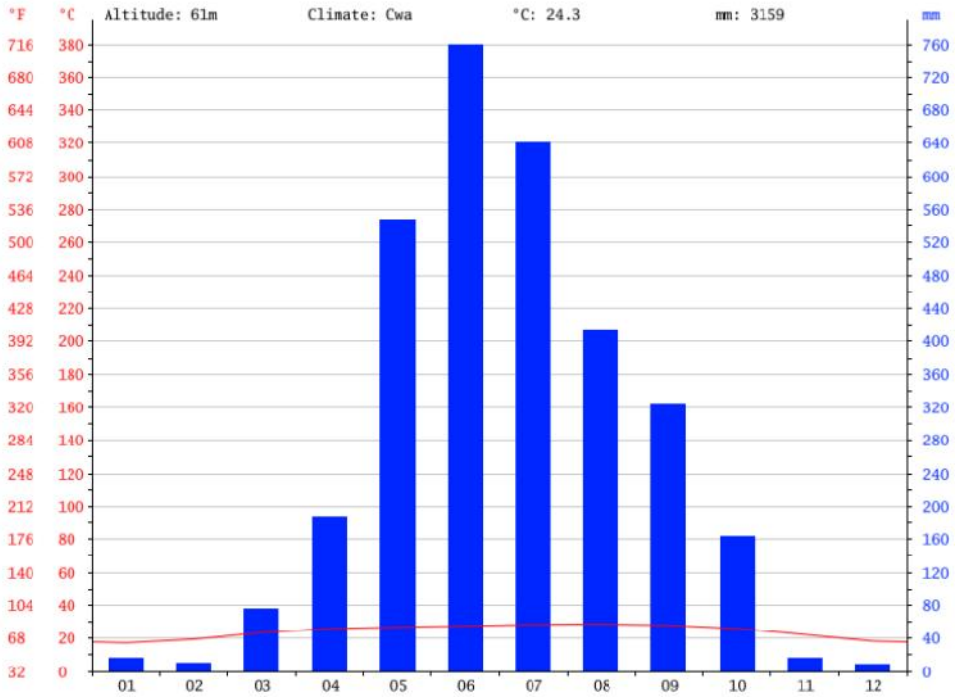

Figure 5-1: Temperature and Rainfall variation in Bongaigaon district

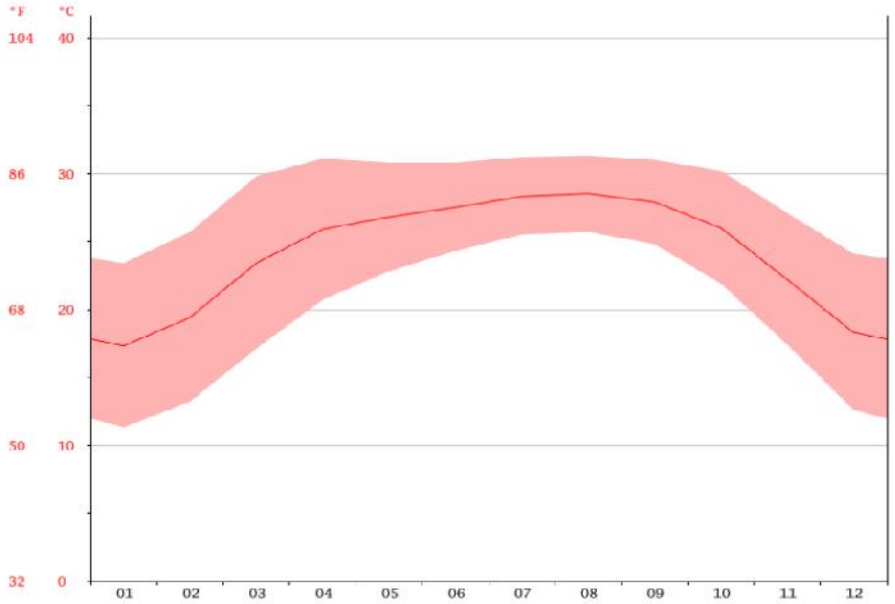

Figure 5-2: Average temperature of Bongaigaon district

Figure 5-3: Wind rose of Bongaigaon district

The wind rose for Bongaigaon district shows how many hours per year the wind blows from the indicated direction.

5.3.3 Land

Geology of Bongaigaon District

The Bongaigaon district is characterized by an abundance of marshes and low lands, the soil of which contain a large percentage of organic matter. The solid geology of the district which mostly lies under the broad level plain is covered by alluvium. The older alluvium composed of light terrace gravel stretches from the Bhutan border. The soil is composed of sand and clay in varying proposition ranging from pure sand near the rivers to stiff clay. The soils in Bongaigaon are generally fertile due to annual deposit of slit. . The soil type is generally sandy to sandy loam with alluvial deposits. The soil is highly porous and therefore, lacks moisture retention capacity and is susceptible to erosion. The water level in the district is very low. The rivers also act as reservoir for fisheries. The district has a total of six registered beel fisheries.

Soil

The four orders of soils are found in the district namely (i) Entisols (recent alluvium), (ii) Inceptisols (old alluvium), (iii) Alfisols (Mountain valley) and (iv) Ultisols, (Laterised red). The soil of the zone is mostly acidic nature and PH increases near the river Brahmaputra. The organic carbon and available Nitrogen of the soil mostly varies from medium to high, low in available P_2O_5 and medium in K_2O status. The soils of the district are suitable for most of the agricultural and horticultural crops. Of late, siltation and sand deposition problems are posing serious threats in some pockets of the district.

Soil is generally acidic in reaction. Organic Carbon context availability is high. While available Phosphorous and available Potash are medium straits or micronutrients like Copper, Freon, Manganese and Zinc are sufficient.

Physiographic

The district has a Plain Topography; however, it is also having some hillocks and hilly areas in some parts of the district. The mighty river Brahmaputra flows along the southern part of the district and its tributary Aie river flows through the district besides many small rivulets and streams.

5.3.4 Hydrology and Drainage

The existing drainage system, formed by rivers and nallahs, carries to the major rivers of the project area. The major rivers of the project area is Kanyapari area. The excess volumes formed by rain; return flows from irrigated areas and waste water from urban flows to these rivers. On the contrary, its impeded flow participates in the flooding of areas away from the main Channel of Rivers.

5.3.5 Seismicity

Based on the distribution of epicenters, fault plane solutions and geotectonic features, northeastern region is divided into five seismotectonic zones. These are (I) Eastern Himalayan collision zone (ii)Indo-Myanmar subduction zone (iii) SyntaxiS zone of Himalayan arc and Burmese arc (Mishmi Hills) (iv) Plate boundary zone of the Shillong Plateau and Assam Valley and (v)Bengal Basin and Plate Boundary Zone of Tripura Mizoram fold belt.

The proposed project corridor attracts under zone-5 (Plate boundary zone of the Shillong Plateau and Assam Valley). Seismicity in this zone is considered as the plate-boundary zone activity. Seismic activity is quite high in this zone.

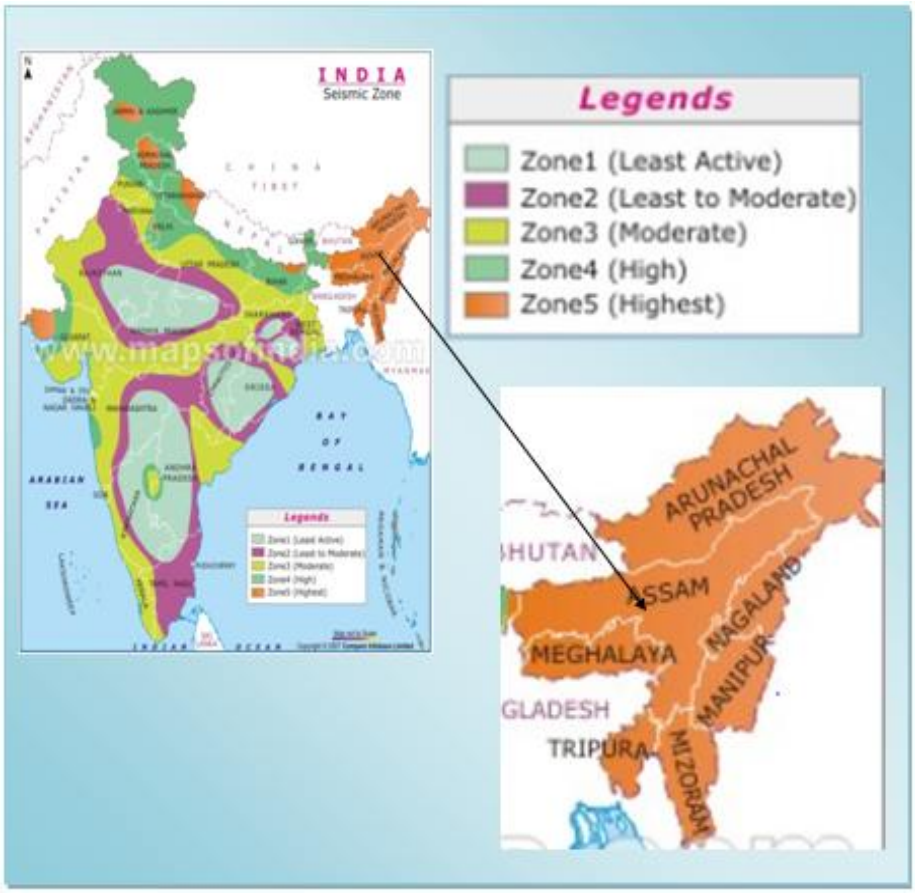

Figure 5-4: Seismic Zone Map of India & Project area

5.3.6 Baseline Environmental Monitoring

Baseline environmental monitoring will be carried out after 30th September. Sampling of soil and water, monitoring of air quality and noise level and other field data will be collected after 30th September. Baseline data will be inserted after the complication of environmental monitoring.

5.3.6.1 Result and Analysis of Soil Quality

Water quality is a concern for the numerous surface water sources and the groundwater sources in road construction.

5.3.6.2 Ambient Air Quality

In order to assess the Ambient Air Quality (AAQ), samples of ambient air will collected by installation of Respirable Dust Sampler at different locations within the study area during study period and analyzed for primary air pollutants to work out the existing status of air quality.

Ambient air quality is the most important parameter that is required to quantify the impact on the natural and biophysical environment. Ambient air quality has been conducted during winter season in the year of 2018-2019 at total one (1) locations along the project road alignments. SPM and RPM have been determined gravimetrically and as specified in IS 5182 (Part 23):2006. The concentration of NOx has been estimated IS 5182 Part 2:2001 method and SOx has been estimated by IS 5182 Part 6:2006 method. CO was measured with EPA Method 13.

The monitoring station had been distributed throughout the project road so as to get representative baseline of any variation in land use as well as road geometrics and traffic conditions across the project road. The purpose is also to establish a benchmark, which can form the reference for monitoring in the construction and operation period.

Baseline AAQ Monitoring

Ambient air quality monitoring will conducted after 30th September. The National Ambient Air Quality Standards (NAAQS) and ambient air quality monitoring results are presented in Table 5-1.

Table 5-1: National Ambient Air Quality Standards

Pollutant	Time Weighted Average	Concentration in Ambient air (µg/m3) ***	
		Industrial, Residential, Rural and Others	Ecologically Sensitive
Sulphur Dioxide (SO2)	Annual Average*	50	20
	24 hr**	80	80
Nitrogen Dioxide (NO2)	Annual Average *	40	30
	24 hr**	80	80
PM10	Annual Average *	60	60
	24 hr**	100	100
PM2.5	Annual Average *	40	40
	24 hr**	60	60
Carbon monoxide mg/m3	8 hr **	02	02
	1 hr	04	04
* Annual Arithmetic mean of minimum 104 measurements in a year taken for a week 24 hourly at uniform interval. ** 24 hourly / 8 hourly values should meet 98 percent of the time in a year *** except for CO			

5.3.6.3 Water Resources

The mighty river Brahmaputra flows along the southern part of the district and its tributary Aie river flows through the district besides many small rivulets and streams. Though a number of rivers and tributaries are flowing over the district, the scenario of flow and lift irrigation is very poor. Out of total net sown area, 20% is actually under assured irrigation and remaining 80% is rainfed. No major and medium irrigation project is running in the district.

5.3.6.4 Ground Water Quality

All ground water sources monitored were Hand Pumps and deep wells. Since the ground water is used without treatment by a large portion of population, the quality of ground water is of great concern. Ground water sample will collected after 30th September.

5.3.6.5 Noise

Noise attributed to roads depends on factors such as traffic intensity, the type and condition of the vehicles plying on the road, acceleration/deceleration/gear changes by the vehicles depending on the level of congestion and smoothness of road surface (IRC: 104-1988). High noise levels are a concern for sensitive receptors, i.e. hospitals, educational institutions, etc.

The Central Pollution Control Board has specified ambient noise levels for different land uses for day and night times and these are given below in Table 3-7 below. Importance was given to the timing of exposure and areas designated as sensitive.

Table 5-2: National Ambient Noise Level Standards

Area Code	Category	Limits in Decibels (dB A)	
		Day Time	Night Time
A	Industrial	75	70
B	Commercial	65	55
C	Residential	55	45
D	Silence Zones	50	40

Source: Central Pollution Control Board, New Delhi

Note:

1. Day-time: 6 AM to 10 P.M., Night-time: 10 PM to 6 AM;
2. Silence zone is an area up to 100 m around premises as hospitals, educational institutions and courts.

5.4 Ecological Environment

The ecology is the scientific analysis and study of interactions among organisms and their environment. It is an interdisciplinary field that includes biology and Earth science. The biodiversity and conservation discipline explores natural landscapes, species and ecosystems and acquires theories and practical methods in preserving environments and organisms. Biodiversity refers not only to endangered species but also to every organism, including microbes and fungi. Biodiversity and conservation programmes increase awareness and understanding of how human life depends on preserving animal species and natural ecosystems. Biodiversity and conservation is connected to similar disciplines like environmental science, natural resources management and animal sciences.

5.4.1 Flora of the project area

Careya arborea, Dillenia scabrella, D. pentagyna, D. indica, Semecarpus anacardium, Erythrina indica, Terminalia belirica, T. arjuna, Holarrhena antjdysenterica, Toona ciliata, Premna benghalesis, Ficus spp., Cassia fistula, Michelia spp., Flacourtia jangamos, Garcinia cowa, Bombax ceiba, Streblus asper, Syzygium spp., Albizzia spp. Pterospermum acerifloium, Alstonia scholaris, Oroxylum indicum, Caryota wens, Calamus spp., 47 Philodendrons etc. are some plants in the forests. Bamboo patches mainly composed o f Bambusa tulda, B, balcooa, Meloccana baccifera etc. are also found in the project district.

Aquatic vegetation:- Tetramelos nudiflora, Batringtonia acutangula, Lagerotroemia flos~reginae etc. are found along the edge o f the water bodies. Nelumbo nucifera, Nymphaea nouchati, N. rubra, Nymphaides spp„ Eurayale ferox, Trapa bispinosa, Vallisneria, Hydrilla, Hydrocharis, Typha Sp., Eichhornia cressipes, Scirpus, Ipoemea aquqtica, I. cornea var. flstulosa, Ludwigia sp. etc. are some common plants representing aquatic vegetation of the project district. So far 93 species of angiosperms are recorded as exotic species in the area being 13.75 % of the total recorded species. Amongst these, 81 species are from dicotyledons (16.56%) and 12 from monocotyledons (6.56%). A good number of threatened species are also found; these include 02 critically endangered, 06 endangered, 08 vulnerable, 01 data deficient and 03 rare species (based on “Assam’s Flora - present status of vascular plants” by S. Chowdhury, Assam Science, Technology and Environment Council, 2005).

5.4.2 Fauna of the Project District

The information of important terrestrial animal groups such as birds, reptiles and mammals are found by trekking inhabiting area, along the road, nearby forest areas and agricultural fields present in the impact zone. An inventory of the animals has been prepared separately for mammals, reptiles and birds. Various types of colorful land birds, water birds and marsh birds are seen in this project area. Little Grebe, Great Cormorant, Little Cormorant, Oriental Darter, Tufted Duck and Water Cock are the commonly found birds in this project area.

Wild animals mostly represented by elephants, Rhinoceros, bisons, buffaloes, tigers, leopards and deer were found in large numbers in this region in the past but at present most of above varieties of animals have disappeared from this region. Frogs and toads are found equally at home in both land and water is found in every part of the region. Fishes of different kind big and small are generally found in beels and rivers. The most common fish are Barali, Cheetal, Bahu,Kaliajara, Bhakua, etc. The small fishes are Puthi, Singara, garoi, Khaliha, etc.

5.4.3 Forest Areas along the Project Road

Forest are important natural resources and they influence climate, soil conditions particularly soil and water balance, erosion, floods, maintenance of bio-sphere, ecology as well as wild flora and fauna etc. 2.11 % of the project district is under forest cover.

However, stretches have been observed along the route where agriculture land and settlements with rural settings has been noticed. However the project road is not pass through any forest area.

5.4.4 Road Side Trees along the Project Road

The baseline ecological survey has primarily taken into account the flora along the roadside, as the direct impact of the road project is on trees in and adjacent to the RoW. Road side vegetation is likely to be impacted due to road widening. However, no endangered floral species was seen along the roadside. Based on the walk-over survey along the proposed alignment, it is estimated approximately 1907 individual trees of various native species may required to be felled during the project construction phase. Road side vegetation is likely to be impacted due to road widening.

5.5 Socio-Economic Environment

5.5.1 Demographic pattern

The population of the district as per census 2011 is 7, 38, 804 with a higher male population. Its population growth rate over the decade 2001-2011 was 19.58 per cent. The population density per sq. km is 676 which contribute 2.37 per cent of state population density. The overall literacy rate is 69.74 percent with higher literacy in males (74.87 %) and lower (64.43%) in females. Bongaigaon district has a sex ratio of 966 females for every 1000 males.

Table 5-3: Demographic pattern of the project districts

Description	Information
Actual population	738804
Male	375818
Female	362986
Population growth	20.59 %
Area sq. Km	1093
Density/km^2	676

5.5.2 Educational Institutes

There are a total of 2 schools (both primary and secondary) along the project corridor. These sensitive receptors are exposed to dust and noise from the road. These educational institutions are located on the edge of the road and are a serious concern from the point of safety and Signage and Safety measures are required.

5.5.3 Archaeological Protected Monumentsand Religious Structures within RoW

The project highway traverses through a number of settlements and there are some community and cultural properties significant to the community. Cultural and community properties along the project highway were identified and documented in the earlier EIA report. There are 3 numbers of temples along the project road.

Table 5-4: Religious structures along the project road

Sl. no	Hospital Name	Side	Chainage (KM)
1.	Temple	RHS	6.265
2.	Temple	RHS	6.305
3.	Temple	RHS	6.451

5.5.4 Industries

The project influence area has small scale industries. These industries area located far away from the project influence area.

5.5.5 Public Facilities

The project road is passing through few numbers habitations area. There are 3 numbers of passengers shed along the project road.

Table 5-5: Details of Public facilities along the project road

Sl. no	Public Facilities	Side	Chainage (KM)
1.	Passengers Shed	LHS	6.480
2.	Passengers Shed	LHS	8.515
3.	Passengers Shed	LHS	10.670

5.5.6 Land Use Pattern of the Project Area

The alignment does not pass through or located nearby any National Park, Wild life Sanctuary or any other ecologically sensitive or protected areas. No archaeological/protected monument is located in the project vicinity. The land use pattern around the alignment is predominantly agricultural. The details land use pattern along the project road is in Figure 5-5.

LANDUSE/LANDCOVER MAP OF THE ENTIRE SURROUNDING REGION OF THE PROJECT ROAD: HAPACHARA-TUNGIA ROAD

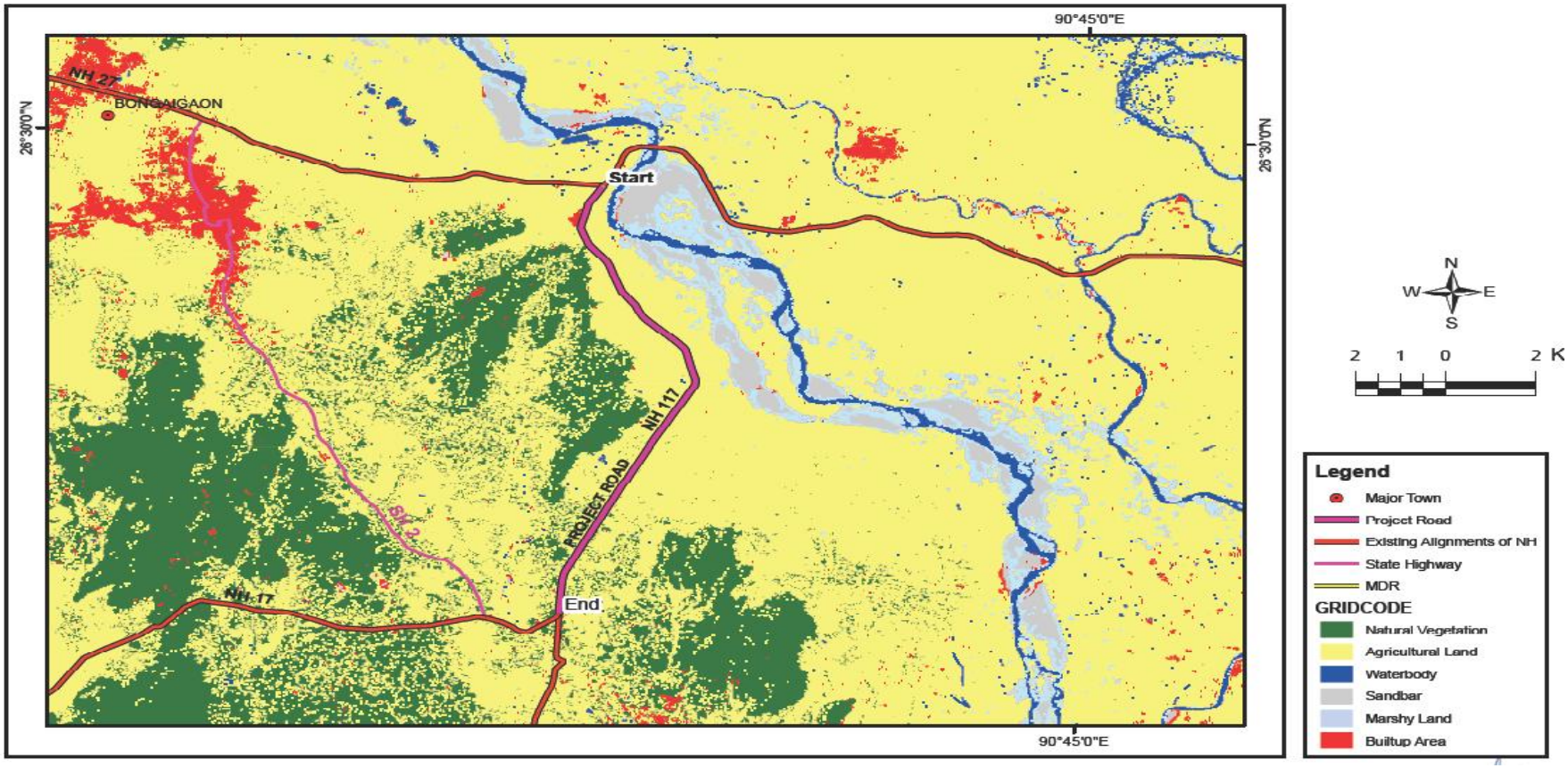

Figure 5-5: Landuse and land cover map along the project road

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5.5.7 Settlement

During road inventory, it has been observed that there are 10 nos. of habitations along the project road. Details of the habitations are given in Table 5-6

Table 5-6: List of Habitations along the Project Corridor

Sl. No.	Chainage (KM)		Length (KM)	Name of Habitation
	From	To		
1	0.000	0.400	0.400	Rakhaldubi
2	0.400	1.800	1.400	Hapachara
3	1.800	2.400	0.600	Garugaon-1
4	2.400	3.200	0.800	Garugaon-2
5	3.200	5.400	2.200	Jiyaguri
6	5.400	7.000	1.600	Sidalsati
7	7.000	8.000	1.000	Kakaijana
8	8.000	10.000	2.000	Beltoli
9	10.000	11.600	1.600	Kadamtola
10	11.600	14.050	2.410	Tulungia

6 Public Consultation

As a part of the legal requirement and to ensure that the community support is obtained, public consultations were carried out for this proposed project. The feedback in the consultation sessions has led to substantial inputs for the project designs.

Consultations involve soliciting people's views on proposed actions and engaging them in a dialogue. It is a two-way information flow, from project authorities to people and, from people to project authorities. While decision making authority would be retained by the project authority, interaction with people and eliciting feedback allows affected populations to influence the decision making process by raising issues that should be considered in designing, mitigation, monitoring and management plans and the analysis of alternatives.

This chapter documents the issues that are important to the community, their aspirations and their addressal by the project. Information source for the chapter has been the similar documentation as part of the Resettlement Action Plan RAP, with the social team conducting these sessions. The objectives of consultation sessions, the procedure adopted and the outputs of the consultation conducted have been briefly described in the following sections.

6.1 Objectives

The main objective of the consultation process is to minimize negative impacts and to maximize the benefits from the project to the local populace. The objectives of public consultation are:

- Promote public awareness and improve understanding of the potential impacts of the proposed project;
- Identify alternative designs and mitigation measures;
- Solicit the views of affected communities / individuals on environmental and social problems;
- Improve environmental and social soundness;
- Clarify values and trade-offs associated with the different alternatives;
- Identify contentious local issues which might jeopardize the implementation of the project;
- Inform the affected populace about the entitlement framework and to settle problems with mutual consent; and
- Create accountability and sense of local ownership during project implementation.

6.2 Consultation Sessions

Consultations were done during the site visit using various tools including interviews with government officials, questionnaire-based surveys with stakeholders etc. The public consultation carried out during the field visit of the project has been summarized in the following sections.

The extent of adverse impacts was one of the major criteria in deciding locations for public consultation sessions. A listing of the various consultation sessions conducted at different locations along the entire project corridor is presented in **Error! Reference source not found.**. These community consultations were held during various times of the design period and were attended by the NHIDCL staffs, consultant's environmental and social experts.

Table 6-1: Location Specific Consultation Strategies

Sl No	Level	Type	Key Participants
1	Individual	Local level Consultation	People along the project corridor
2	Individual	Door to Door Personal Contact	People along the project corridor
3	Village	Focus Group Discussion	Women, truckers, weaker sections, agriculturist, School teachers
4	Institutional	Stake holder Discussion	Line departments

6.2.1 Institutional Level Consultations

The institutional level consultations were held with representatives of institutions having stakes in implementation of the project. The institutions contacted included State Forest Department, State Pollution Control Board etc. In addition to this, officials from other departments were also contacted on several occasions. The contacted officials included revenue officers, irrigation department, etc.

6.2.2 Site Visit Level Consultations

Consultation was carried out at the feasibility stage to identify:

- Location specific social and environmental issues to be addressed through design
- Socio economic profile of community along the project route
- Extent of likely social and environmental impact due to the project
- Expectation and reservation of people towards the project
- Resettlement and rehabilitation option

6.2.3 Location Specific Consultation Needs

Several project road specific consultation needs identified were:

- Where owners of property, land and building / structures or their tenants are involved, consultations are required;
- Need for improvement of intersection, curves, etc. has to be ascertained from people through consultation process;
- The noise sensitive receptors if any are to be identified through public consultation process.

6.3 Identification of Issues

6.3.1 Issues Raised during Consultations

Based on the public consultation, the key environmental, health, safety and social issues identified were:

- Air Quality & Noise levels
- Water pollution, water scarcity in non-monsoon months, construction water requirements
- Roadside trees, tree plantation
- Health issues, such as water borne diseases
- Employment opportunity during civil works
- Location of labour camp and hot mix plant sites

- Safety issues
- Involvement of PAPs in Rehabilitation and Resettlement Plans & Resettlement Options
- Impact on property and land acquisition
- Enhancement of common property resources

6.4 Continued Consultation

As part of the continued consultation program, the following actions are proposed:

- Conduct public hearing for the project at all the districts through which the project road is passing
- Implement the suggestions / recommendations and address those grievances that are technically feasible without compromising on the quality and safety
- Continue consultations with the public and stake holders during the various stages of the construction and operation for smooth implementation of the project.

Table 6-2: Addressal of General Issues and Concerns under the Project

Sl no	Issue / Concern	Addressable under the project
1	Dust and Air Pollution	• Plantation of trees and shrubs along the highway and on median • Turfing on earthen slopes and earthen shoulders • Water spraying to be adopted near the crushers during construction stage.
2	Increased noise levels	• Provision of Noise attenuating wall near sensitive receptors • No-horns signage near schools, colleges and hospitals • Tree plantation and development of green belts along the project corridor abutting settlements to attenuate traffic noise
3	Traffic Congestion	• Improvement of intersections • Provision of Flyovers, bypasses, underpasses and service lanes etc at suitable locations • Road widening itself will be a major factor to avoid traffic jams
4	Road safety	• Provision of Service lane to separate local traffic from through traffic • Proper highway signals provided • Widening of bridges to avoid accidents • Grade level pedestrian crossing • Proper lighting at accident prone locations
5	Cultural properties	• Care has been taken to preserve sites of cultural heritage as far as possible. • Where unavoidable the religious structures within ROW to be relocated only after consultation with local community.
6	Fauna and flora	• Tree clearing within ROW has been avoided beyond what is directly required for construction activities and or to reduce accidents • Compensatory afforestation would be done as per the directives of the forest department.

Sl no	Issue / Concern	Addressable under the project
		• Fruit bearing trees and shade trees, to be planted on the roadside.
7	Roadside Drainage	• Rising of road sections and cross drainage structures in areas facing overtopping problems. • Location of structures based on hydrological study • Provision of proper drainage scheme for the settlements
8	Water bodies	• In unavoidable cases provision for increasing depth of water bodies to increase its capacity is made.
9	Road side amenities	• Provision of facilities like Rest Areas, Truck stoppage site (lay bye) and bus stops along the highway
10	Assistance to vulnerable groups	• Special provisions have been made in the entitlement framework for assisting vulnerable groups to improve their quality of life.
11	Employment of locals during construction	• Locals will be given preference for employment during the project implementation

6.5 Key Findings of the Consultation

Major findings related to key issues such as general perception about the project; suggestions to mitigate hardships resulting from dislocation and loss of livelihood are presented below:

- It was observed that people are not only aware of the project but also welcomed the project in general.
- People want that their views should be taken into account in every matter where it counts for realignment involving new road construction
- They have requested for facilities and amenities like bus stand and safer accessibility at points of habitant's area
- Affected population wanted to know about the exact period when the work will start.
- People suggested that adequate safety measures should be provided such as speed breakers, safety signage's etc. near the school.
- It was felt during consultation that regular meeting with the local population / community could easily resolve any dispute between the community and implementing agency.
- The RAP shall address the social issues brought to the fore during the public consultations.

7 Potential Environmental Impacts & Mitigation Measures

The existing environmental conditions have been described in the Chapter 5. In this chapter, the impacts of theproposed project on the environment have been predicted. Impacts on various environmental attributes duringconstruction as well as operation and mitigate measures have been discussed.

The environmental impacts caused due to the development of the project road sections can be categorised as primary (direct) and secondary (indirect) impacts. Primary impacts are those which are induced directly by the project where as the secondary impacts are those which are indirectly induced and typically include the associated investment and changing patterns of social and economic activities due to the proposed action.

Table 7-1: Activity-Impact Identification Matrix

Sl. No.	Activities	Type of Impact							
		Air	Water	Noise	Flora	Fauna	Drainage	Soil	Topography
1.	Labour camp activities		-ve/t						
2.	Quarrying	-ve/t		-ve/t	-ve/t		-ve/t		-ve/p
3.	Material transport and storage	-ve/t		-ve/t					
4.	Drilling, blasting and hill cutting	-ve/t		-ve/t	-ve/t	-ve/t			
5.	Earthwork						-ve/p	-ve/t	-ve/t
6.	Payment works	-ve/t	-ve/t	-ve/t	-ve/t			-ve/t	-ve/p
7.	Use of construction equipments	-ve/t	-ve/t	-ve/t		-ve/t			
8.	Plantation	-ve/p		-ve/p	-ve/p				
9.	Drainage work						-ve/p		
10.	Culvert and bridge construction		-ve/t	-ve/t			-ve/p		
11.	Stripping of top soil							-ve/p	
12.	Debris generation						-ve/t	-ve/t	
13.	Oil and grease							-ve/t	

Sl. No.	Activities	Type of Impact							
		Air	Water	Noise	Flora	Fauna	Drainage	Soil	Topography
14.	Construction in forest and sensitive areas	-ve/t	-ve/t	-ve/t	-ve/t	-ve/t	-ve/p	-ve/p	-ve/p

Notes: t – temporary, p – permanent. Impact indicated in bold letters indicates significant impacts

Identification and assessment of the potential environmental impacts are based on secondary information supplemented by field visits. Impacts on various environmental components have been assessed at four different stages, namely:

- the project location;
- design and pre-construction;
- construction; and
- operation stages.

A few permanent as well as short-term and long-term adverse effects, mainly at the construction and operation stages, are, nonetheless, anticipated. Temporary short term impacts can be kept in check through proper planning and adopting environment friendly road construction methods and the appropriate regulatory measures.

7.1 Type of Impacts of project road

The types of environmental impacts due to construction and operation phases of project road can be identified in following phases. Pre-construction phase, Construction phase, and Operation phase.

During the construction and operation phase of the project road, the environmental impacts may be in form of: Direct impact, Indirect impact and Cumulative Impact

Direct Impacts: Direct impacts of the road include mainly impacts caused by the road construction such as soil and land surface disturbances, vegetation clearance and material removal activities. These impacts are expected to be significant and need to be mitigated properly.

Indirect impacts of the project: Indirect impacts occur within the region of influence of the road project, at locations more distant from the construction corridor. These include induced development, water quality deterioration downstream and soil erosion, likely to be experienced at furthest distances from the project. These impacts are normally observed during the operation phase of road projects.

Cumulative Impacts: This type of impact results from synergetic effects or added up of several impacts which results in environmental changes. Due to the possibility of a combination of the different categories of impacts in one of the main elements of the environment that will be affected by the road construction activities impacts evaluation and mitigation measures will take in consideration both categories.

7.2 Positive Environmental Impacts due to improvement of subproject road sections

The positive impacts expected from the improvement of the Project Road stretch from Hapachara to Tulungia section include;

- improved quality of life for the rural population in the project influence: this as a result of better access to markets, health, education and other facilities; and the derived stimulus for local economic activity;

- a more efficient and safe road transport system: through reduced travel times, reduced road accidents, reduced vehicle operating and maintenance costs and reduced transportation costs for goods;
- It provides connectivity to nearby state West Bengal through NH-27 (Old NH-31C) at Rakhandubi Chariali (start point of project road). NH-27 starts from Porbandar and ends near Silchar in the state of Assam.
- It provides direct connectivity to important villages/market areas of Hapachara, Jiyaguri, Sidalsati, Kakaijana & Tulungia.
- The project road will play a vital role towards socio-economic development of road side settlement areas. The Social benefits arising due to the project will be triggered off due to improved accessibility to various services such as easy access to markets, health facilities, school, work place etc.
- It increases the income of the locals, and ultimately elevating their standard of living.

7.3 Negative Environmental Impacts due to improvement of subproject road sections

Identification and assessment of the potential environmental impacts are based on secondary information supplemented by field visits. Impacts on various environmental components have been assessed at three different stages, namely: design and preconstruction; construction; and operation stages.

The identified impacts are the following:

- Disfiguration of landscape by road embankments on road widening;
- Risk of encroachment on precious ecology such as sensitive or protected areas.
- Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction sites
- Creation of temporary breeding habitats for mosquito vectors of diseases.
- Accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials and loss of life.
- Increased noise and air pollution resulting from traffic, leading from increased traffic volume.
- Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road.
- Social conflicts between locals and migrant workers.
- Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as fuel and other chemicals, explosives, etc. during construction and operation.
- Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning.

Table 7-2: General impact on environment

Environmental Component Affected	Planning and Design/Pre-construction Phase	Construction Phase							Road Operation	Indirect effects of Operation or Induced Development
	Project Activity									
	Land acquisition	Removal of structures	Removal of trees and Vegetation	Earth works including quarrying	Laying of Pavement	Vehicle & Machine Operation & maintenance	Asphalt & Crusher plants	Sanitation & waste (labour campus)	Vehicle operation	
Air	-	Dust generation during dismantling	Reduced buffering of air & noise pollution, Hotter, drier microclimate	Dust generation	Asphalt odour	Noise, dust pollution	Noise, soot, odour, dust pollution	odour/ Smoke	Noise, dust pollution	Other pollution
Land	Loss of productive land	Generation of Muck	Erosion and loss of top soil	Erosion and loss of top soil	Reduction of ground water recharge area	Contamination by fuel & lubricants compaction	Contamination compaction of soil	Contamination from wastes	Spill from accidents Deposition of lead	Change in cropping pattern
Water	Loss of water resources	Siltation due to loose earth	Siltation due to loose earth	Alteration of drainage, break in continuity	-	Contamination by fuel & lubricants compaction	Contamination by asphalt leakage or fuel	Contamination from wastes Overuse	Spill Contamination by fuel, lubricants & washing of	Increased Contamination of ground water

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Environmental Component Affected	Planning and Design/Pre-construction Phase	Construction Phase							Road Operation	Indirect effects of Operation or Induced Development
	Project Activity									
	Land acquisition	Removal of structures	Removal of trees and Vegetation	Earth works including quarrying	Laying of Pavement	Vehicle & Machine Operation & maintenance	Asphalt & Crusher plants	Sanitation & waste (labour campus)	Vehicle operation	
				of ditches Siltation, Stagnant water pools in quarries					vehicles	
Flora	-	Loss of Biomass	-	Lowered productivity loss of ground for vegetation	-	Removal of Vegetation	Lower productivity Use as fuel wood	Felling trees for fuel	Impact of pollution on vegetation Lowered productivity Toxicity of vegetation	-
Fauna	-	-	Disturbance habitat loss	Disturbance	-	Disturbance	Disturbance	Poaching	Collision with traffic	Distorted habitat
Agricultural land		Change in land use	Loss of land economic value	Loss of standing crops	Loss of productive land					Conversion of agricultural land
Buildings			Loss of		Noise		Noise		Vibration	Change in

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Environmental Component Affected	Planning and Design/Pre-construction Phase	Construction Phase							Road Operation	Indirect effects of Operation or Induced Development
	Project Activity									
	Land acquisition	Removal of structures	Removal of trees and Vegetation	Earth works including quarrying	Laying of Pavement	Vehicle & Machine Operation & maintenance	Asphalt & Crusher plants	Sanitation & waste (labour campus)	Vehicle operation	
and built-up structures			structures, Debris generation, noise and air pollution		vibration may cause damage to structures		vibration - damage to structures		and Noise	building use and characteristics
People and community	Anxiety and fear among community		Displacement of people psychological impact on people loss of livelihood	Loss of shade and community trees, loss of fuel wood and fodder, loss of income	Noise & air pollution	Odour and dust	Noise & air pollution collision with pedestrians livestock and vehicles	Community clashes with migrant labour	Noise pollution, Risk of accidents	Induced pollution
Cultural assets			Displacement of structures	loss of sacred trees	Noise vibration may		Damage from vibration		Damage from vibration	

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Environmental Component Affected	Planning and Design/Pre-construction Phase	Construction Phase							Road Operation	Indirect effects of Operation or Induced Development
	Project Activity									
	Land acquisition	Removal of structures	Removal of trees and Vegetation	Earth works including quarrying	Laying of Pavement	Vehicle & Machine Operation & maintenance	Asphalt & Crusher plants	Sanitation & waste (labour campus)	Vehicle operation	
			from Row		cause damage to structures		and air pollution		and air pollution	
Utilities & amenities			Interruption in supply				Damage to utility and amenities	Pressure on existing amenities		
Labour's health & safety					Increase of stagnant water and diseases	Asphalt odour and dust	collision with pedestrians livestock and vehicles	Increase in communicable diseases	collision with pedestrians livestock and vehicles	

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7.4 Land environment

Land is one of the most important components of the physical environment. During upgrading of the existing road, the potential impacts on soil are discussed as given below:

7.4.1 Impact during Construction Phase for Land requirement, removal of vegetation

Topography of project area is almost plain are seen near to proposed road from Hapachara to Tulungia .

- Loss of agricultural land due to land acquisition for the road
- Generation and storage of spoils and debris due to construction activities.
- Changes in land-use pattern due to proposed widening.

7.4.2 Mitigation Measures

- Excavated earth materials should be re-used to the maximum extent in site preparation.
- Asphalt wastes, debris and other wastes material should be disposed of in environmentally safe area.
- Indiscriminate dumping would be avoided.
- Labour and construction camps should be constructed at the approved sites and away from operation road.
- Indiscriminate settlement of workers should be avoided.
- Haul roads and construction site should be adequately maintained and should not be directly connected to main roads, wherever possible.
- Construction activities should be kept confined to the PROW only.

7.4.3 Impact during Design and Construction Phase on Soil Environment

7.4.3.1 Loss of Productive Soil

For upgrade of the existing road, land requirement is envisaged. According to landuse survey presented in Figure 5-5, almost 50% of the project road traverses through agricultural land. Therefore, adverse environmental impact is anticipated on account of loss of productive soil.

7.4.3.2 Soil Erosion

During the upgrade of the project road, some trees, shrubs and grasses will need to be cleared along the project road, which may pose some soil erosion problem during rains. Suitable mitigation measures will need to be implemented to prevent the soil erosion problem.

Excavations of earth from borrow pit areas may also lead to loss of top soil and cause soil erosion problem.

7.4.3.3 Contamination of Soil

In the road project, the contamination of the soil will be negligible. Further, the contractor shall initiate measures to minimise waste generation from all construction activities. At construction sites, the vehicles and equipments will be maintained properly and refueled only at fueling areas, without spillages. Further, careless handling of construction debris may cause land nuisance and soil contamination.

7.4.3.4 Compaction of Soil

Soil in the adjoining productive lands beyond the ROW may be compacted by the movement of construction vehicles, machinery and equipment.

7.4.3.5 Borrow Areas and Quarries

For filling and embankment during construction phase, borrow pits need to be excavated along the project road. Aggregates will be procured from nearest quarry.

7.4.4 Mitigation Measures during Design and Construction Phase for Soil Environment

During the construction phase, mitigation measures to prevent the soil erosion are:

- Re-plantation of trees,
- Good Engineering & construction practices
- Turfing on embankment
- Providing mild slopes, neither flat nor steep slope,

These steps will efficiently mitigate the potential soil erosion problem and by the time the road is in its operation stage, the ecosystems will restore itself. During construction phase, visual checks on slopes and high embankment areas for signs of soil erosion along the road should be made. In case, soil erosion is found to occur suitable measures should be taken to control the soil erosion.

To avoid the soil contamination, at the wash down and re-fueling areas, “oil interceptors” shall be provided. Unusable debris shall be dumped in nearby landfill sites. The demolition waste shall also be used for construction as far as possible. Oil and grease spill and oil soaked materials are to be sold off to SPCB/ MoEF authorized vendors. If any other hazardous waste as per Hazardous Waste (Management and Handling) Rules, 1989, and amendments thereafter is generated during the construction, it shall be suitably treated or disposed in a landfill site.

To prevent any compaction of soil in the adjoining productive lands beyond the ROW, the movement of construction vehicles, machinery and equipment will be restricted to the corridor.

To mitigate the adverse impact during excavation of borrow pits, following mitigation measures should be taken:

- Indian Road Congress (IRC):10-1961 guideline should be followed for excavation of earth from borrow areas.
- Borrow areas should be excavated as per the intended end use by the owner. In some cases the owners of land want to develop the area in to pond for rearing fishes. The following criteria have been used for selection of borrow pits and amount that can be borrowed. They are as follows:
- Borrow areas should not be located on cultivable lands. However, if it becomes necessary to borrow earth from temporarily acquired cultivated lands, their depth should not exceed 45cm. The topsoil to a depth of 15cm shall be stripped and set aside. Thereafter, soil may be dug out to a further depth not exceeding 30cm and used in forming the embankment.
- Borrow pit shall be selected from wasteland at least 500m away from the road;
- Priority should be given to the borrowing from humps above the general ground level within the road land;
- Priority should be given to the borrowing by excavating/enlarging existing tanks;
- Borrowing should be from land acquired temporarily and located at least 500m away from the road;
- Borrowing should be from mounds resulting from the digging of well and lowering of agricultural fields in vicinity of the road.

- In case of settlements, borrow pit shall not be selected within a distance 800m from towns or villages. If unavoidable, earth excavation shall not exceed 30cm in depth
- The haulage distance from site should not be too far.
- Good engineering and construction practices should be followed.
- Aggregate required for road construction should be procured from quarries approved by State Pollution Control Board. Air and noise emissions from quarry should be well the prescribed limit.

During construction phase, visual checks on slopes and high embankment areas for signs of soil erosion along the road should be made. In case soil erosion is found, suitable measures should be taken to control the soil erosion.

7.5 Ambient Air Quality

The ambient air quality in the project area varies at different locations. High values of PM_{10} and $PM_{2.5}$ are observed in the stretch of start point of Hapachara to Tulungia. SO_2 and NOx levels are found to be well within limits at all the monitoring locations along the project roads.

7.5.1 Impact during Pre-Construction Stage

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

7.5.2 Mitigation Measures during Pre-construction stage

As no major impact is anticipated during the pre-construction stage, no mitigation measure is required.

7.5.3 Impact during Construction Stage

During construction phase, there will be two main sources of air emissions i.e. mobile sources and fixed sources. Mobile sources are mostly vehicles involved in construction activities while emissions from fixed sources include DG sets, construction equipment (e.g. compressors) and excavation/ grading machineries that produce dust emissions.

During the construction phase, dust emissions in unpopulated areas will be emitted and deposited on the leaves of trees and other vegetation which may affect the growth of the trees and other vegetation. Certain amount of dust and gaseous emissions will generate during the construction phase from excavation machine and road construction machines.

Generation of dust particle due to:

- Site clearance and use of heavy vehicles and machinery etc.
- Transport of raw materials, borrow and quarry material to construction sites;
- Earthworks;
- Handling and storage of aggregates at the asphalt plants;
- Concrete batching plants and;
- Asphalt mixing plants due to mixing of aggregates with bitumen.

Certain amounts of dust and gaseous emissions will be generated during the construction phase from excavation and road construction machines. Pollutants of primary concern include Suspended Particulate Matter (SPM) and Respirable Suspended Particulate Matter (RSPM). However, suspended dust particles are typically coarse and will settle within a short distance of construction area. Maximum of the project road has settlements within 10m from the project road. Therefore, although construction phase impact will be temporary but it will be moderate in magnitude.

Considerable amount of emissions of carbon monoxide (CO), unburnt hydrocarbon, sulfur dioxide, particulate matters, nitrogen oxides (NOx), etc, will be generated from the hot mix and batching plants. Hot mix plants should be located away from the populated areas and be fitted with the air pollution control equipments, the emission shall meet Assam Pollution Control Board standards. Further, the hot mix plants must be sited at least 1 km away in the downwind direction from the nearest human settlement. It shall be ensured that the dust emissions from the crusher and vibrating screen from the stone quarries do not exceed the requirements of the StatePollution Control Board.

During construction air quality may be degraded for short periods due to

- The exhaust emissions from the operation of construction machinery
- fugitive emissions from brick, concrete, and asphalt plants
- the dust generated from the haulage of materials, exposed soils and material stockpiles
- cleaning of the road
- material loading and unloading

The impact is expected to be localized, temporary and confined to construction areas.

Construction stage impacts will have adverse impacts on the workers as well as the settlements adjacent to the road, especially those in the down wind direction. Adverse air quality impacts during construction are likely to result from three main sources; (i) emissions from construction equipment, including delivery trucks; (ii) fugitive dust from earth-moving operations and demolition; and (iii) increased traffic congestion in construction areas.

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

Table 7-3: Adverse impacts on air quality during construction stage

Sl no	Impact	Source
1	Generation of Dust (SPM)	Transportation and tipping of cut material - while the former will occur over the entire stretch between the cutting location and disposal site, the latter is more location specific and more intense;
		Activation of landslides and rock falls etc.;
		Transportation of raw materials from quarries and borrow sites
		Stone crushing, handling and storage of aggregates in asphalt plants
		Site levelling, clearing of trees, laying of asphalt
		Concrete batching plants;
		Asphalt mix plants – due to the mixing of aggregates with bitumen;
		Construction of structures and allied activities
2	Generation of polluting gases including SO_2, NO_x and HC	Hot mix plants
		Large construction equipment, trucks and asphalt producing and paving equipment
		The movement of heavy machinery, oil tankers etc. on steep

Sl no	Impact	Source
		slopes will cause much higher emissions of gases
		Toxic gases released through the heating process during bitumen production
		Inadequate vehicle maintenance and the use of adulterated fuel in vehicles.

It is expected that air quality will be affected to some minor extent by dust and particulate matters generated by construction, vehicular movements, site clearance, earth filling and material loading and unloading. The impacts are expected to be localised, temporary and confined to construction areas.

7.5.4 Mitigation Measures for Design and Construction Phase for Air Environment

- Road should be designed with good geometry and roughness less than 4000.
- Road should be designed in such a manner that no traffic congestion happens in the populated areas along the road.
- Vehicles delivering loose and fine materials like sand and fine aggregates shall be fully covered to reduce spills on existing road. Water may be sprayed on earthworks, on a regular basis. During and after compaction of the sub-grade, water will be sprayed at regular intervals to prevent dust generation.
- All vehicles, equipment and machinery used for construction will be regularly maintained to ensure that the pollution emission levels conform to the SPCB norms
- All the vehicles carrying construction material will be covered. Vehicles and machinery will be regularly checked as per the NAAQ standard. Mixing equipment will be well sealed and equipped with dust control removal devices
- All slopes and embankments will have vegetative turfing as per best engineering practices will help to minimize the dust generation during operation of the road.
- During the construction of the project road, emissions from asphalt hot-mix plants, transportation of construction materials and vehicular movement along the stretch will have temporary impact on air quality. However, air quality level is anticipated to be within the prescribed limit for short-term average, except for PM10.

The following mitigation measures will also be taken to mitigate the dust entrainment and fugitive emissions from the various sources:

- Asphalt and hot-mix plants will be located at least 1 km away from inhabited urban and rural stretches along the road with the clearance from Assam Pollution Control Board.
- Sprinkling water will control fugitive dust entrainment.
- The hot mix plant will be fitted with dust extraction units.
- Sprinkling of water on the dust prone areas and construction yard.
- Regular maintenance of machinery and equipment will be carried out.
- Water will be sprayed on earthworks, temporary haulage and detour roads on a regular basis. During and after compaction of the sub-grade, water will be sprayed at regular intervals to prevent dust generation.
- Ambient air quality monitoring should be carried out during construction phase. If monitored parameters are above the prescribed limited, suitable control measures must be taken.

- Workers and construction site will be provided with adequate numbers of personal protective equipments, such as nasal masks, gloves, etc. to reduce the chances of exposure to dust and toxic gases.

7.5.5 Impact during Operation Phase on Air Environment

During the operation phase, air quality along the road will be affected by increased vehicular emissions on the project road. Pollutants of primary concern include NOx, CO, HC, SPM, RSPM and SO_2. However, the increment in pollutant emission expected due to increased vehicular load is estimated to be only 2%. Improvement in road geometry and easing of bottlenecks are expected to significantly offset this increase in pollutant emission. Therefore, the resultant ambient air quality is expected to remain same, if not improved.

Emissions of SPM from the road will depend on the roughness. It is suggested that roughness of road should be maintained at about 4000 to minimise the dust emissions.

7.5.6 Mitigation Measures during Operation Phase for Air Environment

Following mitigation measures are suggested to control the air pollution during operation phase:

- Bottlenecks should be avoided for smooth flow of traffic.
- Plantation of trees, with thick leaf coverage, along the road

Ambient air quality monitoring should be carried out during operation phase. If monitored parameters are above the prescribed limited, suitable control measures must be taken.

7.5.7 GHG Emission

7.5.7.1 Construction Phase

The GHG emissions from a road project typically involve the following components:

- Transport emissions
- Material emissions
- Machines emissions

Table 7-4: Typical breakdown of GHG emissions by generator for various road categories (t CO_2 eq. /km)

Type of Road	Transport emissions	Material emissions	Machines emissions	Total (t CO_2 eq.)
Double bituminous surface treatment Road (DBST)	26	62	14	103

Source: Greenhouse Gas Emissions Mitigation in Road Construction and Rehabilitation - A Toolkit for Developing Countries, World Bank, 2010

Therefore, 14.050 km of road construction would result in emission of approximately 1447.15t CO_2 eq

7.5.7.2 Mitigation Measures:

Alternative practice	Work components & GHG generators concerned	Remarks, if any
Use labor intensive techniques for excavation	Earthworks (Transport, Equipment)	
Optimize location of road safety barriers	Equipment/furniture (Materials, Transport,	GHG emissions from barriers > 5% of total emissions

	Equipment)	
Optimize street lighting	Equipment/furniture (Materials, Transport, Equipment)	
Use recycling	Pavement (Materials, Transport, Equipment)	
Consider gravel roads and surface treatment instead of bituminous / cement concrete pavements	Pavement (Materials, Transport, Equipment)	
Ensure low roughness	Structures (Materials, Transport)	
Ensure recycling of steel	Structures (Materials, Transport)	GHG emissions from metal > 10% of total emissions

Reduction in Transport Emissions:

Transport of materials represents about 30% of the GHG emissions of a road project. From that, about 50% are related to local transport (less than 25 km).

- Use of more efficient road vehicle fleets having a lower unit emission ratio. This can be significant as the efficiency improves with the use of trucks with higher payload (50% decrease in unit emission and savings of more than 20% in total transport emissions).
- Modal shift from road to more efficient modes (rail or water having unit emissions 17 times lower) over long distances. Further improvement can be up to 8% of the total emissions after road transport has been optimized

Reduction in Material Emissions:

- Excavation in hard soil generates two to three times more GHG than in ordinary soil.
- The use of drilling rigs rather than light drillers is twice as productive, but produces 35% more GHG per cubic meter of rock excavated.
- Cold mixtures as well as recycling technologies and materials have lower emissions (a factor of three when compared to hot mixture bituminous structures).

Reduction in Machine Emissions:

- Regular maintenance of the machineries ensure optimum performance of the machines.

7.5.7.3 Operation Phase

The operation phase GHG emission has been calculated based on the emission factors provided in EMEP/EEA air pollutant emission inventory guidebook - 2009, Technical report No 9/2009. Since, the fuel consumption of the vehicles plying on this highway are not available, assumptions have been made on the fuel type and vehicle type based on the Annual Daily Traffic projection provided by the Client.

It has been assumed that:

a) Car/ Van/ Jeep : has Cubic Capacity 1.4 – 2.01 L and runs on petrol
b) Light Commercial Vehicles (LCV) : has Cubic Capacity < 2L and runs on diesel
c) Mini Bus/Bus/2-Axle Trucks/3-Axle Trucks/MAV : has Cubic Capacity > 2L and runs on diesel

Emission Factors Used:

FUEL	CUBIC CAPACITY	EMISSIONS ACCORDING TO SPEED (g CO_2/km)		
		URBAN (21 km/h)	AVERAGE (70 km/h) Other roads	HIGH (107 km/h) Motorways and dual carriageways
Petrol	<1.4 l	205.87	135.96	156.50
	1.4 - 2.01 l	252.62	157.34	173.33
	>2 l	344.32	192.88	220.33
Diesel	<2 l	215.90	134.54	160.68
	>2 l	265.94	169.62	202.22
Hybrid	Any	105.43	101.86	129.44
LPG	Any	175.95	136.10	175.07

Therefore, the estimated GHG emission for the project road would be:

Total CO_2 Emission (t CO_2 /day)	
Year	0.000 km to 14.050 km
2019	26.71
2030	45.68
2042	82.04

7.5.7.4 Mitigation Measure

- Increased use of hybrid and electric cars would reduce the GHG emission;
- Use of solar power in the rest Areas and traffic signals will also reduce carbon foot-print of the project.

7.6 Water Resources

To facilitate the cross-drainage at water crossings, 45 cross-drainage structures including minor bridges, slab, box and pipe culverts will be provided along the project road. The surface water bodies along the project road might be subject to adverse impacts due to the various construction activities as well as during the operation stage of the project. The impacts on water resources have been summarised in Table below.

Table 7-5: Likely Impacts on Water Resources during the Construction Stage

Impacts due to Construction	Indicators
Loss of water bodies	Area of water bodies affected
Loss of other water supply sources	Hand pumps, wells etc. affected
Alteration of drainage, run off, flooding	No. of cross drainage channels
Depletion of ground water recharge	Groundwater in Area rendered inaccessible & impervious
Use of water supply for construction	Quantum of water used
Contamination from fuel and lubricants	Nature and quantum of contaminators

Impacts due to Construction	Indicators
Contamination from improper sanitation and waste disposal in construction camps	Area of camp / disposal site and proximity to water bodies / channels

7.6.1 Impact on Drainage in construction Stage

Impacts of road construction, which lead to alteration of drainage, are generally due to widening at culvert or bridge locations. This requires river and or gully training for the period during which the bridge is to be constructed. Alteration of drainage can lead to soil erosion of adjacent areas, disturb local vegetation and impair local ecology.

- Incidence of water stagnation due to obstruction of drainage on the on-set of monsoon.
- Incidence of accidents in case of blockage of drainage spouts that create water pool on road.
- Increase of flood duration due to obstruction of natural drainage in construction of high embankment.
- Blockage of existing drainage in courses of earth work

7.6.2 Mitigation Measures

- Adequate drains facilities (longitudinal, median and chute drains) should be provided along the road to facilitate the stability of road carriageway. It prevents soil erosion also.
- Existing drainage and cross drainage (CD) structures should be duly augmented, wherever necessary, to accommodate high discharges to avoid flooding and formation of water pool.
- Adequate new drainage and cross drainage (CD) structures should be provided for smooth runoff to avoid water stagnation.
- Inspection of existing drainage spouts before the on-set of monsoon.
- Adequate facilities of drainage at construction site and camp in order to avoid stagnant water pools that also lead to soil erosion and incidence of diseases.

7.6.3 Impacts on Surface Water Resource

In the project, construction of bridges is proposed to across the nallah and river. Bridge constructions require foundation works in the nallah and river bed which includes excavation, drilling and piling works. Minor disturbance of the water flow may likely to occur due to piling and drilling works inside the nallah and river bed for establishing bridge foundations. However these are standard practices for bridge construction works.

Bridge foundation works may result into generation of some quantity of debris materials due to excavation and drilling works. These wastes may cause temporary increase in turbidity and thereby contaminating the water but such situation will occur only for short duration. The impact of increase in turbidity and siltation can be mitigated by providing coffer dams and silt trap around the foundation site before start of piling/drilling works

7.6.4 Mitigation Measures

The above-mentioned problems associated with foundation works can be managed through the proposed mitigation measures

- The bridge construction works will be carried out only during lean period when water flow in the nallah is minimum.
- The bed of the nallah will be cleared from all excavated soils and debris immediately after completion of foundation works.
- All water and liquid wastes arising from construction activities will be properly disposed off and will not be discharged into any water body without adequate treatment.
- Littering or unauthorized discharge will not be permitted.

- Permission of the engineer and the concern regulatory authorities will be obtained for disposal of the waste at the designated disposal point.
- The stream course and drain will be kept free from any dumping of solid wastes and earth materials.
- The fill and debris materials will be stored away from water bodies and only on the designated sites along the construction zones.

7.6.3 Impacts on Ground Water Resources

Water will be required for earthwork, compaction and other construction purposes. Water will also be required for dust suppression at different locations during construction. At workers camp, plant site relatively small quantity of water will be required for drinking and other domestic purposes. The water demands for the construction work may pose severe stress on the public water supply if common water sources are used to meet the water demand for construction as well as various domestic usages by the workers.

7.6.5 Mitigation Measures

The Contractor will arrange their water demand from separate sources so as not to interfere with the normal public water supply. Water from surface water source will be used for construction works with requisite permission from concerned Irrigation Department. However, when the surface water is not available during lean period, approved bore-well from Central Ground Water Authority may be used with prior permission from the competent authority.

7.6.6 Rainwater Harvesting

The proposed project will increase of surface run-off due to more paved road surface. It will have adverse impact on ground water recharging if measures are not taken during the design. Therefore, compensation is required to recharge ground water.

7.6.6.1 Impacts

- Loss of ground water table due to withdrawal of ground water for construction.
- Increase of surface run-off due to more paved road surface

7.6.6.2 Mitigation Measure

Detailed hydrological survey will be conducted and adequate drainage facilities provided to discharge the run-off to existing catchments area.

- Provision of recharge pits, in the design to recharge ground water, in the suburban area.
- Longitudinal road-side drains on both sides of the road and out fall should be nearby culverts/ bridges on nalas/ rivers/ drains.
- All the construction preparatory activities for culverts, bridges and other structure will be carried out during dry seasons.
- Water for construction will be arranged by the contractor from the existing sources.
- Minimum use of water from existing sources for construction purpose will be ensured promoted at construction site/camps to minimize likely impacts on other users.

Rainwater harvesting structures shall be provided near the disposal point of the side drains as prescribed by CGWB guidelines.

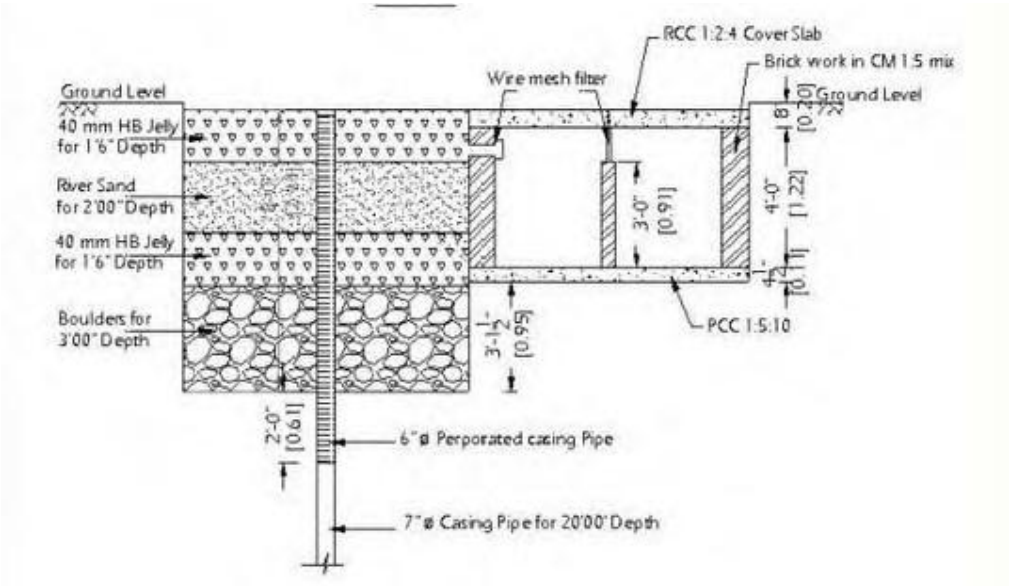


Figure 7-1: Typical rain water harvesting structure

Table 7-6: Summary of Mitigations for Impacts on Water

Sl. No.	Item	Impact	Impact (Reason)	Mitigation / Enhancement
1.	Loss of water bodies	Major, direct impact	Part or complete acquisition of source of water	• Land acquisition to be minimized with provision of Retaining walls • Relocation of ground/ surface water sources.
2.	Alteration of Cross Drainage	Very Low Impact	Major bridge constructions Widening of minor bridges and culverts.	• Widening& construction of bridges, there will be an improvement in the drainage characteristics of the project area.
3.	Runoff and drainage	Direct Impact	Siltation of water bodies Reduction in ground recharge Increased drainage discharge	• Silt fencing to be provided. • Recharge well to be provided to compensate the loss of pervious surface. • Continuous drain is provided, unlined in rural area and lined in urban area.
4.	Water requirement for project	Direct impact	Water requirement for Construction activity. Water requirement for labour	• Contractor needs to obtain approvals for taking adequate quantities of water from surface and ground water sources. • This is required to avoid depletion of water sources. • Water harvesting structures to be provided.

Sl. No.	Item	Impact	Impact (Reason)	Mitigation / Enhancement
5.	Increased sedimentation	Direct impact	Increased sediment laden runoff after the nature and capacity of the watercourse	• Silt fencing to be provided
6.	Contamination of Water	Direct adverse impact	Scarified bitumen wastes Oil and diesel spills Emulsion sprayer and laying of hot mix Production facilities for the labour and officers. Routine and periodical maintenance	• Hazardous wastes (Management and Handling) Rules, 1989 to be enforced. • Oil Interceptor will be provided for accidental spill of oil and diesel Rejected material will be laid as directed by Engineer. • Septic tank will be construction for waste disposal.
7.	Water quality monitoring		Effectiveness / shortfall measurement	• Measures will be revised and improved to mitigate / enhance environment due to any unforeseen impact.

7.7 Impact Noise Environment

7.7.1 Impact on Noise and Vibration

Some salient features related to potential noise impact of road development include:

- The road noise impact is greatest where road passes through populated areas,
- The range of noise level should be understood in relation to the habitation type also, for example, road noise in industrial areas is not likely to be problematic but at sensitive location like schools, hospitals, its impact may be significant,

7.7.2 Impact during Design and Construction Phase on Noise Environment

During the construction phase, noise will be generated from the various activities such as site clearing activities, excavation, erection and finishing. The typical noise levels from these activities are given hereunder:

- Site clearing activities 85 dB(A)
- Erection 80 dB(A)
- Finishing 85 dB(A)

During the construction phase, the noise level is bound to increase by the use of construction machines, generators, etc. The increase is expected to be between 10 - 20 %. However, these noise levels will be temporary in nature mostly during daytime only.

For an approximate estimation of dispersion of noise in the ambient air, a standard mathematical model for sound wave propagation is used. The sound pressure level generated by noise sources, decreases with increasing distance from the sources, due to wave divergence.

An additional decrease in sound pressure level from the source is expected due to atmospheric effect or its interaction with objects in the transmission path.

7.7.3 Resultant Noise Level

The resultant maximum noise level for the above sources as calculated using combined effect equation is 88.7 dB(A). Assuming no environmental attenuation factors, based on the equations, calculations are made which shows that noise level at different distance will be as under:

Area	Permissible Limits (Day Time)	Distance (m) from source
Residential	55 dB (A)	19.2
Commercial	65 dB (A)	6.1
Industrial	75 dB (A)	1.9

Therefore, the impact of noise on surrounding area during the construction phase will be limited within 20 m, hence inferred as moderate. However, in the populated area residential structures are located within 20 m from the road.

7.7.4 Mitigation Measures during Construction Phase for Noise Environment

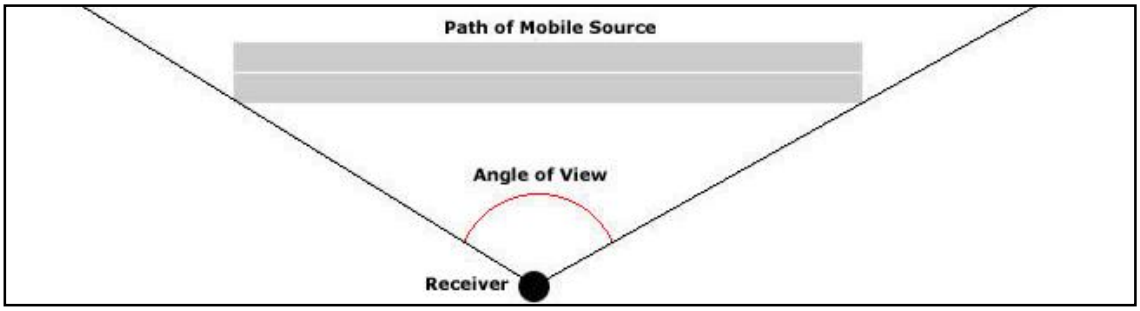
- Site Controls: Stationary equipment will be placed along un-inhabited stretches as per distance requirements computed above as far as practicable to minimize objectionable noise impacts. These locations should be away from known bird nesting areas.
- Scheduling of Project Activities: Operations will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

7.7.4.1 Estimation of Construction Phase Noise

At the outset, it should be noted that unavailability of exact information on the construction methodology, hours of work, no. of equipment and their ratings / fuel consumption, construction schedule, etc. are the limiting factors while estimate the construction noise for this subject project; however, to represent the possible worst case scenario, an effort has been made based on our knowledge on the construction of similar project using QUESTOR Construction Noise Tool.

The QUESTOR Construction Noise Tool is a simple application capable of calculating noise levels for construction sites. It is based on the construction site noise calculation model documented in PR70 "How much noise do you make? A guide to assessing and managing noise on construction sites" by Dr Alan Wills (KVÆRNER) and David Churcher (CIRIA). The tool itself works on a relationship of one receiver to many sources.

'QUESTOR Construction Noise Tool' provides a library of sample plants and the activities they are performing from the BS 5228 standard: The British Standard on Noise. The total noise level calculated by the application is the noise level at the receiver.



As depicted in the above picture, it is considered that for particular construction zone, the source is located at a distance of 50m with 90^0 angle of view. Accordingly, the sound pressure levels are predicted at the receptor location during different activities.

Assessment of Impact:

Based on the calculations, presented below it is anticipated that whenever the construction will happen in any zone other than industrial, the ambient noise level will exceed the statutory level at a distance of 50m away from the construction zone, if no barrier is put.

ID	Type	Noise pressure (dB), 1m from the source	Distance (m)	Barrier	Reflection	On Time (%)	Angle of View (^{0})	Traffic Volume / hour	Speed (km/hr)	Total (dB(A))
Site Clearing										
1	Dozer	116	50	None	None	20	90	10	10	46
2	Tracked excavator	113				20	90			76
3	Tracked loader	113				20	90			76
4	Wheeled loader	108				20	90			71
Total noise from site at receiver										80
Ground Excavation										
1	Dozer	114	50	None	None	20	90	10	10	44
2	Tracked excavator idling	96				20	90			59
3	Tracked excavator	113				20	90			76
4	Wheeled loader	104				20	90			67
5	Tracked loader	112				20	90			75
Total noise from site at receiver										79
Tipping Fill										
1	Dump Truck	110	50	None	None	100	90	10	10	57
Total noise from site at receiver										57
Spreading Fill										
1	Wheeled excavator / loader	104	50	None	None	50	90	10	10	81
2	Dozer	117				50	90	10	10	61
Total noise from site at receiver										81
Spreading Fill										
1	Wheeled excavator / loader	104	50	None	None	50	90	10	10	81
2	Dozer	117				50	90	10	10	61
Total noise from site at receiver										81
Ground leveling										

ID	Type	Noise pressure (dB), 1m from the source	Distance (m)	Barrier	Reflection	On Time (%)	Angle of View (^{0})	Traffic Volume / hour	Speed (km/hr)	Total (dB(A))
1	Dozer	114	50	None	None	50	90	10	10	58
2	Grader	111				50	90	10	10	55
Total noise from site at receiver										60
Unloading										
1	Tipper lorry	113	50	None	None	50	90	10	10	57
2	Tracked loader	112				50	90	10	10	89
Total noise from site at receiver										89
Rolling gravel / bricks										
1	Road roller	108	50	None	None	100	90	10	10	55
Total noise from site at receiver										85
Compacting fill										
1	Vibratory roller	106	50	None	None	50	90	20	15	84
2	Compactor rammer	108	50	None	None	50	90	20	15	86
Total noise from site at receiver										88
Compacting sub-base										
1	Compactor rammer	108	50	None	None	100	90	20	15	89
Total noise from site at receiver										89
Compacting earth										
1	Compactor rammer	108	50	None	None	100	90	20	15	89
Total noise from site at receiver										89
Road surfacing										
1	Asphalt melter (Stationary)	103	50	None	None	70	NA	NA	NA	59
2	Asphalt spreader	110	50	None	None	70	90	10	10	88

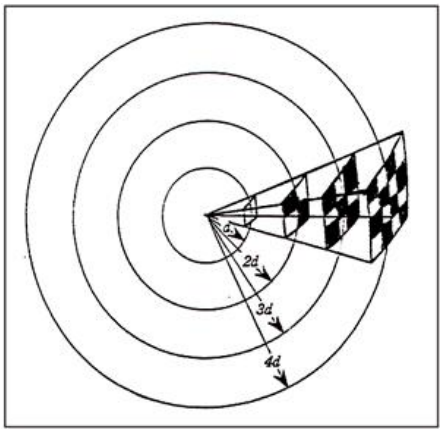
ID	Type	Noise pressure (dB), 1m from the source	Distance (m)	Barrier	Reflection	On Time (%)	Angle of View (^{0})	Traffic Volume / hour	Speed (km/hr)	Total (dB(A))
3	Road roller and lorry	96	50	None	None	80	90	10	10	42
Total noise from site at receiver										88
Installation of traffic light controls										
1	Groove cutter	115	50	None	None	100	NA	NA	NA	73
Total noise from site at receiver										71

Receiver Distance: The minimum distance in meters between the source plant and the receiver – considered as 50m.

* On Time (%): The percentage of time (of the overall time period in question) for which this plant is on.
* Barrier: If there is a barrier between the source and the receiver (None - To reflect the worst-case scenario)
* Reflection: If the receiver is within 1m of a wall then select this option
* Angle of view: 90^0
* Traffic Volume (veh/hour): Total number of return journeys that is made by the mobile plant in an hour
* Speed: Average speed of the plant in kilometers per hour

7.7.5 Operation Phase

Noise during the operation phase will be solely due to plying of vehicles. Based on the traffic projection provided in Table 2-4 and Section 2.1.6, it was found that the AADT is too small for performing the Noise dispersion model.



However, based on the 'inverse square law' of sound propagation, it can be stated that as a sound wave propagates spherically, the sound energy is distributed over the ever-increasing surface diameter of the wave front surface. Thus as per Inverse Square Law for every doubling of the distance from the sound source in a free field situation, the sound intensity will diminish by 6 decibels.

However, World Bank Technical Paper No.376, provides following guidance for calculation of noise from highway source:

- Doubling the distance between the road and the receptor results in a decrease of 3 dB (A) in the noise level.
- When traffic on road is doubled, the noise level increases 3 dB (A), all other factors being equal
- Doubling the speed results in an increase of 6 dB (A)

The residential area is not on the edge of the road. Therefore residential area is not expected to be affected by the noise of the traffic plying on the highway.

7.7.6 Mitigation Measure

To reduce noise and vibrations, noise barriers in the form of compound wall is proposed. In case of space crunch, the use of concrete screens is also suggested. The noise barrier wall shall be constructed by excavation of foundation, laying of brick masonry wall up to a height of 2m above ground, plastering and coping as per the direction of the engineer and as laid in the specification. Creepers and paints shall be used in consultation with the affected community to give an aesthetic look. Shade and flowering trees shall be planted within the boundary of the sensitive receptor, between the building line and the compound wall, wherever space shall be available, 5m centre to centre.

The measures adopted for noise attenuation is given below

- Plantation within the premises if space available for plantation
- Rising of existing boundary wall / construction of new wall up to 2m height
- Planting creepers to provide aesthetic view
- In urban areas the boundary wall can be painted with posters to provide aesthetic views. The option of posters or creepers shall be agreed by the school / hospital administrator.

<u>Noise Pollution Monitoring</u>

The effectiveness of mitigation measures and further improvement in designs to reduce the noise level due to construction and operational activity shall be monitored. The frequency, duration and monitoring plan shall be functional in construction as well as in operation stages as per the Environmental Monitoring Plan. Noise shall be monitored at all locations stated in Environmental Monitoring Plan beside the plant sites.

Table 7-7: Specific Noise Mitigation Measures

Sl. No.	Item	Impact	Reason	Mitigation / Enhancement
1.	Sensitive receptors	Direct impact	Increase in noise pollution Man, material and machinery movements.	• Noise barrier to be provided where ever required • Traffic calming devises to be used. • No Horn Zone sign Post.
2a.	Noise Pollution (Pre Construction Stage)	Direct impact, short duration	Establishment of labour camps, onsite offices, stock yards and construction plants	• Area specific and for short duration. • Machinery to be checked and complied with noise pollution regulations. • Camps to be setup away from the settlements, in the down wind direction
2b.	Noise Pollution (Construction Stage)	Marginal Impact	Stone crushing, asphalt production plant and batching plants, diesel generators etc. Community residing near to the work zones.	• Camps to be setup away from the settlements, in the down wind direction. • Noise pollution regulation to be monitored and enforced. • Temporary as the work zones will be changing with completion of construction.
2c.	Noise Pollution (Operation Stage)	Marginal Impact	Due to increase in traffic (due to improved facility)	Will be compensated with the uninterrupted movement of heavy and light vehicles
3.	Noise Pollution Monitoring		Effectiveness / shortfall measurement	Measures will be revised and improved to mitigate / enhance environment due to any unforeseen impact.

7.8 Management of Debris/ Waste

Waste material will generate due to dismantling of pavement, structures etc. in some sections wherever existing pavement cannot be utilized as determined by the contractor and approved by the NHIDCL. Quarry dust and unused iron bars or damaged support structures constitutes significant waste. Mitigation for solid waste from construction camp has been described in construction camp section.

7.8.1 Mitigation measures

- The excavated bituminous mix materials can be utilized for paving of cross roads, access roads, and paving works in construction sites and camps, temporary traffic diversions and haulage routes.
- All excavated materials from roadway, shoulders, verges, drains, cross drainageand the like will be the property of the NHIDCL and will be used for backfillingembankments, filling pits, and landscaping.
- Unusable debris material should be suitably disposed off at predestinated disposallocations, with approval of the concerned authority. The bituminous wastes shall

bedisposed in secure landfill sites only in environmentally accepted manner. Forremoval of debris, wastes, and its disposal MoRTH guidelines should be followed.

- Unusable and surplus materials, as determined by the Project Engineer, will beremoved and disposed off-site.

The locations of dumping sites should be selected with following considerations.

- Unproductive/wastelands shall be selected for dumping sites.
- Away from residential areas and located at least 500 m downwind side of these locations,
- Dumping sites do not contaminate any water sources, rivers etc
- Dumping sites have adequate capacity equal to the amount of debris generated.
- Public perception and consent from the village Panchyats about the location of debris disposal site has to be obtained before finalizing the location.
- Form works will be re-used to the extent possible, more than 20 times as dictated by good practice. All stripped formworks will be examined for any damage and rectified in the workshop for re-use. Rectification includes plugging holes, and straightening bent steel props.

7.9 Biological Environment

During the design and construction of project road, following impacts are expected.

7.9.1 Forest Areas

The proposed alignment is not likely to impact the forest. Removal of the existing vegetative cover and the uprooting of few numbers of trees is an unfortunate activity, which will reduce the ecological balance in the areas. This will also enhance soil erosion. The loss of vegetative cover will mostly be permanent and only some might be revived through mitigation efforts. Another impact from road construction activities and deriving from the borrow area, quarrying, preparation and transfer of stone chips and other earthwork; is the accumulation of dust on the surrounding vegetation. This leads to deterioration of the vegetative health, which in turn will affect the ecology as well as the aesthetic beauty of the area.

7.9.2 Roadside Plantations

The principal impact on flora involves the removal of trees for the creation of a clear zone within the Corridor of Impact. Reason for clearing trees is threefold:

- To prevent single-vehicle collision with the roadside trees, trees very close to the road need to be cleared. Roadside trees are safety hazards, particularly those trees with strong and rigid stems. Some trees are safety hazards because they preclude clear sight distances.
- To ease construction of the embankment for the widened road formation and, to permit construction of adequate roadside drainage structure, trees located within the area between the pavement and the daylight line needs to be removed.
- Trees need to be cleared to facilitate construction of traffic detours.
- The stage wise impact on roadside trees and plantation has been described in the following sections.

7.9.2.1 Preconstruction Stage

The project will have a significant, direct and long-term impact on roadside trees in the pre-construction stage. It is estimated almost 1907 trees need to be felled for construction of this

road. The cutting of trees shall have manifold impact. Most visible impact is the loss of shade. Also, there is a possibility of the local people being deprived of tree products, such as wood, fruits, leaves etc. Removal of roadside tress will reduce comfort levels for slow moving traffic and pedestrians. This is the only impact considered important after the effect on the embankment stability has been considered. It may be pointed out that this may be marginal in case of a full fledge road, where the segregation of through (fast-moving) and local (slow moving and pedestrian) becomes a major consideration. This negative implication needs to be taken into consideration by compensating with new plantation along the ROW of the project highway. The felling of trees need to be compensated for by compensatory afforestation, and wherever possible, the options of transplantation of significant trees need to be worked out and adequate provisions for the monitoring of the same need to be worked out.

A far less contentious issue, which normally takes the back seat, is the importance of the ecosystems supported by the roadside trees. Not only would the removal of trees lead to erosion, it would also mean that the micro-ecosystems developed on the roadside with the birds, animals and insects using the plantation over the years would be lost too.

7.9.2.2 Construction Stage

The construction of new road shall involve removal of topsoil and clearing of vegetation cover and felling of trees. The widening and strengthening of the road is involved in forest land acquisition. Hence diversion of forest land is required. Though the loss of these trees is an irreversible and long-term impact, the loss of the roadside plantations shall have to be compensated in accordance to the principles of the Forest (Conservation) Act.

7.9.2.3 Operation Phase

The operation phase is envisaged to have significant long-term positive impact with regard to roadside plantation. Five times plantation against trees to be felled as per IRC: SP: 21-2009 apart statutory requirement as per available land.

7.9.3 Mitigation Measure

The major adverse impacts on flora shall involve the removal of trees, shrub and ground cover from within the Corridor of Impact. As part of the project preparation, to minimise the loss of trees, clearance of only those trees identified from the design will be removed.

Plantation-9535 trees as compensatory plantation (five times plantation against trees to be felled) will be planted as per IRC: SP: 21-2009 apart statutory requirement as per available land.

Savings of Trees- Best effort shall be given to prevent loss of avoidable trees at every possible location.

Transplantation- In order to minimise the negative impact of tree felling and to conserve the gene pool transplantation of trees shall be adopted wherever possible.

Contractor to identify trees that can be transplanted and adopt methodology for transplantation. The methodology shall be approved by the Environmental expert and Employer.

Avenue and Block Plantation

- Avenue plantation along corridor, where ever possible shall be given to compensate the loss of trees due to felling.
- Native indigenous trees species shall be used as far as practicable, strictly avoiding any exotic (but popular) species that can have far-reaching adverse effects on the ecology and water regime of the area.
- Endeavour to initiate plantations before the construction is complete so that the trees are at least a year or two old when the project is completed.

- Contractor shall work out the number of trees to be planted around junctions and for enhancement purposes.
- Avenue plantation with single species only to be planted for a few kilometers (or, the stretch between two market places for example) to provide harmonious and pleasing look, and a regular and wavelike skyline. This row of trees forms the first and innermost line.
- Selection of tree species in outer rows (where multiple rows can be accommodated) has been considered from economic point of view. Therefore, trees that provide fuel and fruit as well as small timber for agricultural implements have been suggested.
- The plantation of trees shall be done subject to availability of space in the proposed ROW.

Protection of Species

Activities during the construction period are likely to have adverse impact on the plant species located along the carriageway. Tree guards shall be provided to protect the young trees in the median and avenue

7.9.4 Impact on Fauna

Domesticated animals dominate fauna species. There is likelihood of slight impact to local domestic animals, which graze in the area especially after the road is constructed. Increased vehicle movement in the area might lead to accidents involving animals. In areas with high traffic volumes, road kill can be a considerable or even the predominant cause of mortality. To avoid such accidental kill, the project shall provide underpasses as part of the project.

More over there shall be positive impact on the faunal species during the operational phase. The plantation activity carried out, as part of the project component shall provide shelter and food for the smaller avian and mammalian species, which in turn shall improve the overall food chain and food web and ultimately the ecology of the area.

7.9.4.1 Impact on Aquatic Ecology

The construction of new bridges will cause some contamination of the river water due to spillage of construction material, sediment loading & increased turbidity downstream of the bridge location. This change shall have short-term impact on the flora and faunal species and change the nature of the substratum resulting in decline in the number and diversity of plants and thus the food web. No negative impacts are envisaged on the aquatic ecology during the operational phase.

7.9.4.2 Impact on Wildlife

There is no wildlife reported in the project area hence, no impact is anticipated.

7.9.5 Mitigation measure

Although no significant fauna species were sighted along the project road, following precautionary measures need to be taken up during the construction stage by Contractor.

- All works are to be carried out such that minimum damage and disruption to fauna is caused.
- Construction workers shall be instructed to protect natural resources and fauna, including wild animals and aquatic life.
- Hunting and unauthorised fishing shall be prohibited.

- During construction, at any point of time, if a rare / endangered / threatened fauna species is spotted, Contractor shall make all arrangements to intimate the wild life authorities and measures will be taken for conservation during the operation period also.

Table 7-8: Summary of Mitigations for Impacts on Biological Environment

Sl. No.	Item	Impact	Reason	Mitigation / Enhancement
1.	Forest area	No impact	No Diversion of protected forest area (felling of road side plantation)	• Compensatory afforestation.
2.	Wild life	No impact	No protected area like sanctuary, national park, biosphere reserve etc. located within 10Km of project area	• Provision for cattle crossing shall be provided • Avenue plantation shall act as the habitat for various faunal components.
3.	Trees cutting	Direct impact	Increase in soil erosion, silting of water bodies. Dust and noise pollution Loss of shade and loss of tree products	• Five times plantation against trees to be felled as per IRC: SP: 21-2009 • Option of compensatory afforestation through Forest Department. • Avenue plantation along corridor, where ever possible. • Identification of incidental spaces (ox bow areas) for group plantation. • Transplantation of trees also explored.
4.	Vegetation	Direct impact	Increase in soil erosion, silting of water bodies, noise pollution, dust pollution	• Clearing and grubbing will be minimised, and sprinkled with water to reduce dust pollution. • Exposed surface like embankment slopes will be protected with stone pitching and turfing. • Open land in and around plant will be vegetated.
5.	Cattle Grazing	No impact	No cattle grazing found	NIl

7.10 Impacts on Social Environment

Upgrading and operation phases of project road will have some beneficial impacts on social environment. Some increase in income of local people is expected as some local unskilled, semiskilled and skilled persons will gain direct or indirect employment during construction phase. Approximately 150-200 construction workers will be engaged from local sources for

about 3 years long construction period. Since the immigration of work force during construction phase is likely to be very small, the social impacts on literacy, health care, transport facilities and cultural aspect are expected to be insignificant.

Temporary medical facilities for the construction workers will be provided if construction camps are required to be set up.

7.10.1 Human Use Values

Amenities and Facilities

The traffic movement will be within the constricted width available and the traffic shall be managed as per the Traffic management Plan. All public utilities like electricity lines, telephone lines or water pipelines which are likely to be impacted shall be replaced before the start of work.

Change in Land Use

The development that the improved road will bring with it will induce a chain reaction towards change in land use. Change In land use will be sparked off as a result of land speculation. The availability of cheap labour and easy access to markets in the city will make roadside areas quite an incentive for the industrialist. Reduced transportation costs and availability of high-class transportation facilities for raw materials and products will be the most important advantage of the improved road.

Exploitation of Resource base

Development of a road in areas previously not easily accessible can work like a double-edged sword for the environmental resources in the area. While the road would unlock potential value in the area, stimulate growth and make the environment hospitable, the rapid depletion of natural resources, by means with which these areas cannot cope is a distinct possibility. Development of such vital Infrastructure will lead to over exploitation of the environmental resources (e.g. too much groundwater pumping, indiscriminate wastewater disposal, etc.). While the medium term impacts may not be large enough to be noticed, the long-term implications of such depletion are potentially disastrous.

Road Safety

The improvement of the project road will entail doubling the development of existing carriageway and improve its condition to allow increasing the vehicles speed. Increased vehicular speed means that the fringe areas of the road are at increased risk from speeding vehicles. The existing facilities and amenities along the road shall be subjected to adverse impacts of road operation. The possibility of accidents is likely to increase. The possibility of this happening is a cause of concern as there are few educational, cultural and health institutes along the road.

Cultural Properties

There are no archaeological heritage, local built heritage and art forms along the project road. There are 2 temples, along the project road also.

7.10.2 Impacts of Construction Workers Camps

During the construction phase of project road, construction worker will be engaged in construction activities. Most of the workers will be from local area and some may be from other areas. This may affect demography of the area for short a time.

Construction stage

Although the construction contractors are likely to use unskilled labour drawn from local communities, use of specialized road building equipment will require trained personnel not likely to be found locally. Sudden and relatively short-lived influxes of construction workers to communities along road will not have the potential to 'skew' certain demographic variables and the traditional social coherence of towns and villages. It is anticipated that the construction labour inputs for the construction works will be in the order of about 150-200 persons per day. However, this number will fluctuate, and the number of worker on any particular day will be higher or lower.

The construction workforce will be made up of the following groups:

- Supervision, specialist and administrative personnel, normally about 50 per cent of the workforce-the contractor would probably arrange local accommodation using boarding houses or rented houses
- Skilled workers, normally about 25 per cent of the workforce - the contractor will probably establish a construction camp for the skilled workers.
- Unskilled workers, normally about 75 per cent of the workforce – contractors normally recruit these workers locally and do not need to provide accommodation.
- The contract documents will require the contractor to obtain all necessary approvals before building a construction camp.

7.10.3 Mitigation measure for Construction Camp

- Construction camp shall be sited at such locations to utilize the existing infrastructure. No productive land should be utilized for construction camp. All sites must be graded, ditched, and rendered free from depressions to avoid water stagnation. Accommodation and ancillary facilities including recreational facility for workers shall be erected and maintained to standards and scales approved by the resident engineer.
- All camps should maintain minimum distance of 500 m from habitation and water bodies.
- All construction camps shall be provided sanitary latrines and urinals with provision of septic tanks attached with soak pits. Storm water drains shall be provided for the flow of used water outside the camp. Drains and ditches shall be treated with bleaching powder on a regular basis. Garbage bins must be provided in the camp and regularly emptied and disposed off in a hygienic manner.
- At every workplace, the Contactor will ensure, in collaboration with local health authorities that a readily available first-aid unit including an adequate supply of sterilized dressing materials and appliances shall be provided. Workplaces remote and far away from regular hospitals shall have indoor health units with one bed for every 250 workers. Suitable transport shall be provided to approach the nearest hospital. At every workplace, an ambulance containing the prescribed equipment and nursing staff shall be provided.
- The Contractor will ensure the good health and hygiene of all workers to prevent sickness and epidemics. These include the HIV/AIDS prevention program to reduce the risk and transfer of HIV virus between and among the workers and community, promote early diagnosis and assist affected individuals. Activities under the program include monthly information, education, and consultation communication campaigns to workers, drivers, delivery crew, and communities on the risk, dangers, and impacts of STD and HIV/AIDS.

- The Contractor will ensure that sufficient supply of suitable and hygienically prepared food at reasonable price is available to the workers.
- The Contractor will provide adequate and safe water supply for the use of the workers.
- The Contractor will ensure that all precautions to protect the workers from insect and pest to reduce the risk to health. This may include the use of insecticides which should comply with local regulations.
- Migrant workers may be the potential carriers of various diseases. Local community may get exposed to the diseases carried by migrant workers. Regular health check-up and immunization camps shall also be organized for the workers and nearby population.

7.10.4 Impact on Quality Of Life Values

Socio-Economic Profile

The impact of the improvements of project road on the socio-economic environment will be significantly beneficial. Improved access and reduced travel time and cost will be major stimuli to economic growth, particularly in rural areas. Better access of agricultural goods to market will be important and a major contributor to poverty reduction. Increased labour mobility will occur. This has both positive and negative impacts. Increased access is a two-way phenomenon, and the corollary to increased access to the project areas is increased access for the residents of these areas to more urban life-styles. Out-migration may result. There is also the likelihood of the relocation of homes and businesses to new roadside locations.

During construction, benefits to local people can be maximized if the contractor recruits construction workers locally regardless of gender. Where possible, he/she should also not discriminate in the employment of women.

Community Impacts

Community impacts are mostly due to the resettlement of people due to the development of project road. Construction camps may put stress on local resources and the infrastructure in nearby communities resulting to people raising grievances. This sometimes leads to aggression between residents and migrant workers.

Health, Safety and Hygiene

Construction of the road will result in the generation of waste. In isolated places, the amount of waste generated may be greater than normal because of substandard subsoil materials, which will need to the replaced.

- Debris generated on account of the above-mentioned activities if not properly disposed might give rise to health problems in the area. However, the structures to be dismantled during pre-construction phase will mainly be of semi-permanent and temporary nature and much of the waste shall be salvageable.
- In case of non-local labour, labour camps are set up at one or more sites adjacent to the alignment, and at some ancillary sites, like aggregate quarries. These labourers hired from outside can have clashes with the local population on account of cultural and religious differences.
- In and around forest areas if alternative fuels are not made available to the workforce, there is a likelihood that trees / branches will be cut down for cooking or heating purposes.
- Unsanitary conditions in the labour camps might also result in impact on health of labourers as well as the local population. Transmission of diseases is also facilitated by the migration of people. During the construction phase work, crews and their dependents

may bring with them a multitude of communicable diseases including Sexually Transmitted Diseases (STDs) like AIDS. This is more so if the nature of the project requires more male-workers, who have migrated from other parts of the state or country.

- During road construction allied activities like quarrying and crushing operations, traffic diversions, etc., may cause disruption of social and economic life of the local population of the nearby areas. Dust and noise generated in crushing and blasting operations may cause nuisance to the nearby communities. Other problems perceived during construction period is inconvenience to the local people as well as the highway passengers due to traffic jams and congestion, loss of access and other road accident risks, as a result of diversion of traffic and construction work on road.
- The traffic amount and speeds are likely to increase throughout the road corridors. The accident risk would tend to increase. Although the design speeds have been kept lower in the major settlement areas, some amount of severance is expected in the rural areas.

Nuisance to Nearby Properties

Nuisance to nearby properties is likely to result from:

- noise and vibration from mechanical devices and construction plant;
- dust during quarrying, construction and the trafficking of new surfaces prior to sealing
- gaseous emissions from heavy equipment; and
- Fumes from asphalt boiling sites.

7.10.5 Mitigation measure

Community / Cultural Resources

All religious/cultural structures are located beyond ROW. No cultural or community structures except few ground water source shall be affected as the proposed development will be accommodated within available ROW. However, if any structure gets affected in final design phase, the structure shall be relocated accordingly.

Work Associated Risks

Contractor is required to comply with all the precautions as required for the safety of the workmen as per the International Labour Organisation (ILO) Convention No.62 as far as those are applicable to this contract. Contractor will supply all necessary safety appliances such as safety goggles, helmets, masks, etc., to the workers and staff. Contractor shall comply with all regulation regarding sage scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress.

Risk at Hazardous Activity

All workers employed on mixing asphaltic material, cement, lime mortars, concrete etc., will be provided with protective footwear and protective goggles. Workers, who are engaged in welding works, would be provided with welder's protective eye-shields. Stonebreakers will be provided with protective goggles and clothing and will be shifted at safe intervals. The use of any toxic chemical during construction will be strictly in accordance with the manufacturer's instructions. The Engineer will be given at least 6 working days notice of the proposed use of any toxic chemical. A register of all toxic chemicals delivered to the site will be kept and maintained up to date by Contractor. The register will include the trade name, physical properties and characteristics, chemical ingredients, health and safety hazard information, handling and storage procedures, and emergency and first aid procedures for the product.

Risk of Lead Pollution

No man / woman below the age of 18 years will be employed on the work of painting with products containing lead in any form. No paint containing lead or lead products will be used except in the form of paste or readymade paint. Face masks will be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scrapped.

First Aid

At every workplace, a readily available first aid unit including an adequate supply of sterilised dressing material and appliances will be provided as per the Factory Rules. Workplaces remote and far away from regular hospitals will have indoor heath units with one bed for every 250 workers. Suitable transport will be provided to facilitate shifting injured or ill person(s) to the nearest applicable hospital. At every workplace an ambulance containing the prescribed equipment and nursing staff will be provided as prescribed.

Potable Water

In every workplace at suitable and easily accessible places a sufficient supply of cold potable water (as per IS) will be provided and maintained. If the drinking water is obtained from an intermittent public water supply, then storage tanks will be provided. All water supply storage will be at a distance of not less than 15m from any latrine, drain or other source of pollution. Where water has to be drawn from an existing well, which is within such proximity of any latrine, drain or any other source of pollution, the well will be properly chlorinated before water is drawn from it for drinking purpose. All such wells will be entirely closed in and be provided with a trap door, which will be dust proof and waterproof. A reliable pump will be fitted to each covered well. The trap door will be kept locked and opened only for cleaning or inspection, which will be done at least once a month.

Safety

Design Stage

Safety of road users as well as of the vehicles plying on the project road is given highest importance and adequate measures have been incorporated in the design of the alignment. The design incorporates adequate numbers of pedestrian and vehicular underpasses to facilitate crossing of the project road by the locals. Concrete crash barriers and / or steel Beam Guardrails shall be installed at the main carriageway.

Construction Stage

Construction activities cause hindrance to traffic movement and are also hazardous for the traffic. Traffic management plans shall be prepared and temporary diversion routes will be identified to divert traffic from construction locations. Signboards indicating construction sites on the road and flags shall be erected. All the signboards giving caution, barricades for diverting the traffic shall be as per highway specifications.

Operation Stage

All safety measures erected at time of construction will be maintained properly. There will be special attention to signage.

8 Implementation Arrangement

8.1 Introduction

The institutional arrangement proposed for the Project has been presented here with defined roles and responsibilities. The responsibility of implementing the mitigation measures lies with the contractor and all the construction activities being taken up by the contractor. The PMC M/s Bongs Prayukti International Pvt. Ltd. (Prayukti) shall monitor the implementation of the work on behalf of M/s CE Testing Pvt. Ltd, who will be responsible for planning all Environmental Management Plan (EMP) activities in the construction phase of the Project.

8.2 Environmental Expert

For effective implementation and management of the EMP, the PMC has an Environmental Expert to deal with the environmental issues of the project. This officer shall interact with the Road Manager to ensure that the mitigation and enhancement measures mentioned in the EMP are adhered. His prime responsibility shall be to apprise the Team Leader of PMC and the Road Manager about the ground conditions. He shall also monitor that the requisite clearances and the NOCs for the project and shall also strictly supervise the adherence to the EMP. The qualifications and responsibilities of Environmental Expert are given below box.

Proposed Qualification and Responsibilities of Environmental Expert (EE)

Qualifications & Experience

- Postgraduate in Environmental Science / Environmental Management / degree in Civil Independent Engineering with specialisation in environment
- 7 years of total experience with a minimum of 3 years in the implementation of EMP of highway projects and an understanding of environmental, health and safety issues
- Prior practical experience in State and National Highways would be an advantage

Roles & Responsibilities

- Primarily responsible for implementation of the EMP on site and ensuing that the environmental quality is meeting the standards laid down by CPCB and other related authority
- The EE shall implement the EMP by assigning the necessary resources and attending such meetings as are required for the effective implementation of the EMP on behalf of M/s CE Testing Pvt. Ltd.

8.3 Reporting System

Reporting system provides necessary feedback to ensure quality of the works and that the program is on schedule. Environmental Management Plan gets implemented in the Project. Reporting system shall be for environmental performance indicators as documented in the contract agreement. The items / performance indicators that shall be reported are:

- RoW Encroachment within five working days of observing any encroachment of RoW – Monthly
- Muck dumping area management- Monthly

- Ambient Air Quality & Noise Levels in construction stretches - Quarterly (during construction period)
- Operational Management Processes including labour deployment during routine and maintenance work – Monthly
- Management of any chance discovery of archaeological remains at any site excavated under the contract. Quarterly (during construction period)
- Prevention of communicable diseases spreading to new areas due to increased communications-Quarterly

8.4 Environmental Capacity Building

Training of staff will be done at a number of levels to raise their levels of environmental awareness. The training can be conducted by either some external agency or through the help of in-house expertise. The main focus of training programmes shall be on implementation of EMP with special emphasis on the project road.

9 Environmental Monitoring Programme

To ensure the effective implementation of the mitigation measures and environmental management plan, it is essential that an effective Environmental Monitoring Plan (EMoP) 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

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Table 9-1: Construction and operation Stage Environmental Monitoring Plan

Environmental Component	Project stage	Parameter	Standards	Location	Duration / Frequency	Cost (Million Rs)	Implementation	Supervision
Air	Construction Phase	PM2.5, PM10, SO2, NOx, CO, HC	National Ambient Quality Standards	Wherever the Contractor decides to locate the Hot Mix Plant (1 site)	Continuous 24-hourly, twice a week, once every year (summer)	For monitoring cost refer to **Error! Reference source not found.**	Contractor through a approved monitoring agency	PIU, Authority Engineer
		PM2.5, PM10	National Ambient Quality Standards	Construction Sites (2 sites)	Continuous 24-hourly, twice a week, twice every year (winter and summer)	For monitoring cost refer to **Error! Reference source not found.**	Contractor through a approved monitoring agency	PIU, Authority Engineer
	Operation Phase	PM2.5, PM10, SO2, NOx, CO, HC	National Ambient Quality Standards	Near major Junction	Continuous 24-hourly, twice a week for four weeks once in a year (summer) for 3 years	For monitoring cost refer to **Error! Reference source not found.**	PIU	PMU

Environmental Component	Project stage	Parameter	Standards	Location	Duration / Frequency	Cost (Million Rs)	Implementation	Supervision
Water Quality	Construction Stage	pH, BOD, COD, TDS , TSS, DO, Oil & Grease, Cl, Pb, Zn, Cd	As per Surface Water Discharge standards	Adjacent water body near concrete batching plants	At 01 location once in a season excluding monsoon for 3 years	For monitoring cost refer to **Error! Reference source not found.**	Contractor through a approved monitoring agency	PIU, Authority Engineer
	Operation Phase	pH, BOD, COD, TDS , TSS, DO, Oil & Grease, Cl, Pb, Zn, Cd	As per Surface Water Discharge standards	Nalla near proposed project road	At 01 location once in a season excluding monsoon for 3 years	For monitoring cost refer to **Error! Reference source not found.**	PIU	PIU
Noise level	Construction Phase	Noise Level in dB (A)	As per National Noise standards	Construction Sites	At 2 locations once in each season excluding the monsoon season for 3years	For monitoring cost refer to **Error! Reference source not found.**	Contractor through a approved monitoring agency	PIU, Authority Engineer

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Environmental Component	Project stage	Parameter	Standards	Location	Duration / Frequency	Cost (Million Rs)	Implementation	Supervision
	Operation Phase	Noise Level in dB (A)	As per National Noise standards	Near sensitive area	At 2 locations once in each season excluding the monsoon season for 3years	For monitoring cost refer to **Error! Reference source not found.**	PIU	PMU
Soil Erosion	Construction Phase	Visual check for Soil erosion	--	On slopes and high embankment	After precipitation	For monitoring cost refer to **Error! Reference source not found.**	Contractor	PIU, Authority Engineer
	Operation Phase	Study of Soil erosion	--	On slopes and high embankment	After precipitation for three years	For monitoring cost refer to **Error! Reference source not found.**	PIU	PMU

Environmental Component	Project stage	Parameter	Standards	Location	Duration / Frequency	Cost (Million Rs)	Implementation	Supervision
Road Side Plantation and wildlife	Construction Phase	Monitoring of trees felling and plantation of saplings	As laid out in the detailed design for project	Entire stretch of project road	During felling of trees	For monitoring cost refer to **Error! Reference source not found.**	Contractor , Forest Dept.	PIU
	Operation Phase	Maintenance of plantation	The survival rate should be at least 75%, below which re-plantation shall be done.	Entire stretch of project road	Every year for 5 years	For monitoring cost refer to **Error! Reference source not found.**	PIU, Forest Dept.	PMU

CETEST TESTING CO. PVT. LTD. KOLKATA 700 092 S.N. BANERJEE ROAD

10 Project Benefits

The Project Road starts at Rakhaldubi (junction with NH-27) in Hapachara and ends at Tulungia (junction with NH-17). The project road provides connectivity to nearby state West Bengal through NH-27 (Old NH-31C) at Rakhandubi Chariali (start point of project road). NH-27 starts from Porbandar and ends near Silchar in the state of Assam.The improvement of existing 2 lane roadsup to 4 lane with paved shoulder standard will give direct connectivity to Dhubri through NH-17(Old NH-31) via. Tulungia i.e. end point of the project Road(NH-17 starts from Sevok in the state of West Bengal and ends near Guwahati in the state of Assam). Villagers will reach to these district towns within reasonable time frame for business, education, health, services and other purpose.

The benefits of the 4 laning with paved shoulder of Hapachara-Tulungia project road may also be seen from a different angle, viz., the local benefit and the wider regional or national level benefit. The entire regional and national economy lying beyond this neighborhood will also be benefitted from the development. Such effect may be called as the regional or national level benefits. Further the benefit may be direct or indirect in nature.

10.1 Reductions in Operation Cost

Vehicle Operating Cost (VOC) will be reduced when riding quality of road is improved. Maintenance and Operation cost such as fuel consumption, wear and tear of tyres, will be sufficiently reduced. The vehicle operating cost shall be further reduced by improving the geometrics and design. The benefits perceived by the road user are in the form of lower expenditure. VOC consist of the following components:

- Fuel Consumption;
- Lubricating oil consumption;
- Spare part consumption and repairs
- Tire consumption; and
- Vehicle depreciation.

10.2 Reductions in Accidents

The proposed up-gradation of Hapachara-Tulungia road will reduce congestion in built-up area. Due to poor road alignment, inconvenience cause during travelling. The accident will reduce after the geometric improvement. In order to make project road accident free road signage and safety features have been planned at the design stage. Required lightning shall be provided at critical locations to avoid accidents during night and in adverse climatic conditions.

10.3 Tourism Development

The project road is a connecting one important national highway no NH-27. The improvement of road connectivity will help in growth of tourism activities immensely.

10.4 Economic Development

The proposed project will also contribute to economic development by encouraging attraction of businesses to sites equipped with good access and by improving the travel efficiencies of existing businesses and to start a new avenue. This also helps for:

- The development of new project sites,
- The development of industrial parks,
- Infrastructure projects, and
- Development of new educational institutions and hospitals/health centers

10.5 Employment Opportunity

The proposed upgradation of Hapachara-Tulungia road will serve as an important employment generator and will provide employment opportunity during construction period. After construction period, the industrial and infrastructure development will provide enormous employment opportunities.

The immediate benefits of road construction and improvement will come in the form of direct employment opportunities for the roadside communities and specially those who are engaged as wage labourers, petty contractors and suppliers of raw materials.

10.6 Road Safety

The upgradation of Hapachara-Tulungia road of existing road will ensure smooth flow of the traffic. Installation of proper road safety system through signage, barricades, and crash barriers will add to be safety to the traffic. Bus bays, lay byes, rest areas, underpasses, service roads are proposed in the project, which shall enhance the road safety.

10.7 Environmental Benefits

The proposed widening project will ensure the smooth flow of traffic, which reduces the emissions and noise level. Apart from these, plantation will be done throughout the project road, which will increase the aesthetic of the project road. All the bus bays will be provided with proper toilet and drinking water facilities for the people who will be using the local communications. Rest areas with various facilities are proposed for the highway users.

10.8 Indirect Benefits

In addition to direct positive impacts, a large number of indirect benefits are also attributed to the up gradation Hapachara-Tulungiaproject road. Lowering transportation cost for users and improving access to goods and services enables new and increased economic and social activity. Individuals, households and firms adjust to take the advantage of those benefits, leading to several indirect impacts over a period. These indirect impacts include changes in landuse and development, changes in decision to locate houses and business in areas where houses and land are less expensive or more desirable, and changes in warehouse and delivery procedure for businesses in order to take advantage of improved speed and reliability in the transportation system. These impacts further lead to increased property values, increased productivity, employment and economic growth.

The indirect benefit of proposed upgradation would work through the dynamic developmental externalities generated through the forward and backward linkages. The change in land use pattern in the area that have better connectivity due to the improved road there, since there will be a change in the patterns of settlement, agricultural land use and location of industries, trading and other services and non-farm unorganized sector activities. All the above would

reflect in the changes in the pattern of economic activities, income generation, price evolution, employment condition and ground rent prevailing all along the project corridor.

A new Landuse pattern may in turn induce greater accessibility to job market, health and educational facilities etc. attract investment for development of feeder roads, power distribution networks, telecommunication facilities and other modes of connectivity amongst other, leading to a greater access of the local people to markets and infrastructure facilities. Project road provides the facilities for public amenities such as Restrooms, Telephone booths, Toilets and shops.

11 Environmental Management Plan

Environmental impacts could be positive or negative, direct or indirect, local or regional and also reversible or irreversible. The impacts generated during construction and operational phase of the roads along with management plan for these impacts has been discussed in Environmental Management Plan. Environmental management considerations in the form of EMP have been designed for project activities based on sample EMP and the Codes of practices. The plan outlines existing and potential problems that may impact the environment and recommends corrective measures where required. Enhancement measures are also proposed in order to provide good environmental practices and improve the aesthetics. The EMP for the project road is being submitted separately. The key components are:

- Mitigation of potentially adverse impacts.
- Monitoring during project implementation and operation stages.
- Institutional capacity building and training.
- Implementation schedule and Environmental Cost Estimate.
- Integration of EMP with projects planning, design, construction and operation.

The highway management should implement sound Environment Management Plan (EMP), which will make environment protection an essential requirement. Prediction of the potential environmental and social impact arising due to development activities are considered as the heart of EIA process. An equally essential element of this process is to develop measure to eliminate, offset or reduce adverse impacts to acceptable levels and enhance the beneficial ones during implementation and operation of the projects. The integration of the project planning is done by clearly defining the environment requirements within an Environment Management Plan (EMP). The Management Action Plan aims at controlling pollution at the source level to the maximum possible extent with the available and affordable technology followed by treatment measures before they are discharged. Specifically, the EMP lays stress on key environmental aspects and issues of the project during operation phase by:

- Identifying potential environmental impacts;
- Recommending mitigation measures for the negative impacts;
- Identifying opportunities for enhancement measures;
- Providing an organizational framework for operating Environment Management System and other functions of the project by assigning roles and responsibilities for environmental monitoring and management;
- Formulating Environmental Action Plans (EAPs) which specify mitigation, periodic and annual monitoring activities during project implementation and operation.

11.1 Objectives of the EMP

The main objectives are to mitigate the various adverse impacts and enhance positive impacts. The objectives at various stages of the project planning and design and implementation stages are as follows.

11.1.1 Design Phase

- To minimize impact on roadside trees, forests and vegetation cover.
- To keep land acquisition and building demolition at a minimum.
- To incorporate safety of road users and roadside communities in project design.
- To provide mitigation measures to all expected environmental degradation.

- To develop a design that incorporate environmental safeguards.

11.1.2 Construction Stage

- To prevent and reduce the negative environmental impacts of the project by implemental mitigation measures to be carried out by the contractor.
- To ensure that the provision of the EMP are strictly followed and implemented by strengthening implementation arrangement.

11.1.3 Operation Stage

- To monitor deterioration of natural environmental components of air, water, soil, noise etc.
- To improve the safety of road users and the roadside communities

11.2 Meeting the EMP Objectives

The following commitments are important to effectively implement the EMP and achieve the above objectives.

- Commitment to address environmental health, safety and social impacts: To improve conditions in the areas of environmental health, safety and social impacts measures, developed as a part of interactive process, have been suggested
- Commitment for constant dialogue with the public and interested stake holders: Community consultations have been carried out right from inception stage of the project. Continuous dialogue with local inhabitants and stakeholders including public agencies has been undertaken to obtain their feedback. Consultations would continue throughout the project implementation.
- Commitment to meet legal requirements: Mandatory legal requirements and procedures are followed including conditions stipulated by statutory authorities such as State Forest Department and Pollution Control Board.

11.3 Environmental Management Plan Matrix

The Environmental Management Plan is meant for mitigation/management /avoidance of the negative impacts and the enhancement of the various environmental components along the project road. For each mitigation measure to be taken its location, timeframe, implementation and overseeing/supervising responsibilities are listed in the EMP matrix. The measure adopted and /or to be adopted during the different stages of the project have been detailed in Table for pre-construction, construction and operation phases respectively.

Table 11-1: Environmental Management Plan Matrix

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
PRE-CONSTRUCTION STAGE				
Pre-Construction Activities by Project Implementation Unit				
P.1	Land Acquisition	The acquisition of land and private properties will be carried out in accordance with the National Rehabilitation and Resettlement Policy 2006 (NRRP) of Government of India. The Supervision Consultants has to ascertain that any additional environmental impacts resulting from acquisition of land shall be addressed and integrated into the EMP and other relevant documents.	PIU / Revenue Department	NHIDCL
P.2	Preservation of Trees	• The development of existing road originates from Hapachara to Tulungia involves removal of trees from RoW. The tree cutting is to proceed only after all the legal requirements including obtaining of In-principle and Formal Clearances from the Forest Dept. /Collector are completed and subsequently a written order is issued to the Contractor. • During the site clearance 1907 trees will be cut. Providing and maintaining compensatory tree plantation of 9535 numbers i.e. ten times of cutting according to IRC: SP: 21-2009 rule. • Particular species declared as 'protected' by the State's Forest Dept. in the private land will be felled only after due clearance from the Forest Dept. is obtained. • Tree cutting should not be carried out simultaneously all along the corridor as this will adversely impact the traffic movement and road safety. It should be carried out on priority basis at locations of diversions, bridge and culvert construction, and such other place where the construction work is scheduled to be started early i.e. is under milestone one stretch as identified in the Contract Package. • All workers involved in the cutting and removal of trees and demolition of structures shall wear safety helmets, gloves, and protective shoes and shall provided with a batch of first aid facility for attending to basic unforeseen and	Nodal Officers, Forest Department, Contractor	NHIDCL

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
		freak accidents. Emergency numbers and details of nearest hospitals shall be identified during work in each stretch of the road corridor and this information shall be with the Site Supervisor. • On the spot records shall be maintained for all trees felled and logs, fire wood, stacks, obtained from such trees in the conversion register, which shall be available for verification by any competent supervising authority of the Forest Department, • In the event of design changes, additional assessments including the possibility to save trees shall be made. • Stacking, transport and storage of the wood will be done as per the relevant norms • Systematic corridor level documentation for the trees cut and those saved will be maintained by the Supervision consultants.		
P.3	Relocation of Common Property Resources	Relocation of common property resources such as tube wells, hand pumps, wells, etc. will be done in consultation with locals people.	Contractor	Supervision consultants
P.4	Relocation of affected Cultural and Religious Properties	In the present plan, the cultural properties have been avoided in the RoW. However, if there is any change in alignment post DPR that may require relocation of any cultural properties then such relocation should be done in consultation with locals and with proper rituals.	Contractor	Supervision consultants
P.5.1	Joint Field Verification	Supervision consultants and the Contractor will carry out joint field verification to ascertain the possibility of saving trees, environmental and community resources. The verification exercise shall assess the need for additional protection measures or changes in design/scale/nature of protection measures including the efficacy of enhancement measures suggested in the EMP. Proper documentation and justifications/reasons shall be maintained in all such cases where deviation from the original EMP is proposed.	Environment Expert of Supervision consultants , Contractor	PIU

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
P.5.2	Assessment of Impacts due to Changes/Revisions/ Additions in the Project Work	Supervision consultants will assess impacts and revise/modify the EMP and other required sections of the project document/s in the event of changes/revisions (including addition or deletion) in the project's scope of work.	Environment Expert of Supervision Consultants	PIU
P.5.3	Crushers, hot-mix plants and Batching Plants Location	• Hot mix plants and batching plants will be sited sufficiently away from settlements and agricultural operations or any commercial establishments. Such plants will be located at least 1.00 km away from the nearest village/settlement preferably in the downwind direction. • The Contractor shall submit a detailed lay-out plan for all such sites and approval of Supervision Consultants shall be necessary prior to their establishment. • Arrangements to control dust pollution through provision of windscreens, sprinklers, and dust encapsulation will have to be provided at all such sites. • Specifications of crushers, hot mix plants and batching plants will comply with the requirements of the relevant current emission control legislations and Consent/NOC for all such plants shall be submitted to the Supervision Consultants. • The Contractor shall not initiate plant/s operation till the required legal clearances are obtained and submitted.	Construction Manager of contractor	PIU
P.5.4	Other Construction Vehicles, Equipment and Machinery	• All vehicles, equipment and machinery to be procured for construction will conform to the relevant Bureau of India Standard (BIS) norms. The discharge standards promulgated under the Environment Protection Act 1986 will be strictly adhered to. • Noise limits for construction equipments to be procured such as compactors, rollers, front loaders concrete mixers, cranes (moveable), vibrators and saws will not exceed 75 dB (A), measured at one meter from the edge of the equipment in free field, as specified in the Environment (Protection) Act 1986. • The Contractor shall maintain a record of PUC certificates for all vehicles and machinery used during the contract period.	Construction Manager of contractor	PIU

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
P.6	Identification and Selection of Material Sources			
P.6.3	Borrow Area	• Conservation of topsoil for reuse in planting pits and rehabilitation of borrow areas, sodding /grass turfing and implementation of soil erosion control plan. • Rehabilitation of borrow areas for productive use.	Construction Manager of contractor	PIU
P.6.4	Arrangement for Construction Water	• Contractor is not allowed to use any community water resources.The contractor will not be allowed to pump from any irrigation canal and surface water bodies used by community. • The Contractor will provide a list of locations and type of sources from where water for construction will be used. • To avoid disruption/disturbance to other water users, the contractor will extract water from fixed locations and consult the Supervision Consultants before finalizing the locations. • The contractor will need to comply with the requirements of the State Ground Water Department and seek their approval for doing so and submit copies of the permission to Supervision Consultants.	Construction Manager of contractor	PIU
P.7	Labour Requirements	The contractor preferably will use unskilled labor drawn from local communities to give the maximum benefit to the local community.	Construction Manager of contractor	PIU
P.8	Construction Camp Locations – Selection, Design and Layout	• Sitting of the construction camps will be as per the guidelines of Environmental Expert of Supervision Consultants. Locations identified by the contractor will report to the Supervision Consultants. • Construction camps will not be proposed within one kilometer from the nearest settlements to avoid conflicts and stress over the infrastructure facilities with the local community. • Location for stockyards for construction materials will be identified at least one kilometer from the water courses.	Construction Manager of contractor	PIU

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Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
		• All location and lay-out plans of such sites will be submitted by the Contractor prior to their establishment and will be approved by the Environmental Officer of SC and PIU/PWD. Other conditions laid out in the Framework for Construction Camps (part of this EMP) shall apply. • The waste disposal and sewage treatment shall be such that the environment is not polluted with the waste material and foul odour including the effluents and wastewater generated at the campsite. The designing and setting up of these structures should be as per the approved site plan. This should include soak pits, septic tanks and arrangements for carriage of extra sewage by sealed mechanized containers for disposal at designated sites, as available in the locality, with due written permission from the Competent Local Authority. • In case of non-receipt of any such permission from the competent authority as stated above, the provision of wider safety tanks and storage facility for garbage has to be made at the camp site as additional measures.		
P.9	Arrangements for Temporary Land Requirement	• The Supervision Consultants as per prevalent rules will carry out negotiations with the landowners for obtaining their consent for temporary use of lands for construction sites/hot mix plants/traffic detours/borrow areas etc. • The Environmental Expert of Supervision Consultants will be required to ensure that the clearing up of the site prior to handing over to the owner (after construction or completion of the activity) is included in the contract	Construction Manager of contractor	PIU
P.10	Orientation of Implementing Agency and Contractors	The Supervision Consultants shall organize orientation sessions and regular training sessions during all stages of the project. This shall include on-site training These sessions shall involve designated staff of the Contractors.	Construction Manager of contractor	PIU
Construction Stage				
Activities to be Carried Out by the Contractor				
C.1	Site Clearance			

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
C.1.1	Clearing and Grubbing	Vegetation will be removed from the construction zone before commencement of construction. All works will be carried out such that the damage or disruption to flora other than those identified for cutting is minimum. • Structures and utilities (cabins, commercial properties, hoardings, overhead power transmission lines, cable connections, telephone lines, bore wells, stand posts, wells, statues, temples etc.) should have been compensated/relocated as per RAP and EMP provisions before tree felling work and clearing or grubbing activities are undertaken since such activities may damage structures (private and govt.) and essential facilities/utilities of public use. • All works shall be carried out in a manner such that the damage or disruption to flora is minimum. Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works will be removed with prior approval from Environmental Officer of SC. • Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works will be removed with prior approval the Supervision Consultants. • The contractor, under any circumstances will not cut or damage trees. Trees identified under the project will be cut only after receiving clearance from the Forest Dept.	Contractor	Supervision consultant
C.1.2	Soil Erosion and Sedimentation control	Main reason of soil erosion is rains. Concessionaire / Contractor should plan the activities so that No naked / loose earth surface is left out before the onset of monsoon, for minimising the soil erosion following preventive measures to be taken such as: • Embankment slopes to be covered, soon after completion. • Activity to be planted, soon after completion of clearing and grubbing, laying of embankment layer, sub-grade layer, sub-base layer, scarification etc. • Top soil from borrow area, Debris disposal sites; borrow area, construction site to	Contractor	Supervision consultant

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
		be protected /covered for soil erosion. • Debris due to excavation of foundation, dismantling of existing cross drainage structure will be removed from the water course immediately. • Diversions for bridges will be removed from the water course before the onset of monsoon • Along sections abutting water bodies, stone pitching needs to be carried out. • At the outfall of each culvert, erosion prevention measure, such as the following, will be undertaken		
C.1.3	Generation of Debris from dismantling structures and surface	Debris generated due to the dismantling of the surface will be suitably reused in the proposed construction, subject to the suitability of the materials and approval of the Construction Manager as follows: • The contractor will make use of debris portion suitable for embankment filling. • Balance portion of debris will be dispose off through filling up of wasteland or at pre-designated disposal locations, subject to the approval of Supervision Consultants • All arrangements for transportation during construction including provision, maintenance, dismantling and clearing debris, will be considered incidental to the work and will be planned and implemented by the contractor as approved and directed by the Supervision Consultants. • The pre-designed disposal locations will be a part of Comprehensive Solid Waste Management Plan to be prepared by Contractor in consultation and with approval of Supervision Consultants. • Debris generated from pile driving or other construction activities shall be disposed off such that it does not flow into the surface water bodies or form mud puddles in the area. • The contractor shall identify dumping sites. The identified locations will be reported to the Supervision Consultants. These locations will be checked on site and accordingly approved by the Supervision Consultants prior to any disposal of waste materials	Contractor	Supervision consultant

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
C.1.4	Other Construction Wastes Disposal	• The pre-identified disposal locations will be a part of Comprehensive Waste Disposal Solid Waste Management Plan to be prepared by the Contractor in consultation and with approval of Supervision Consultants. Location of disposal sites will be finalized prior to completion of the earthworks on any particular section of the road. • The Supervision Consultants will approve these disposal sites after conducting a joint inspection on the site with the Contractor. • Contractor will ensure that any spoils of material unsuitable for embankment fill will not be disposed off near any water course, agricultural land, and natural habitat like grass lands or pastures. Such spoils from excavation can be used to reclaim borrow pits and low-lying areas located in barren lands along the project corridors (is so desired by the owner/community). • Non-bituminous wastes may be dumped in borrow pits (preferably located in barren lands) covered with a layer of the soil. No new disposal site shall be created as part of the project, except with prior approval of the Supervision Consultants. • All waste materials will be completely disposed and the site will be fully cleaned and certified by Environmental Expert of Supervision Consultants before handing over. • The contractor at its cost shall resolve any claim, arising out of waste disposal or any non-compliance that may arise on account of lack of action on his part.	Contractor	Supervision Consultants
C.1.5	Stripping, stocking and preservation of top soil	The topsoil from all areas of cutting and all areas to be permanently covered will be stripped to a specified depth of 150 mm and stored in stockpiles. A portion of the temporarily acquired area and/or Right of Way will be earmarked for storing topsoil. The locations for stock piling will be pre-identified in consultation and with approval of Supervision Consultants. The following precautionary measures will be taken to preserve them till they are used: • Stockpile will be designed such that the slope does not exceed 1:2 (vertical to horizontal), and height of the pile is restricted to 2 meters. To retain soil and to allow percolation of water, siltfencing will protect the edges of the pile. • Stockpiles will not be surcharged or otherwise loaded and multiple handling will be kept to a minimum to ensure that no compaction will occur. The stockpiles shall be	Contractor	Supervision Consultants

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
		covered with gunny bags or vegetation. • It will be ensured by the contractor that the topsoil will not be unnecessarily trafficked either before stripping or when in stockpiles. • Such stockpiled topsoil will be utilized for -covering all disturbed areas including borrow areas (not those in barren areas) top dressing of the road embankment and fill slopes, filling up of tree pits, in the agricultural fields of farmers, acquired temporarily. • Residual topsoil, if there is any will be utilized for the plantation at median.		
	Accessibility	The contractor will provide safe and convenient passage for vehicles, pedestrians and livestock on either side of alignment and property accesses connecting the project road, providing temporary connecting road. The contractor will also ensure that work on existing accesses will not be undertaken without providing adequate provisions and to the prior satisfaction of Environmental Expert of Supervision Consultants.	Contractor	Supervision Consultants
C.2	Procurement of Construction Material			
C.2.1	Earth from Borrow Areas for Construction	• No borrow area will be opened without permission of the Supervision Consultants. The location, shape and size of the designated borrow areas will be as approved by the Supervision Consultants and in accordance to the IRC recommended practice for borrow pits for road embankments (IRC 10:1961). The borrowing operations will be carried out as specified in the guidelines for sifting and operation of borrow areas. • The unpaved surfaces used for the haulage of borrow materials, if passing through the settlement areas or habitations; will be maintained dust free by the contractor. Sprinkling of water will be carried out twice a day to control dust along such roads during their period of use. • During dry seasons (winter and summer) frequency of water sprinkling will be increased in the settlement areas and Supervision Consultants will decide the numbers of sprinkling depending on the local requirements. • Contractor will rehabilitate the borrow areas as soon as borrowing is over from a	Contractor	Supervision Consultants

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
		particular borrow area in accordance with the Guidelines for Redevelopment of Borrow Areas or as suggested by Supervision Consultants.		
C.2.2	Quarry Operations	• The Contractor shall obtain materials from quarries only after the approval of Department of Mines, Govt. of Assam and the District Administration. A copy of this consent must be submitted to PIU/PWD through Environment Expert of SC. • The Contractor will develop a Comprehensive Quarry Redevelopment Plan, as per the Mining Rules of the State and submit a copy to PIU/PWD and SC prior to opening of the quarry site. • The quarry operations will be undertaken within the rules and regulations in vogue.	Contractor	Supervision Consultants
C.2.3	Transporting Construction Materials and Haul Road Management	• Contractor will maintain all roads (existing or built for the project), which are used for transporting construction materials, equipment and machineries. All vehicles delivering fine materials to the site will be covered to avoid spillage of materials. • All existing highways and roads used by vehicles of the contractor or any of his sub-contractor or suppliers of materials and similarly roads, will be kept clear of all dust/mud or other extraneous materials dropped by such vehicles. • Contractor will arrange for regular water sprinkling as necessary for dust suppression of all such roads and surfaces. • The unloading of materials at construction sites in/close to settlements will be restricted to daytime only.	Contractor	Supervision Consultants
C.2.4	Construction Water	• Contractor will arrange adequate supply and storage of water for the whole construction period at his own costs. The Contractor will submit a list of source/s from where water will be used for the project to Supervision Consultants. • The contractor will source the requirement of water preferentially from ground water but with prior permission from the Ground Water Board. A copy of the permission will be submitted to Supervision Consultants prior to initiation of construction. • The contractor will take all precaution to minimize the wastage of water in the	Contractor	Supervision Consultants

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
		construction process/ operation.		
C.3	Construction Work			
C.3.1	River Training and Disruption to Other Users of Water	• While working across or close to any perennial water bodies, contractor will not obstruct/ prevent the flow of water. • Construction over and close to the non-perennial streams shall be undertaken in the dry season. If construction work is expected to disrupt users of community water bodies, notice shall be served well in advance to the affected community. • The contractor will serve notice to the downstream user group well in advance wherever excavation/drilling will take place in the water bodies. Contractor will ensure that the slopes are not steeper than 1:2 (vertical: horizontal) otherwise proper slope protection measures will be taken as given in IRC Guidelines. • The contractor will take prior approval of the River Authority or Irrigation Department or Supervision Consultants for any such activity. The Supervision Consultants will ensure that contractor has served the notice to the downstream users of water well in advance.	Contractor	Supervision Consultants
C.3.2	Drainage	• Contractor will ensure that no construction materials like earth, stone, ash or appendage disposed off so as not to block the flow of water of any water course and cross drainage channels. • Where necessary adequate mechanical devices to bail out accumulated water from construction sites, camp sites, storage yard, excavation areas are to be pre-settled and arranged well in advance of the rainy season besides providing temporary cross drainage systems.	Contractor	Supervision Consultants
C.3.3	Siltation of Water Bodies and	• The Contractor will not excavate beds of any stream/canals/ any other water body for borrowing earth for embankment construction.	Contractor	Supervision Consultants

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
	Degradation of Water Quality	• Contractor will construct silt fencing at the base of the embankment construction for the entire perimeter of any water body (including wells) adjacent to the alignment and around the stockpiles at the construction sites close to water bodies. The fencing will be provided prior to commencement of earthwork and continue till the stabilization of the embankment slopes, on the particular sub-section of the road. • The contractor will also put up sedimentation cum grease traps at the outer mouth of the drains located in truck lay byes and bus bays which are ultimately entering into any surface water bodies / water channels with a fall exceeding 1.5 m. • Contractor will ensure that construction materials containing fine particles are stored in an enclosure such that sediment-laden water does not drain into nearby water course.		
C.3.4	Slope Protection and Control of Soil Erosion	The contractor will take slope protection measures as per design, or as directed by the Supervision Consultants to control soil erosion and sedimentation through use of dykes, sedimentation chambers, basins, fibber mats, mulches, grasses, slope, drains and other devices. All temporary sedimentation, pollution control works and maintenance thereof will be deemed as incidental to the earth work or other items of work and as such as no separate payment will be made for them. Contractor will ensure the following aspects: • During construction activities, the side slopes of all cut and fill areas will be graded and covered with stone pitching, grass and shrub as per design specifications. • Turfing works will be taken up as soon as possible provided the season is favorable for the establishment of grass sods. Other measures of slope stabilization will include mulching netting and seeding of batters and drains immediately on completion of earthworks. • Other measures of slope stabilization will include mulching netting and seeding of batters and drains immediately on completion of earthworks with sowing of seeds of grass, shrub and bushes 30cm interval from line to line across the slope and	Contractor	Supervision Consultants

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
		sprinkling of water on such slopes after completion of the earth work. • In borrow pits, the depth shall be so regulated that the sides of the excavation will have a slope not steeper than 1 vertical to 2 horizontal, from the edge of the final section of the bank. • Along sections abutting water bodies, stone pitching as per design specification will protect slopes. • Stabilization of the embankment with appropriate technique/s shall commence soon after the embankment formation. • Any existing drainage channel or body shall not be obstructed during filling operations. • The embankment slope shall be maintained as per IRC specifications.		
C.4	Pollution			
C.4.1	Water Pollution			
C.4.1.1	Water Pollution from Construction Wastes	• The Contractor will take all precautionary measures to prevent the wastewater generated during construction from entering into streams, water bodies or the irrigation system. Contractor will avoid construction works close to the streams or water bodies during monsoon. • All waste arising from the project is to be disposed off in the manner that is acceptable to the AssamState Pollution Control Board (ASPCB) or as directed by the Supervision Consultants. • The Contractor will certify that all liquid wastes disposed off from the sites meet the discharge standards. • No garbage, sludge, lubricants, fuel, sewerage or contaminated waste water is to be released in the settlement areas, water bodies, forests and wildlife habitats or grazing areas. All waste arising from the project is to be disposed off in the manner that is acceptable to the State Pollution Control Board or as directed by Environmental Expert of Supervision Consultant. • The Environmental Expert of SC will specify in the progress reports on whether the	Contractor	Supervision Consultants

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
		all liquid wastes disposed off from the various sites meets the discharge standards as specified by the CPCB Govt. of India. If case of non-compliance actions taken by SC shall also be specified.		
C.4.1.2	Water Pollution from Fuel and Lubricants	• The contractor will ensure that all construction vehicle parking location, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites will be located at least 1km from rivers and irrigation canal/ponds. • All location and lay-out plans of such sites will be submitted by the Contractor prior to their establishment and will be approved by the Supervision Consultants. • Contractor will ensure that all vehicle/machinery and equipment operation, maintenance and refueling will be carried out in such a fashion that spillage of fuels and lubricants does not contaminate the ground. Oil interceptors will be provided for vehicle parking, wash down and refueling areas as per the design provided. • In all, fuel storage and refueling areas, if located on agricultural land or areas supporting vegetation, the top soil will be stripped, stockpiled and returned after cessation of such storage. • Contractor will arrange for collection and storing and disposal of oily wastes to the pre-identified disposal sites (list to be submitted to Supervision Consultants) and approved by Supervision Consultants. The waste oil will be sold to vendors authorized by MoEF for recycling. All spills and collected petroleum products will be disposed off in accordance with MoEF and ASPCB guidelines. • Contractor will certify that all arrangements comply with the guidelines of ASPCB/MoEF or any other relevant laws. • Construction materials containing fine particles like lime stone, lime, cement, fine aggregates etc. shall be stored in enclosures away from water bodies on high land to ensure that any run off from such locations does not drain into nearby water courses • The contractor will arrange for collection, storage, reuse/disposal of spent oil, lubricants, grease, sludge, slurry, bitumen, chemicals, paints etc. Covered bins/drums (marked specifically regarding the contents) shall be kept separately at	Contractor	Supervision Consultants

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
		maintenance and refueling areas.		
C.4.2	Air Pollution			
C.4.2.1	Dust Pollution	• The contractor will take every precaution to reduce the level of dust from crushers/hot mix plants, construction sites involving earthwork by sprinkling of water, encapsulation of dust source and by erection of screen/barriers. • All the plants will be sited at least 1km in the downwind direction from the nearest human settlement. • The contractor will provide necessary certificates to confirm that all crushers used in construction conform to relevant dust emission control legislation. • The suspended particulate matter value at a distance of 40 m from a unit located in a cluster should be less than 500 µg/m3. The pollution monitoring is to be conducted as per the monitoring plan. • Alternatively, only crushers licensed by the ASPCB shall be used. The Contractor in such a case shall submit required certificates and consents. • Hot mix plant will be fitted with dust extraction system like bag filter etc. • The contractor will provide necessary certificates to confirm that all crushers used in the project conform to relevant dust emission control legislation. Air pollution monitoring will be conducted as per the Pollution Monitoring Plan and results shall be used to strengthen/rectify problematic areas. If other existing crushers are used, such units need to have valid license from the SPCB • Copies of the required certificates and consents of the operator owner shall be procured by the Contractor and submitted to PIU/PWD through Environment Officer of SC prior to the procurement of material from such units. The Resident Engineer will ensure that the necessary documents have been submitted by the contractor before material procurement permission is issued by the Materials Engineer of SC.	Contractor	Supervision Consultants

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
C.4.2.2	Emission from Construction Vehicles, Equipment and Machineries	• Contractor will ensure that all vehicles, equipment and machinery used for construction are regularly maintained and confirm that pollution emission levels comply with the relevant requirements of SPCB. • The Contractor will submit PUC certificates for all vehicles/equipment/machinery used for the project. Monitoring results will also be submitted to Supervision Consultants as per the monitoring plan.	Contractor	Supervision Consultants
C.4.3	Noise Pollution			
C.4.3.1	Noise Pollution: Noise from Vehicles, Plants and Equipments	The Contractor will confirm the following: • All plants and equipment used in construction (including crushing plant) shall strictly conform to the MoEF/CPCB noise standards. • All vehicles and equipment used in construction will be fitted with exhaust silencers. • Servicing of all construction vehicles and machinery will be done regularly and during routine servicing operations, the effectiveness of exhaust silencers will be checked and if found defective will be replaced. • Limits for construction equipment used in the project such as compactors, rollers, front loaders, concrete mixers, cranes (moveable), vibrators and saws shall not exceed 75 dB (A) (measured at one meter from the edge of equipment in the free field), as specified in the Environment (Protection) Rules,1986. • Maintenance of vehicles, equipment and machinery shall be regular and up to the satisfaction of the Supervision Consultants to keep noise levels at the minimum. • At the construction sites within 250 m of the nearest habitation, noisy construction work such as crushing, concrete mixing, batching will be stopped during the night time between 10.00 pm to 6.00 am. • No noisy construction activities will be permitted around educational institutes/health centers (silence zones) up to a distance of 100 m from the sensitive receptors • Monitoring shall be carried out at the construction sites as per the monitoring	Contractor	Supervision Consultants

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
		schedule and results will be submitted to Supervision Consultants. Supervision Consultants will be required to inspect regularly to ensure the compliance of EMP.		
C5	Land Pollution			
C.5.1	Spillage from plant and equipment at construction camp	• Providing impervious platform and oil and grease trap for collection of spillage from construction equipment vehicle maintenance platform. • Collection oil and lubes drips in container during repairing construction equipment vehicles. • Providing impervious platform and collection tank for spillage of liquid fuel and lubes at storage area. • Providing bulk bituminous storage tank instead of drums for storage of bitumen and bitumen emulsion. • Providing impervious base at bitumen and emulsion storage area and regular clearing of any bitumen spillage for controlled disposal. • Reusing bitumen spillage. • Disposing non-usable bitumen spills in a deep trench providing clay lining at the bottom and filled with soil at the top (for at least 0.5 m).	Contractor	Supervision Consultants
C.5.2	Domestic solid waste and waste water generated at camp	• Collecting kitchen waste at separate bins and disposing of in a pit at designated area/s. • Collecting plastics in separate bins and disposing in deep trench at designated area/s covering with soil. • Collecting cottons, clothes etc. at separate bins and burning in a pit (with sand bed).	Contractor	Supervision Consultants
C.5.3	Borrow pits	• Controlled operation and redevelopment ofborrow pits to avoid water logging and landcontamination.		
C.6	Safety			

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
C.6.1	Personal Safety Measures for Labour	• Protective footwear and protective goggles to all workers employed on mixing asphalt materials, cement, and lime mortars, concrete etc. • Protective eye-shields to workers who are engaged in welding works • Protective goggles and clothing to workers engaged in Factories Act, 1948 stone breaking activities and workers will be seated at sufficiently safe intervals • Earplugs to workers exposed to loud noise, and workers working in crushing, compaction, or concrete mixing operation. • Adequate safety measures for workers during handling of materials at site are taken up. • The contractor will comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and exit. • The contractor will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labor Organization (ILO) Convention No. 62 as far as those are applicable to this contract. • The contractor will make sure that during the construction work all relevant provisions of the Factories Act, 1948 and the Building and other Construction Workers (regulation of Employment and Conditions of Services) Act, 1996 are adhered to. • The contractor will not employ any child labour for any work and no woman will be employed on the work of painting with products containing lead in any form. • The contractor will also ensure that no paint containing lead or lead products is used except in the form of paste or readymade paint. • Contractor will provide facemasks for use to the workers when paint is applied in the form of spray or a surface having lead paint dry is rubbed and scrapped. • The Contractor will mark ‘hard hat’ and ‘no smoking’ and other ‘high risk’ areas and enforce non-compliance of use of PPE with zero tolerance. These will be reflected in the Construction Safety Plan to be prepared by the Contractor during mobilization and will be approved by Supervision Consultants.	Contractor	Supervision Consultants

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
C.6.2	Traffic and Safety	• The contractor will take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as proposed in the Traffic Control Plan/Drawings and as required by the Supervision Consultants for the information and protection of traffic approaching or passing through the section of any existing cross roads. • The contractor will ensure that all signs, barricades, pavement markings are provided as per the MoRT&H specifications. Before taking up of construction on any section of the existing lanes of the highway, a Traffic Control Plan will be devised and implemented to the satisfaction of Supervision Consultants.	Contractor	Supervision Consultants
C.6.3	Risk from Electrical Equipment(s)	The Contractor will take all required precautions to prevent danger from electrical equipment and ensure that • No material will be so stacked or placed as to cause danger or inconvenience to any person or the public. • All necessary fencing and lights will be provided to protect the public in construction zones. • All machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be free from patent defect, will be kept In good working order, will be regularly inspected and properly maintained as per IS provision and to the satisfaction of the Supervision Consultants.	Contractor	Supervision Consultants
C.6.4	Risk Force Measure	• The contractor will take all reasonable precautions to prevent danger to the workers and public from fire, flood etc. resulting due to construction activities. • The contractor will make required arrangements so that in case of any mishap all necessary steps can be taken for prompt first aid treatment. Construction Safety Plan prepared by the Contractor will identify necessary actions in the event of an emergency.	Contractor	Supervision Consultants
C.6.5	First Aid	The contractor will arrange for – • A readily available first aid unit including an adequate supply of sterilized dressing	Contractor	Supervision Consultants

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
		materials and appliances as per the Factories Rules in every work zone • Availability of suitable transport at all times to take injured or sick person(s) to the nearest hospital.		
C.6.6	Informatory Signs and Hoardings	The contractor will provide, erect and maintain informatory/safety signs, hoardings written in Hindi and English, wherever required or as suggested by the Supervision Consultants.	Contractor	Supervision Consultants
C.7	Flora and Fauna: Plantation / Preservation / Conservation Measures			
C.7.1	Road side Plantation Strategy	• Ten times the number of trees to be felled would be planted, according to IRC: SP: 21-2009 rule, in the form of strip and block plantations depending on the availability of lands. • Foliage and flowering shrubs will be planted in available clear space in RoW. Plans for compensatory plantation will be drawn up in consultation with the State Forest Department. Species composition and pattern of planting will be decided in consultation with the communities and Social Forestry wing of the Forest Department. • Minimum 75 percent survival rate of the saplings will be acceptable otherwise the contractor will replace all casualties at his own cost to ensure this survival percentage. The contractor will maintain the plantation till they handover the project site. • The Supervision Consultants will undertake regular inspection of the survival rate of the plants and compliance of tree plantation guidelines.	Horticulture Department of RCD Assam	Supervision Consultants
C.7.2	Flora and Fauna	• The contractor will take reasonable precaution to prevent his workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal). • If any carcass of any wild animal/ wetland bird is found near the construction site at any point of time, the contractor will immediately upon discovery thereof acquaint	Contractor	Supervision Consultants

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
		the Supervision Consultants and carry out the instructions for dealing with the same. • The Supervision Consultants will report to the nearby forest office (range office or divisional office) and will take appropriate steps/ measures, if required in consultation with the forest officials.		
C.8	Labor Camp Management			
	Accommodation	Contractor will follow all relevant provisions of the Factories Act, 1948 and the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labor camp. • The location, layout and basic facility provision of each labor camp will be submitted to Supervision Consultants prior to their construction. • The construction will commence only upon the written approval of the Supervision Consultants. • The contractor will maintain necessary living accommodation and ancillary facilities in functional and hygienic manner and as approved by the Supervision Consultants.	Contractor	Supervision Consultants
C.8.2	Potable Water	The Contractor will construct and maintain all labor accommodation in such a fashion that uncontaminated water is available for drinking, cooking and washing. The Contractor will also provide potable water facilities within the precincts of every workplace in an accessible place, as per standards set by the Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 The contractor will also guarantee the following: • Supply of sufficient quantity of potable water (as per IS) in every workplace/labor camp site at suitable and easily accessible places and regular maintenance of such facilities. • If any water storage tank is provided that will be kept such that the bottom of the tank at least 1m from the surrounding ground level.	Contractor	Supervision Consultants

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
		• If water is drawn from existing well within 30 m proximity of any toilet, drain or other source of pollution, the well will be disinfected before water is used for drinking. • All such wells will be entirely covered and provided with a trap door, which will be dust proof and waterproof. • A reliable pump will be fitted to each covered well. The trap door will be kept locked and opened only for cleaning or inspection, which will be done at least once in a month. • Testing of water will be done every month as per parameters prescribed in IS 10500:1991. Supervision Consultants will be required to inspect the labor camp once in a week to ensure the compliance of the EMP.		
C.8.3	Sanitation and Sewage System	The contractor will ensure that • the sewage system for the camp are designed, built and operated in such a fashion that no health hazards occurs and no pollution to the air, groundwater or adjacent water courses take place • separate toilets/bathrooms, wherever required, screened from those from men (marked in vernacular) are to be provided for women • adequate water supply is to be provided in all toilets and urinals • all toilets in workplaces are with dry-earth system (receptacles) which are to be cleaned and kept in a strict sanitary condition • Night soil is to be disposed off by putting layer of it at the bottom of a permanent tank prepared for the purpose and covered with 15 cm. layer of waste or refuse and then covered with a layer of earth for a fortnight.	Contractor	Supervision Consultants
C.8.4	Waste Disposal	• The contractor will provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner as per the Comprehensive Solid Waste Management Plan approved by the Supervision Consultants. • Unless otherwise arranged by local sanitary authority, arrangements for disposal of	Contractor	Supervision Consultants

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
		night soils (human excreta) suitably approved by the local medical health or municipal authorities or as directed by Environmental Expert of Supervision Consultants will have to be provided by the contractor.		
C.9	Contractor's Demobilization			
C.9.1	Clean-up Operations, Restoration and Rehabilitation	• Contractor will prepare site restoration plans, which will be approved by the Supervision Consultants. The clean-up and restoration operations are to be implemented by the contractor prior to demobilization. The contractor will clear all temporary structures; dispose all garbage, night soils and POL waste as per Comprehensive Waste Management Plan and as approved by Supervision Consultants. • All disposal pits or trenches will be filled in and effectively sealed off. Residual topsoil, if any will be distributed on adjoining/ proximate barren land or areas identified by the Supervision Consultants in a layer of thickness of 75 mm-150 mm. • All construction zones including river-beds, culverts, road-side areas, camps, hot mix plant sites, crushers, batching plant sites and any other area used/affected by the project will be left clean and tidy, at the contractor's expense, to the entire satisfaction of Supervision Consultants.	Contractor	Supervision Consultants
OPERATION STAGE				
Activities to be Carried Out by the PIU				
O.1	Monitoring Operation Performance	The Supervision Consultants will monitor the operational performance of the various mitigation/ enhancement measures carried out as a part of the project. The indicators selected for monitoring include the survival rate of trees; utility of enhancement provision for relocated structures; status of rehabilitation of borrows areas; and utility of noise barriers.	PIU	NHIDCL

Sl. no	Environmental Aspect / Issue	Management Measures	Responsibility	
			Execution / Civil Work	Supervision / Monitoring
O.2	Maintenance of Drainage	• The contractor will ensure that all drains (side drains, median drain and all cross drainages) are periodically cleared especially before monsoon season to facilitate the quick passage of rainwater and avoid flooding. • The contractor will ensure that all the sediment and oil and grease traps set up at the water bodies are cleared once in every three months.	PIU	NHIDCL
O.3	Pollution Monitoring	• The periodic monitoring of the ambient air quality, noise level, water (both ground and surface water) quality, soil pollution/contamination in the selected locations as suggested in pollution monitoring plan will be responsibility of the PIU. • The PIU, will appoint approved pollution monitoring agency for this purpose.	PIU	NHIDCL
O.3.1	Atmospheric Pollution	• Ambient air concentrations of various pollutants shall be monitored as envisaged in the pollution-monitoring plan. • Road-side tree plantation will be maintained.	PIU	NHIDCL
O.3.2	Noise Pollution	• Noise pollution will be monitored as per monitoring plan at different zones. Noise control programs are to be enforced strictly. • Monitoring the effectiveness of the pollution attenuation barriers, if there is any, will be taken up thrice in the operation period.	PIU	NHIDCL
O.4.	Soil Erosion and Monitoring of Borrow Areas	Visual monitoring and inspection of soil erosion at borrow areas, quarries (if closed and rehabilitated), embankments and other places expected to be affected, will be carried out once in every three months as suggested in monitoring plan.	PIU	NHIDCL

11.1 Environmental Budget

The environmental budget for the various environmental management measures proposed in the EMP is detailed in table below. The rates adopted for the budget has been worked out on the basis of market rates.

Sl. no	Component	Stage	Item	Unit	Unit cost (Rs.)	Quantity	Total Cost (INR)
1	Environmental Monitoring Costs						
1.1	Air	Construction	Monitoring near all hot mix plant locations approved by the Engineer	No. Of Samples	7,000	At 1 location once in a season excluding monsoon for 3 years. (9 Samples)	63000
			Monitoring at construction sites and at sensitive locations.	No. Of Samples	7,000	At 1 location once in a season excluding monsoon for 3 years. (9 Samples)	63000
		Operation	Ambient Air Quality Monitoring (At 1 location where environmental monitoring during baseline data generation done)	No. Of Samples	7,000	At 2 location once in a season excluding monsoon for 2 years. (18 Samples)	126000
1.2	Water Quality	Construction	Surface Water Quality	No. Of Samples	6000	At 01 locations once in a season excluding monsoon for 3 years (9 samples)	54000
			Ground Water Quality	No. Of Samples	6,000	At 01 locations once in a season excluding monsoon for 3 years (9 samples)	54000
		Operation	Surface Water Quality (As per	No. Of Samples	6,000	At 01 locations once	54000

Sl. no	Component	Stage	Item	Unit	Unit cost (Rs.)	Quantity	Total Cost (INR)
			suggestion in monitoring plan)			in a season excluding monsoon for 3 years (9 samples)	
			Ground Water Quality (As per recommendation in monitoring plan)	No. Of Samples	6,000	At 01 locations once in a season excluding monsoon for 3 years (9 samples)	54000
1.3	Noise	Construction	At equipment yards/ Hot mix plants/ Construction Camps	No. Of Samples	3,000	At 1 locations once in each season excluding the monsoon season for 3 years (9 Samples)	27000
			As directed by the Engineer (Sensitive location)	No. Of Samples	3,000	At 1 locations once in each season excluding the monsoon season for 3 years (9 Samples)	27000
		Operation	As directed by the Engineer	No. Of Samples	3,000	At 2 locations once in each season excluding the monsoon season for 3 years (18 Samples)	54000
1.4	Soil	Construction	At productive agricultural lands abutting traffic detours and traffic diversions, to be identified by the Engineer	No of Samples	5000	At 01 locations once in a season excluding monsoon for 3 years (9 samples)	45000

Sl. no	Component	Stage	Item	Unit	Unit cost (Rs.)	Quantity	Total Cost (INR)
		Operation	At accident/spill locations involving bulk transport carrying hazardous material	No of Samples	5000	At 01 locations once in a season excluding monsoon for 3 years (9 samples)	45000
Total monitoring Cost							666000

Sl. no	Environmental Components	Particulars	Unit	Rate In (Rs.)	Approx. Quantity	Total Cost In (Rs.)
2	Mitigation / Enhancement Cost					
2.	Construction Stage					
2.1	Air	Dust Management with sprinkling of water, covers for vehicles transporting construction material	KM	32000	14	448000
2.2	Water & Water Bodies	Provision of Taps	No.	9000	3	27000
		Enhancement of Road side Ponds	No.	450000	1	450000
		Oil interceptors at parking of construction vehicle (total one camp)	No.	60000	1	60000
		Site Fencing at identified at locations of project road crossing streams	No.	60000	1	60000
2.3	Environmental Enhancements	Enhancement of boundary walls of 2locations by planting of creepers on the exterior wall and planting of 1 row of flowering, shade, medicinal, ornamental & fruit bearing trees inside the boundary at a distance of 3m c/c and as per directions of the Engineer	No.	120000	2	60000
2.4	Flora	Compensatory Afforestation @ 1:5 ratio (Number of trees to be cut =9535) Compensatory Afforestation (Greenbelt) will be provided within the ROW along the roadside at available locations and especially in some of the project section where roadside plantation (greenbelt) does not exist or found very few including watering and maintenance of Planted trees for 3 years	Nos.	1400	9535	13349000
2.5	Silt Runoff Control	Slope stabilization, turfing, silt fencing etc		Covered in Engineering Cost and Specification		
2.6	Slope/	Stone pitching, Gabian		Covered in		

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Sl. no	Component	Stage	Item	Unit	Unit cost (Rs.)	Quantity	Total Cost (INR)
	embankment protection measures	Retaining wall, Turfing at toe line, etc			Engineering Cost and Specification		
	Total Mitigation / Enhancement Cost						15882000
3	Miscellaneous Cost						
3.1	Environmental Awareness and Training	Environmental Awareness and training in Construction Stage As per developed Module		LS			250000
3.2	Administrative Charges including logistics	Maintenance of vehicle with the Environment Cell, Data processing, administrative support, stationery etc.		LS			450000
Total Miscellaneous Cost							700000
TOTAL COST (1 + 2 +3)							17248000
Contingency @ 10%							1724800
TOTAL BUDGETED COSTS							18972800

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12 Borrow Pit Management

12.1 Objectives

Responsible management of borrow pit operations

12.2 Control Measures

12.2.1 Site assessment and selection

A preliminary site assessment prior to undertaking excavation works should be undertaken. Such assessment shall include as a minimum the following:

12.2.1.1 Land tenure and approval for use

A written approval for use of the proposed site shall be obtained from the local authorities. It is recommended to commence discussion with relevant authorities as soon as possible to understand requirements and potential limitations of the process. Negotiation may require preparation of the narrative that describes borrow pit operations, outlines potential risk to the community, proposes mitigation measures to control and minimize such risks and presents restoration plans.

12.2.1.2 Geotechnical site investigation

- Borehole drilling and/or excavation of test pits shall be carried out to confirm the extent and quality of the materials within the proposed site. Test pits and boreholes shall be decommissioned unless used as a borrow site.
- Hydrogeological information shall be obtained to determine the presence and depth of any groundwater table.

12.2.1.3 Site property lines and location

- Borrow pits should be preferably located in the areas with minimal volume of vegetation or existing/decommissioned pits can be used.
- The borrow pit site shall have clearly defined property lines which will be surveyed and clearly marked to limit excavation within the approved area of the site.
- The borrow pit operational site must have an undisturbed buffer area of natural vegetation of a minimum of 25 meters in width around the perimeter of the site – excluding entry roadway with a maximum width of 5 meters.
- The property line of the site shall be a minimum of 100 meters from the nearest households and 100 meters away from the nearest watercourse.
- Location of the borrow pit place shall be well documented. Documentation should include: a map showing the location and a plan-view of the site, a photographic record of the site in its undisturbed state (photographs should be taken from the geographic center of the proposed site in 8 directions: north, northeast, east, southeast, south, southwest, west, and northwest).

12.2.2 Borrow pit operations

During borrow pit operations as a minimum good management practices shall be followed:

12.2.2.1 Operational area

Site area shall include: area of extraction, a buffer zone, perimeter berm, stockpiles (i.e. top soil and overburden) and area for general operations. Borrow Pit location is given in Table 12-1

Table 12-1: Summary of the borrow areas

Sl. No	Chainage (KM)	Name of the Village	Details of Owner	Co-ordinate	Area	No. of Sample collected
1	8+600	Beltoli	Bhupen Gogoi	E-266428.00 N-2924674.74	Plenty	2
2	12+200	Tulungia	Nur Ali	E-264377.74 N-2921147.98	Plenty	2

12.2.2.2 Stockpiles

- Topsoil depth ranges between 150 mm and 500 mm. The exact depth shall be determined from the geotechnical site assessment. Topsoil shall be stripped and stockpiled away from other materials. Topsoil shall be only used for reclamation purposes when pit operation is complete.
- Overburden soil (i.e. the layer of soil below the topsoil and above the material of interest) shall be used as a perimeter berm to direct drainage on the site or stockpiled separately from topsoil and later used to landscape and backfill exhausted areas of the borrow pit.

12.2.2.3 Excavation slopes

- Pit excavations shall be a maximum of 6 meters in depth with a maximum allowable horizontal to vertical slope (H:V) of 2:1 or 50% grade.
- One side of the excavation shall have a maximum horizontal to vertical slope (H:V) of 2.5:1 or 40% grade for efficient operation of heavy equipment and to allow for ease of access.
- Pit excavations greater than 6 meters must be fenced all round.

12.2.2.4 Duration of operations

An estimated lifespan of site should be given based on the geotechnical assessment, anticipated rate of extraction and planned site reclamation.

12.2.3 Environmental and safety management

The Contractor must undertake the following environmental protection and public safety measures:

12.2.3.1 Site Access/Safety

- The extraction site should have a barrier such as yellow warning tape and/or perimeter berms to control or discourage public access. Alternatively, the Contractor can post a local full-time guard until the site is reinstated.
- Any deep excavation site that has standing water greater than 0.75 meters deep must be protected from public access by installing a fence and/or posting a full-time guard before the water level goes down.

- Entrances to the site should be gated so as to block ease of access and shall be designed to provide vehicles with adequate sight distance to avoid a safety hazard.
- Durable warning signs shall be posted around the perimeter of the borrow site not more than 50 meters apart which will provide symbols of danger and no trespassing (e.g. skull and crossbones).
- Liaison with the local community should be undertaken, which includes information on dangers within borrow pit operational sites and that trespassing is not permitted.

12.2.3.2 Visual

Ensure that existing vegetation within the minimum 25-meter buffer area is not disturbed, as it should provide some visual screening of pit operations from the road and nearby residents.

12.2.3.3 Noise

Ensure that existing vegetation within the minimum 25-meter buffer area is not disturbed, as it should screen noise of pit operations from nearby residents.

12.2.3.4 Water

- If water is needed for borrow pit operations, a water extraction points such as a borehole, shall be established within the site, ideally located near the perimeter of the property for use by the local community once the site is reinstated.
- Borrow pits shall not be located within a wetland area.
- Excavation below the water table is not permitted.
- Standing water in the borrow pit is not permitted and shall be removed either through drainage structures and/or pumping. Alternatively, any pits with deep (greater than 0.75 meter) pools of water must be secured by a fence and/or full-time guards to prevent public access.
- Under no circumstances shall community members be allowed to use water at an active borrow pit site for any purpose (e.g. watering their animals, washing clothes, etc.).

12.2.3.5 Water discharge

- Overburden soil can be used as a perimeter berm to direct drainage away from the site.
- Efforts shall be made to reduce the amount of runoff into the borrow pit.

12.2.3.6 Erosion

- Erosion control measures must be undertaken in all aspects of pit operations including stockpiles and access roads. These measures include reduced slopes, seeding, and stockpile covers to protect stockpiles and the adjacent land.
- Topsoil stockpiles shall be protected from wind and water erosion by reducing slopes (i.e. less than 50% grade), using a covering, and/or spraying with water.

12.2.3.7 Dust

- In all operation of the borrow pits, measures shall be undertaken to minimise dust emission and spreading (water sprinklers, covering stockpiles, introducing speed limit, etc).
- If a rock crusher is used, the dust control measures shall be undertaken by using a water truck or fixed sprinklers on crushing equipment.

12.2.4 Site reclamation

Site reclamation (reinstatement) should be completed prior to handover of completed road section.

12.2.4.1 Stockpile reuse

- Overburden stockpiles and perimeter berms shall be placed on the excavated site and graded to the desired slopes and drainage paths.
- Reserved topsoil shall be spread on top of the overburden with more topsoil focused on sloping land (minimum depth on slopes: 150 mm).

12.2.4.2 Final slope and drainage

- Suitable surface slopes together with drainage ditches and conduits – as needed – shall be constructed to prevent water from collecting at the site.
- Final slopes within the site shall be a maximum horizontal to vertical slope (H:V) of 3:1 or 33% grade.

12.2.4.3 Final cover

- The borrow pit operational site including access roads shall be thoroughly scarified as needed to help establish adequate vegetative cover.
- A minimum of 75% of vegetative cover should be established and maintained following the first rains after reclamation.
- Particular focus shall be given to vegetation cover on the side slopes of the excavated area to minimize erosion. Any required seeding used shall be of local plant varieties.

12.2.4.4 Interim reclamation

- When excavation activities are going to cease for longer than 60 days, interim reclamation measures should be undertaken to protect the environment and public safety.
- Interim reclamation measures include a minimum of seeding of topsoil stockpiles and grading the site to reduce erosion potential.

12.3 Performance Criteria

Certificate of closure for all borrow pits.

RESETTLEMENT ACTION PLAN (RAP)

1. 0 EXECUTIVE SUMMARY

1.1. THE PROJECT

Assam is located south of the eastern Himalayas situated between 8905/-960 1/ East Longitude and 2403/-27058/ North Latitude. It can be divided into three principal geographical regions: the Brahmaputra Valley in the north; the Barak Valley in the south; and the KarbiAnglong and Cachar Hills that divide the two regions with a total area of 30,285 square miles (78,440 km2). Assam is surrounded by six of the other Seven Sister States: Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, and Meghalaya. Assam is the sentinel of north-east India and gateway to the North-Eastern States. Assam also shares international borders with Bhutan and Bangladesh.

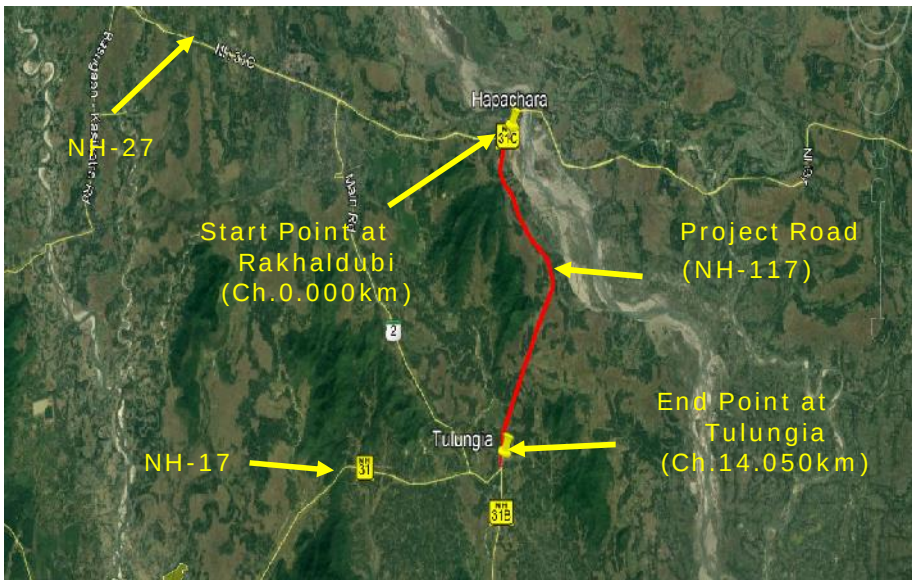
The state is the rich, green land of rolling plains and dense forests is the gateway to the north eastern part of India. The mighty Brahmaputra river that has its origins in Tibet charts its majestic course through this state. This mystic land of eternal blue hills and beautiful rivers is renowned for its tea, rich flora and fauna, the world famous one horned rhinoceros and other rare species of wildlife on the verge of extinction. Barring Africa, there is perhaps no part of the world where such a variety of wildlife exists

Assam is well connected by a network of national highways and other roads to important places within the state and other major cities in the country. Assam comprises of approximately 40342 km of road network including 2841 km of national highway.

Guwahati, the capital of Assam has good quality roads that are accessible and connected with major cities and towns in India. The National Highway Number 31, 37, 38, 40 and 52 links the state of Assam with other states and cities.

The Hapachara – Tulungia Road is located in the state of Assam in North East Region of India. The total length of the road section is about 14.050 km (as per Topographic Survey)).Figure1.1: Existing Project Road.

Figure 1.1: Existing Project Road



Source: Google Earth

The Project Road starts at Rakhaldubi (junction with NH-27(NH-27 starts from Porbandar in the state of Gujrat and ends near silchar in the state of Assam)) in Hapachara and passes through village / localities namely Rakhaldubi, Hapachara, Garugaon-1, Garugaon-2, jiyaguri, Sidalsati, Kakaijana, Beltoli, Kadamtola and ends at Tulungia (junction with NH-17(NH-17 starts from Sevok in the state of West Bengal and ends near Guwahati in the state of Assam). The project road lies in Bongaigaon district of Assam. The road runs through two Police Stations at Bongaigaon& at Abhayapuri. The length of the road comes out as 14.050 km (As per Topographic Survey).

The project road is of significant importance as the road connects two National Highway NH-17 & NH-27.

1.2. SCOPE OF LAND ACQUISITION AND RESETTLEMENT IMPACTS

The existing ROW of the project stretch varies from 14 m to 55 m with an average right of way 35.0 m as per collected revenue maps

New pavement has been designed for widening as well as overlay portion as per the latest guidelines of IRC applicable for flexible/rigid options. Requirement of overlay shall be determined after finalization of horizontal and vertical alignment for this project.

As discussed, the scope of land acquisition is quite significant in the project because of availability of limited ROW. A project census survey was carried out to identify the persons who would be displaced 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.

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As per requirement of the Resettlement Action Plan a 100% census survey of the likely affected Displaced Persons (DP) have been conducted again in June-July 2019 of affected land and non-land assets of the project has been taken up. The impacts can be broadly classified as (i) impacts on land, (ii) impacts on private structures (Encroachers and Squatters), (iii) impacts on livelihoods due to loss of private properties and (iv) loss of common property resources. It was found out that altogether 13.24hectare non govt. land will be affected due to the project work. The Details is given in the Table 1.2

TABLE- 1.2 BRIEF SUMMARY OF THE RESETTLEMENT IMPACT

Summary Project Impacts		
Sl.	Impacts	Number
1	Total land acquisition requirements (In Hectare)	13.24
4	Total number of Structures that will be affected	59
5	Total number of Private Structures (Title Holder &Non Title Holder) that will be affected	59
6	Total number of Community and Government Structures that will be affected	0
7	Total number of Affected Family	51
8	Total number of Affected Person	200

Source: Census Survey on June-July 2019

1.3. LEGAL AND POLICY FRAMEWORK

The legal framework and principles adopted for addressing resettlement issues in the Project have been guided by the proposed legislation and policies of the Government of Assam and Government of India. The main legal provisions are National Highway Act, 1956,(NH Act 1956) the Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (RFCTLARR Act, 2013) and The Assam Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Rules, 2015 (Assam RFCTLARR Rules, 2015). Prior to the preparation of the Resettlement Plan, a detailed analysis of the proposed national and state policies was undertaken and an entitlement matrix has been prepared for the entire program. The section below provides details of the various national and state level legislations studied and their applicability within this framework. This RP is prepared based on the review and analysis of all applicable legal and policy frameworks of the country requirements.

The objectives of the Resettlement Framework as per the policies are as follows: -

- To minimize displacement and to identify non-displacing or least-displacing alternatives.
- To plan the resettlement and rehabilitation of Project Affected Families, (PAFs) including special needs of Tribal and vulnerable sections.
- To provide better standard of living to DPs; and

- To facilitate harmonious relationship between the Requiring Body and DPs through mutual cooperation.
- The involuntary resettlement would be avoided wherever possible or minimized as much as possible by exploring project and design alternatives.
- The Project or all sub-projects under the program will be screened to identify past, present, and future involuntary resettlement impacts and risks.
- The scope of resettlement planning will be determined through a survey and/or census of displaced persons, including a gender analysis, specifically related to resettlement impacts and risks.
- Meaningful consultations with affected persons, host communities, and concerned non-government organizations will be carried out and all displaced persons will be informed of their entitlements and resettlement options participation in planning, implementation, and monitoring and reporting of resettlement programs will be ensured.
- Particular attention will be paid to the needs of vulnerable groups, especially those below the poverty line, the landless, the elderly, women and children, and Indigenous Peoples, and those without legal title to land, and ensure their participation in consultations.
- An effective grievance redress mechanism will be established to receive and facilitate resolution of the displaced persons' concerns. The social and cultural institutions of displaced persons and their host population will be supported through proper planning. Where involuntary resettlement impacts and risks are highly complex and sensitive, compensation and resettlement decisions should be preceded by a social preparation phase.
- The livelihoods of all displaced persons will be improved or at least restored through (i) land-based resettlement strategies when affected livelihoods are land based where possible or cash compensation at replacement value for land when the loss of land does not undermine livelihoods, (ii) prompt replacement of assets with access to assets of equal or higher value, (iii) prompt compensation at full replacement cost for assets that cannot be restored, and (iv) additional revenues and services through benefit sharing schemes where possible.
- Physically and economically displaced persons will be provided with needed assistance, including (i) if there is relocation, secured tenure to relocation land, better housing at resettlement sites with comparable access to employment and production opportunities, integration of resettled persons economically and socially into their host communities, and extension of project benefits to host communities; (ii) transitional support and development assistance, such as land development, credit facilities, training, or employment opportunities; and (iii) civic infrastructure

and community services, as required.

- The standards of living of the displaced poor and other vulnerable groups, including women, will be improved to at least national minimum standards. In rural areas legal and affordable access to land and resources will be provided, and in urban areas appropriate income sources and legal and affordable access to adequate housing will be provided to the displaced poor.
- If land acquisition is through negotiated settlement, procedures will be developed in a transparent, consistent, and equitable manner to ensure that those people who enter into negotiated settlements will maintain the same or better income and livelihood status. If, however, the negotiated settlement fails, the normal procedure of land acquisition will be followed.
- Displaced persons without titles to land or any recognizable legal rights to land will be ensured that they are eligible for resettlement assistance and compensation for loss of non-land assets.
- A resettlement plan will be prepared elaborating on displaced persons' entitlements, the income and livelihood restoration strategy, institutional arrangements, monitoring and reporting framework, budget, and time-bound implementation schedule.
- The draft resettlement plan, including documentation of the consultation process will be disclosed in a timely manner, before project appraisal, in an accessible place and in a form and language(s) understandable to affected persons and other stakeholders. The final resettlement plan and its updates will also be disclosed to displaced persons and other stakeholders.
- Involuntary resettlement will be conceived and executed as part of a development project or program. Full costs of resettlement will be included in the presentation of project's costs and benefits. For a project with significant involuntary resettlement impacts, consider implementing the involuntary resettlement component of the project as a stand-alone operation.
- All compensation will be paid and other resettlement entitlements will be provided before physical or economic displacement. The resettlement plan will be implemented under close supervision throughout project implementation.
- Resettlement outcomes, their impacts on the standards of living of displaced persons will be monitored; it will be accessed whether the objectives of the resettlement plan have been achieved by taking into account the baseline conditions and the results of resettlement monitoring. Monitoring reports will be disclosed to DPs.
- Land acquisition for the project would be done as per NH Act, 1956, Assam RFCTLARR Rules, 2015 and the RFCTLARR Act 2013. To meet the replacement cost

of land payment of compensation in revised rate.

- The uneconomic residual land remaining after land acquisition will be acquired as per the provisions of Land Acquisition Act. The owner of such land/property will have the right to seek acquisition of his entire contiguous holding/ property provided the residual land is less than the average land holding of the district.
- People moving in the project area after the cut-off date will not be entitled to any assistance. In case of land acquisition, the date of publication of preliminary notification for acquisition under RFCTLARR Act, 2013 and Assam RFCTLARR Rules, 2015 will be treated as the cut-off date. For non-titleholders the date of project census survey or a similar designated date declared by the executing agency will be considered as cut-off date.
- All common property resources (CPR) lost due to the project will be replaced or compensated by the project.

The project will recognize three types of displaced persons like (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.

1.4. ENTITLEMENTS, ASSISTANCE AND BENEFITS

The project will have three types of displaced persons 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.

Compensation eligibility is limited by a cut-off date as set for this project on the day of the beginning of the census survey. DPs 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.

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 DPs living below poverty line (BPL), SC, ST, women headed households, the elderly

and the disabled. The detail of the assistance and entitlements has been discussed in the following chapters.

1.5. RELOCATION OF HOUSING AND SETTLEMENTS

The EA will provide adequate and appropriate replacement land and structures or cash compensation at full replacement cost for lost land and structures, adequate compensation for partially damaged structures, and relocation assistance, according to the Entitlement Matrix. The EA will compensate to the non-title holders for the loss of assets other than land, such as dwellings, and also for other improvements to the land, at full replacement cost. The entitlements to the non-titleholders will be given only if they occupied the land or structures in the project area prior to the cut-off date.

1.6. RESETTLEMENT BUDGET

The resettlement cost estimate for this project includes eligible compensation, resettlement assistance and support cost for RP 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 land 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. The total R&R budget for the proposed project RP works out to Rs.17.38Cr

1.7. INSTITUTIONAL ARRANGEMENTS

For implementation of RP there will be a set of institutions involve at various levels and stages of the project. The Executing Agency (NHIDCL) for the Project. They have already set up a Project Implementing Unit (PIU) headed by General Manager (GM), Deputy General Managers (DGM), Assistant General Manager (AGM) and assisted by other staffs. This office will be functional for the whole Project duration. The PIU, headed by GM will have overall responsibility for implementation of the project and will also be responsible for the overall coordination among MoRTH, Government of Assam and EA. For resettlement activities, PIU will do the overall coordination, planning, implementation and financing. Project Implementation Unit (PIU) will be established at project level for the implementation of sub-projects headed by AGM. An experienced and well-qualified NGO in this field will be engaged to assist the PIUs in the implementation of the RP.

1.8. IMPLEMENTATION SCHEDULE

Implementation of RP mainly consists of compensation to be paid for affected structures and rehabilitation and resettlement activities. A composite implementation schedule for R&R activities in the project including various sub tasks and time line matching with civil work schedule is prepared and presented in the following chapters. 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. However, the sequence had change or delay had occurred due to circumstances beyond the control of the Project and accordingly the time can be adjusted for the implementation of the plan. The present implementation schedule may 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.

1.9. MONITORING AND REPORTING

Monitoring and reporting are critical activities in involuntary resettlement management in order to ameliorate problems faced by the DPs and develop solutions immediately. Monitoring is a periodic assessment of planned activities providing midway inputs. It facilitates change and gives necessary feedback of activities and the directions on which they are going. In other words, monitoring apparatus is crucial mechanism for measuring project performance and fulfillment of the project objectives.

PIU responsible for supervision and implementation of the RP will prepare monthly progress reports on resettlement activities and submit to EA. PIU will submit quarterly reports to MoRTH The Resettlement Expert under CSC would be responsible for monitoring of the RP implementation will submit a quarterly review report to determine whether resettlement goals have been achieved, more importantly whether livelihoods and living standards have been restored enhanced and suggest suitable recommendations for improvement. All the resettlement monitoring reports will be disclosed to DPs as per procedure followed for disclosure of resettlement documents by the EA.

2. PROJECT DESCRIPTION

2.1. PROJECT BACKGROUND

National Highways & Infrastructure Development Corporation Limited (NHIDCL) has beenentrusted with the assignment of Consultancy Services for Feasibility Study, Preparation of Detailed Project Report and providing pre-construction services for up gradation Hapachara - Tulungia (Length 14.000 km) in the state of Assam.

The Project Road starts at Rakhaldubi (junction with NH-27) in Hapachara and passes through village / localities namely Rakhaldubi, Happachara, Garugaon-1, Garugaon-2, jiyaguri, Sidalsati, Kakaijana, Beltoli, Kadamtola and ends at Tulungia (junction with NH-17).

2.2. THE STATE PROFILE

Assam is located in the far North-East part of the country and situated within the longitude 90oE to 96oE and latitude 24oN to 28oN. The area of the state is 78,438 square kilometers as against the country's total area of 3,280,483 square kilometers. Thus, the state constitutes 2.39% of the total land area of the country. Population of Assam stood at 266.38 lakhs. Assam is situated at the North-Eastern Himalayan sub-region of India. The state is bounded by Bangladesh on the West and South and is very near to Burma (Myanmar) on the East and to Tibet, Bhutan and China on the North. Internally, the state has a common boundary with Nagaland, Tripura, Mizoram, Meghalaya, West Bengal and Arunachal Pradesh.

TABLE 2.1: SOCIO-ECONOMIC PROFILE OF ASSAM

Sl.	Description	Assam 2011
1	Population size	31205576
2	Population size(Males)	15939443
3	Population size(Females)	15266133
4	Population size(Rural)	26807034
5	Population size(Urban)	4398542
6	pulation density (Total, Persons per sqkm)	398
7	Sex ratio (Females per 1000males)	958
8	Population size, 0 - 6 yrs	4638130
9	x ratio, 0 - 6 yrs (Females per 1000 males)	962
10	Literacy rate, 7+ yrs (Persons, Per cent)	72.19
11	Literacy rate, 7+ yrs (Males, Per cent)	77.85
12	Literacy rate, 7+ yrs (Females, Per cent)	66.27

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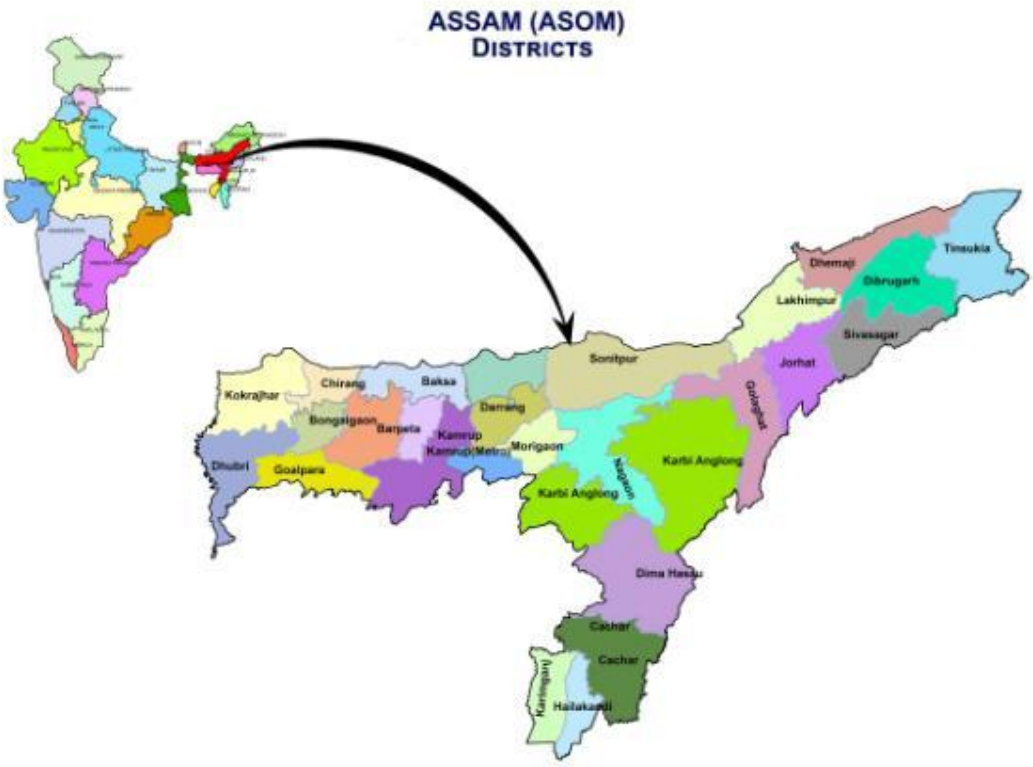
FIGURE 2.1 :MAP OF ASSAM STATE



2.3. THE DISTRICT PROFILE

The entire Project road lies under Bonagaigaon districts of Assam.

Bonagaigaon

The decision of the Government of Assam in 1989, to create a new District of Bongaigaon curving out some areas of the Goalpara and Kokrajhar District with its headquarter located at Bongaigaon was quite challenging. It was the political and administrative exigencies which had necessitated to create this new district suddenly although the people of Bongaigaon and the adjoining areas were demanding a new Sub-Division with its headquarter to be located at Bongaigaon from the very beginning.

Bongaigaon District, with population of about 7.4 lakh is Assam's the 11th least populous district, located in the state Assam in India. Total geographical area of Bongaigaon district is 1093 km2 and it is the 3rd smallest district by area in the state. Population density of the district is 676 persons per km2. There are 5 sub districts in the district, among them Srijangram is the most populous sub district

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with population of about 2.7 lakh and Sidli(Pt) is the least populous sub district with population of about 58 thousand. There is only one city in the district that comes under the district administration which is Bongaigaon Municipal Board. An official Census 2011 detail of Bongaigaon, a district of Assam has been released by Directorate of Census Operations in Assam. Enumeration of key persons was also done by census officials in Bongaigaon District of Assam.

In 2011, Bongaigaon had population of 738,804 of which male and female were 375,818 and 362,986 respectively. In 2001 census, Bongaigaon had a population of 612,665 of which males were 315,537 and remaining 297,128 were females. Bongaigaon District population constituted 2.37 percent of total Maharashtra population. In 2001 census, this figure for Bongaigaon District was at 2.30 percent of Maharashtra population.
There was change of 20.59 percent in the population compared to population as per 2001. In the previous census of India 2001, Bongaigaon District recorded increase of 22.09 percent to its population compared to 1991.

The fact is, last census for Bongaigaon district was done only in 2011 and next such census would only be in 2021. But as per estimate and projection, population of Thane district in 2018 is 8.09 Lakhs compared to 2011 census figure of 7.39 Lakh.

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Table 9.2 Socio- economic profile of Bongaigaon District

Description	2011	2001
Population	7.39 Lakhs	6.13 Lakhs
Actual Population	7,38,804	6,12,665
Male	3,75,818	3,15,537
Female	3,62,986	2,97,128
Population Growth	20.59%	22.09%
Area Sq. Km	1,093	1,093
Density/km2	676	355
Proportion to Assam Population	2.37%	2.30%
Sex Ratio (Per 1000)	966	942
Child Sex Ratio (0-6 Age)	969	972
Average Literacy	69.74	60.95
Male Literacy	74.87	68.66
Female Literacy	64.43	52.69
Total Child Population (0-6 Age)	1,16,392	1,10,839
Male Population (0-6 Age)	59,099	56,197
Female Population (0-6 Age)	57,293	54,642
Literates	4,34,078	42,25,078
Male Literates	2,37,114	23,17,126
Female Literates	1,96,964	19,07,951
Child Proportion (0-6 Age)	15.75%	18.09%
Boys Proportion (0-6 Age)	15.73%	17.81%
Girls Proportion (0-6 Age)	15.78%	18.39%

Source: http://www.census2011.co.in

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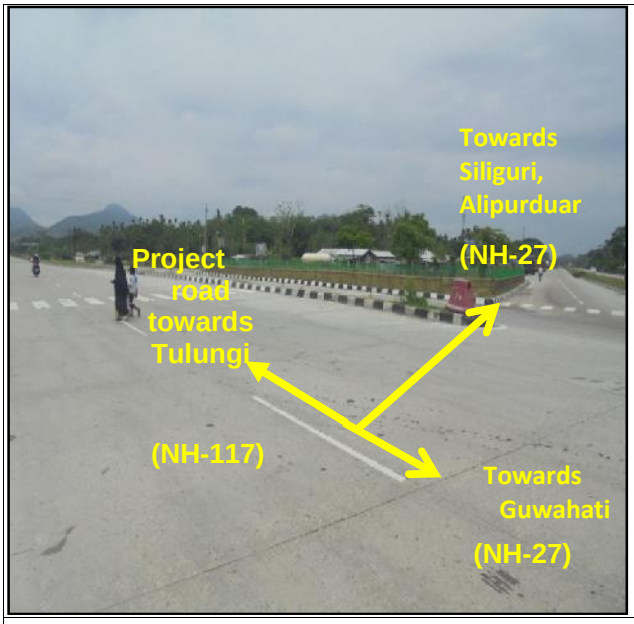
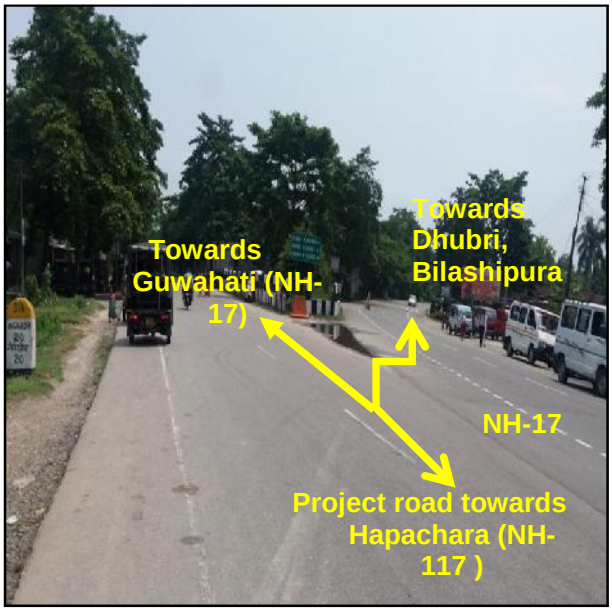
2.4. THE PROJECT

The project road lies under Bongaigaon districts of Assam.

The Project Road starts at Rakhaldubi (junction with NH-27) in Hapachara and passes through village / localities namely Rakhaldubi, Happachara, Garugaon-1, Garugaon-2, jiyaguri, Sidalsati, Kakaijana, Beltoli, Kadamtola and ends at Tulungia (junction with NH-17). The Starting co-ordinate of the project road is 26°29'13.78"N and 90°38'35.29"E and the ending co-ordinate is 26°22'32.50"N and 90°38'7.56"E.

The photographs of Originating & Terminating Point are as follows:

	
Originating point at Rakhaldubi (Ch. 0.000 Km)	Terminating point at Tulungia junction (Ch. 14.050 Km)

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3. IMPACT AND BENEFITS

The road project is associated with some adverse impacts as well as some benefits. The major impacts of the road project include loss of agricultural land due to acquisition of land all along the project corridor. But it should be kept in mind that the project road strategically interconnects the state of Assam. The project road connects two major roads NH-17 & NH-27 Boost in industrial development can be viewed as boosting economic growth and poverty reduction which will bring substantial social and economic development in the region. The social benefits arising due to the project will be triggered off due to improved accessibility to various services such as easy access to markets, health facilities, schools, workplace etc. which in turn increases the income of the locals, and ultimately elevating their standard of living. The possible direct and indirect positive impacts of the project are listed below.

- Road network will not only link the village communities to better markets, but also open up wider work opportunities in distant places. People can shuttle to distant worksites and engage in construction, mining, factories, business as well as domestic works.
- The immediate benefits of road construction and improvement will come in the form of direct employment opportunities for the roadside communities and specially those who are engaged as wage labourers, petty contractors and suppliers of raw materials.
- Effective drainage system to ensure that there will be no pooling of water
- Safety measures for Highway signs, Pavement marking, Traffic signals, Truck lay byes, Bus stops and Bus bays
- Rectification of geometric deficiencies (both Horizontal & Vertical).
- Provision of Pedestrian passes.
- Provision of ROBs to fly over the traffic and minimize the traffic congestion.
- Provision of ROBs over railway crossings.
- Slope protection.
- 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 and Trauma Centers.

Other benefits: -

- It will give a major fillip to the quest for all weather connectivity.
- It will reduce travel time between metros by 50% to 70%.
- It will enhance the spirit of enterprise.

- Help the locals to ply their trade.
- Provide direct employment in road construction and allied activities.
- Lower accident and provide quick accessibility to services like hospital, market, office etc.

3.1. Minimizing Resettlement Impact

Adequate attention has been given during the feasibility and detailed project design phases of the project preparation to minimize the adverse impacts on land acquisition and resettlement impacts. However, technical and engineering constraints were one of the major concerns during exploration of various alternative alignments. With the available options, best engineering solution have been adopted to avoid large scale land acquisition and resettlement impacts. Following are the general criteria adopted for the selection of the alignment:

- It should provide linkage to other roads in the region.
- It should take in to account the future traffic growth and management.
- It should be coordinated with local and national development plans.
- It should minimize environment impact along the corridor.
- It should take in to consideration the opinions of local people in selection of Alignment.

The specific measures adopted for minimizing the resettlement impacts for the sub Project is as follows:

- Exploration of several alternate alignments in consultation with engineering team, concerned government departments and local community
- Following proposed local roads as much as possible to minimize the land acquisition in the bypass alignments.
- Avoiding major settlements and urban areas to minimize the large scale physical displacement.
- Avoiding productive agricultural land to minimize the adverse economic displacement;
- Diverting the alignment towards the available unused government land to minimize impact on private property.

3.2. SCOPE AND OBJECTIVE OF RESETTLEMENT PLAN (RP)

The aim of this Resettlement Plan (RP) 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 MoRT&H, Assam state 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 like poor, women and other disadvantaged sections of society.
- Public consultation and people's participation in the project.
- Existing 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.
- R&R cost estimate including provision for fund .
- Institutional framework for the implementation of the plan, including grievance redress mechanism and monitoring & reporting.

3.3. PRIMARY RESPONSIBILITY FOR LAND ACQUISITION & RESETTLEMENT

The NHIDCL (Assam) Department is the nodal agency for implementation of the proposed project. Therefore, the prime responsibility for land acquisition lies with the NHIDCL (Assam), Assam. However, such land acquisition is normally done through the State level District Administration and the compensation amount is deposited with the District Administration by the acquiring body for disbursement. Similarly, the resettlement of the affected population will be implemented by the NHIDCL (Assam) like it is being done in other projects. The NHIDCL will hire the services of some experienced NGO to implement the RAP on its behalf. However, the NH will conduct its own internal monitoring of RAP implementation through PIU.

4. METHODOLOGY FOR IMPACT ASSESSMENT

This section presents an analysis of the project impacts based on census survey data. The purpose of the analysis is to (a) develop profiles of DPs and communities affected by the project. (b) Identify the nature and types of losses. The following sections briefly describe the methods used to ascertain various types of impacts.

4.1. THE CENSUS SURVEY

The census survey was carried out in the month of June – July 2019 by a team of trained enumerators. The objectives of the census survey were 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 DPs. The census survey includes the following:

- Inventory of the affected assets
- Categorization and measurements of potential loss
- Physical measurements of the affected assets/structures
- Household characteristics, including social, economic and demographic profile
- Identification of customary right holders
- Assessment of potential economic impact

The present census survey has covered 100% structures affected within the proposed ROW including titleholders and Customary rights holder. The additional information about the titleholders land will be collected on completion of landholders' data collection from revenue department/Village Council 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.

4.2. LAND ACQUISITION PLANNING

The alignment was finalized as per the detailed engineering design. Initially, the numbers of affected villages were identified as per the alignment. All the village maps were collected from the local revenue offices. The village maps were digitized by the consultant. Following the digitization of village maps, the engineering design of the alignment was superimposed in the digitized cadastral map in order to identify the number of land parcels and their demarcation including the quantification. The superimposition of alignment on the village map provided all the plot numbers. A Land Acquisition Plan (LAP) has been prepared accordingly.

4.3. INVENTORY OF ASSETS

Following finalization of the road alignment and identification of the land parcels, cross-sections design and land acquisition requirements, census of all displaced

persons (DPs) was carried in the sub-project. The objective of the project census survey was to identify the persons who would be displaced 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. The survey team was trained by the resettlement specialist and the survey was closely monitored on a regular basis. Additionally, socio-economic data was also collected as part of the Social Impact Assessment (SIA) study. The census survey includes the following.

4.4. SURVEY OF AFFECTED STRUCTURES

Different types of structures will be affected by the road improvements. In order to assess market/ replacement value for the affected structures, the survey considered the types of construction, material used for roof, walls and floor; levels/ stories of structures, and land area of each structure.

4.5. PUBLIC CONSULTATION

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 DPs and women were also included in this consultation process.

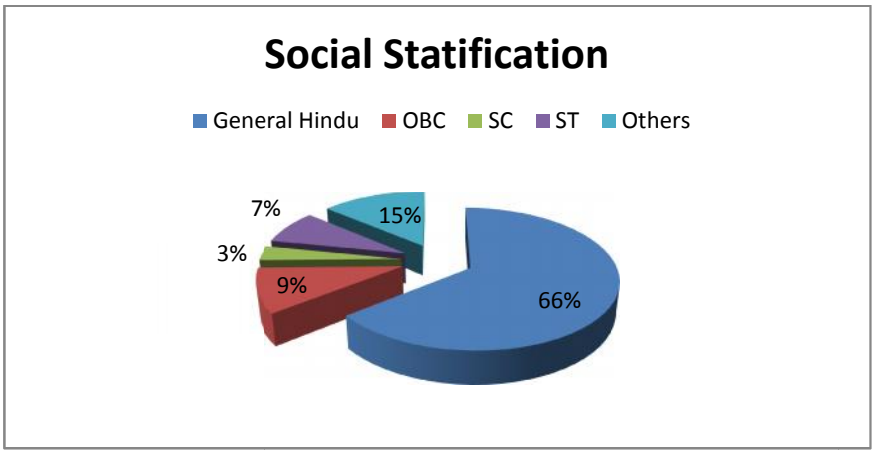
5. SOCIO ECONOMIC PROFILE OF THE PROJECT AREA

To understand the socio-economic profile of project area, the socio-economic information of DPs was collected through the Socio Economic Survey (SES) and Census survey. The total number of Displaced Household (DH) is 224 and the total number of Displaced Population (DP) living within this 224 household is 1205 persons. The gross findings of the survey are presented in the following sections.

5.1. NUMBER OF DISPLACED PERSONS (DPS)

The social stratification of the project area shows the dominance of General Hindu population with 66% households. The second stratum of the social grouping in the area is of Others population, mainly Muslims in the project area is 15% and OBC population with 9% households followed by Scheduled Tribe 7% households. The detail of social grouping in the project area is presented in the.

Figure 5.1.1: Social Categories of DPs along the Project Road



Source: Census Survey , June - July 2019

5.2. NUMBER OF DISPLACED PERSONS (DPS)

There are altogether 224 DPs concerning to titled and non-titled categories, that are being affected by the project. It includes 50% males and 49% females. The number of DPs is substantially significant in the project area mainly because presence of joint family system and a large number of shareholders of landed properties.

5.3. ANNUAL INCOME LEVEL OF THE AFFECTED HOUSEHOLDS

The number of BPL population, is further strengthen from the data analyzed on the basis of monthly income of the households, which reflects that there are no households, which are having an average monthly income of less than Rs. 30000/. About 21 % DPs are having income in the range of Rs. 30000-50000, while 47% are earning in the range of Rs. 50000-100000. It have been observed that about 32% households are annually earning more than Rs. 100000/-. About 14% of the Household have a BPL card and certificate from the local authority. The average income level of households in the project area is summarized in the (Table 5.3.1).

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TABLE 5.3.1: ANNUAL INCOME LEVEL OF THE AFFECTED HOUSEHOLDS

Sl.	Annual Income Categories in (Rs)	% Age
1	>30000 and <50000	21%
2	>50000 and <100000	47%
3	<100000	32%
	Total	100.00%

Source: Census Survey, June - July 2019

5.4. OCCUPATION BY DPS

The occupational status of head of the households i.e. the primary occupation by the households reveals that 87% households are depending on business and this includes the business they are carrying out in the road side mainly shops. About 7% households are having agriculture as their primary source of income and 2% are engaged in Government jobs. The details of occupations by the DPs are presented in the (Table 5.4.1).

TABLE 5.4.1: OCCUPATIONAL STATUS OF DPS

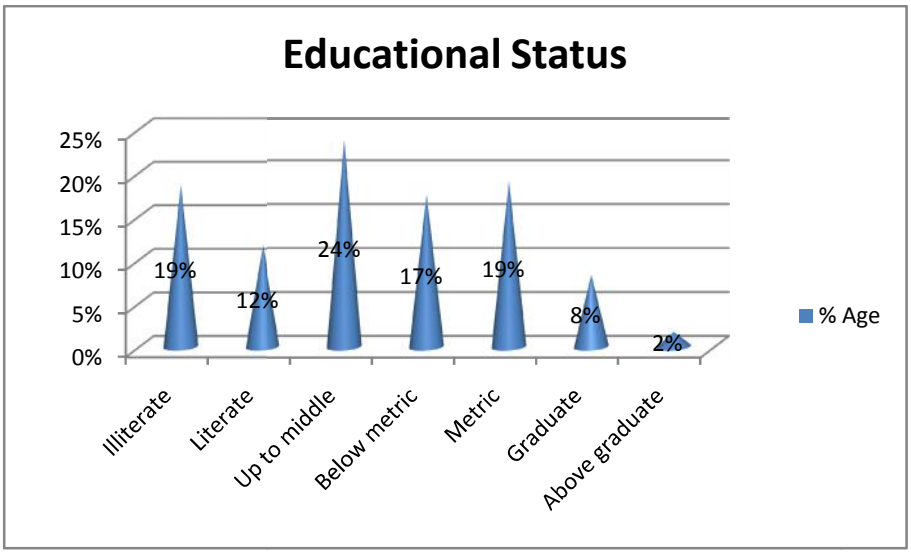
Sl. No.	Occupational Status of	% Age
1	Service	2%
2	Business	87%
3	Agriculture	7%
4.	Wage Earner	2%
5	Professional	2%
	Total	**100.00%**

Source: Census Survey, June - July 2019

5.5. EDUCATIONAL STATUS OF DPS

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., 19% are still illiterate. Another 12% has attained the education up to elementary level. About 8% DPs are graduates; while very few (2%) have degree of master and above, which are presented in the (Figure 5.5.1).

FIGURE 5.4.1: EDUCATIONAL STATUS OF DPS



Source: Census Survey , June - July 2019

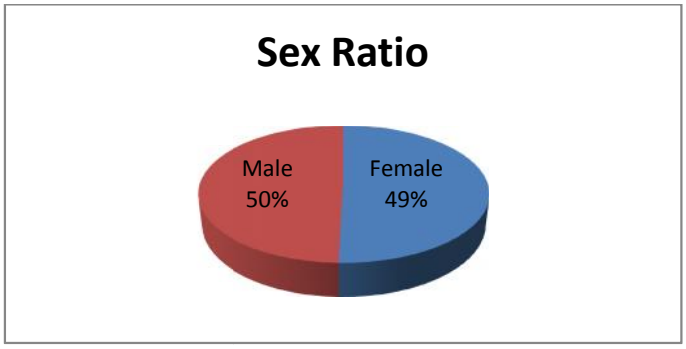
5.6. IMPACT ON INDIGENOUS PEOPLE

The Scheduled Tribes (STs) in the project area is considered to be IP. The census survey finding shows that there is 7% DP at the roadside who belongs to the ST community

5.7. GENDER IMPACT AND MITIGATION MEASURES

The gender composition of DPs shows that the male accounts for 50% and female accounts for 49%. The gender disparity is visible in lower sex ratio among DPs i.e. 966 against state level statistic having 958 as per provisional census data of India, 2011. The census survey revealed that 2% of the DH is women headed households will be affected by the project.

FIGURE 5.7.1 GENDER RATIO IN STUDY AREA



Source: Census Survey, June - July 2019

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 .

The women feel that their mobility will increase as market & 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 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 Govt. 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.

Women will not be affected negatively due to the program. Any negative impacts of the project on female-headed households will be taken up on a case-to-case basis and assistance to these households will be treated on a priority basis. 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 RP. 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.

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6. DEFINITIONS

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

- "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.
- "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 Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement, Act 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.
- "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, and occupiers of forest lands and of collectors of minor forest produce.
- "Agricultural labourer" means a person normally resident in the affected zone for a period of not less than three years immediately 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.
- "Agricultural land" includes lands used or capable of being used for the purpose of-agriculture or horticulture;
- Dairy farming, poultry farming, pisci-culture, 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.
- 'BPL Family': The Below Poverty Line Families shall be those as defined by the Planning Commission of India from time to time.
- "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.

- "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.
- "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.
- "Holding" means the total land held by a person as an occupant or tenant or as both;
- "Marginal farmer" means a cultivator with an unirrigated land holding up to one hectare or irrigated land holding up to half hectare.
- "non-agricultural labourer" means a person who is not an agricultural labourer but is normally residing in the affected zone for a period of not less than three years immediately 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 labour or as a rural artisan immediately before such declaration and who has been deprived of earning his livelihood principally by manual labour or as such artisan in the affected zone.
- "Notification" means a notification published in the Official Gazette;
- "Occupiers" mean members of Scheduled Tribe community in possession of forest land prior to 25th October 1980;
- "Project" means a project displacing 500 families or more enmasse in plain areas and 250 families or more enmasse in hilly areas, DDP blocks, areas mentioned in Schedule V and Schedule VI of the Constitution of India as a result of acquisition of land for any project.
- "displaced family" means a family/person whose place of residence or other properties or source of livelihood are substantially affected by the process of acquisition of land for the project and who has been residing continuously for a period of not less than three years preceding the date of declaration of the affected zone or practicing any trade, occupation or vocation continuously for a period of not less than three years in the affected zone, preceding the date of declaration of the affected zone.
- "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.

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- "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.
- "Small farmer" means a cultivator with an unirrigated land holding up to two hectares or with an irrigated land holding up to one hectare.

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7. SCOPE OF LAND ACQUISITION AND RESETTLEMENT

7.1. SCOPE OF LAND ACQUISITION

As discussed earlier also the scope of land acquisition is quite significant in the project because of availability of limited ROW. A project census survey was carried out to identify the persons who would be displaced 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. The major findings of the land acquisition estimate and census of 100% affected structures are discussed in the following sections which will be further updated after completion of landholder's data collection.

7.2. LOSS OF LAND

Many DPs will be losing their land to 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.

7.3. OWNERSHIP OF LAND BEING ACQUIRED FOR THE PROJECT

The total affected non govt land is about 13.24 hectare which is owned by individual Private Villagers, and by the community as a whole.

7.4. IMPACT TO STRUCTURES UNDER THE PROJECT

The total number of affected Structure in this project area is summarized below.

Table-7.4.1 BRIEF SUMMARY OF THE RESETTLEMENT IMPACT

Sl.	Impacts	Number
1	Total land acquisition requirements (In Hectare)	13.24
2	Total number of Structures that will be affected	59
3	Total number of Private Structures (Title Holder &Non-Title Holder) that will be affected	59
4	Total number of Community and Government Structures that will be affected	0
5	Total number of Affected Family	51
6	Total number of Affected Person	200

Source: Census Survey, June - July 2019

During the census survey in addition to structures belong to titleholders, large number of squatters were also enumerated along the proposed road. Based on the social survey data, a total of 59 structures would be affected due to the improvement of the project road.

TABLE 7.4.2: LOSS OF STRUCTURE IN THE SUB-PROJECT

Sl..	Type of Ownership	No. of Properties	% Age
1	Squatter/ Non-Title Holder	0	0%
2	Title Holder	59	100%
3	Community/Government	0	0%
	Total	59	100.00%

Source: Census Survey, June - July 2019

7.5. IMPACT TO STRUCTURES UNDER THE PROJECT

Based on the social survey data, a total of 59 structures would be wholly affected due to the improvement of the project road. The details of the same are depicted in Table- 7.5.1.

TABLE- 7.5.1: LOSS OF TITLE HOLDER STRUCTURE IN THE PROJECT

Sl.	Use of Structure	Numbers
1	Commercial	0
2	Residential	55
3	Under Construction	2
4	Compound Wall	0
5	Other Structure (Toilet & Abandoned)	2
Total		59

Source: Census Survey,June - July 2019

7.6. TYPE OF CONSTRUCTION OF PRIVATE AFFECTED STRUCTURE

The construction type of structures being affected in the project area is of various types such as temporary, semi-permanent and permanent. The details of type of constructions of the affected structures are summarized in the Table-7.6.1.

TABLE- 7.6.1: TYPE OF TITLE HOLDER STRUCTURE

Sl.	Typology of structure	Number
1	Permanent	0
2	Semi-Permanent	16
3	Temporary	39
4	Under Construction	2
5	Compound Wall	0
6	Others(Toilet & Abandoned)	2
Total		59

Source: Census Survey,June - July 2019

7.7. LOSS OF COMMUNITY PROPERTY RESOURCES (CPRS)

The detail of number of community properties, which may face relocation, has been mentioned in Table 7.9.1.

TABLE 7.9.1: LOSS OF COMMUNITY PROPERTY RESOURCES

Sl.	Type of Properties	Number
1	Community Property	0
2	Government Properties	0
Total		0

Source: Census Survey, June - July 2019

8. PUBLIC 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 Table briefly depicts the plan and implementation of Public Consultation and Disclosure of the Project.

The overall objectives of the consultation program in preparing RAP were to disseminate project information and to incorporate public and Sample Household's views in Resettlement and Environmental Action Plans, which are guided by specific objectives like:

- Awareness amongst stakeholders by disclosing the updated R.P. 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 R&R 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.

8.1. OBJECTIVES OF PUBLIC CONSULTATIONS

The overall objectives of the consultation program in preparing RAP were to disseminate project information and to incorporate public and DP's views in Resettlement and Environmental Action Plans, which are guided by specific objectives like:

- Awareness amongst stakeholders by disclosing the updated R.P. 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 R&R 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.

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8.2. 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 DPs 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 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 R&R programme.

Primary stakeholders included those affected negatively or positively by the project, like the DPS, project beneficiaries and project implementing agencies. Secondary stakeholders included other individuals and groups, with an interest in the project, viz., the NHIDCL,Assam,the highway users, the various line departments of the State etc.

8.3. DISCLOSER 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 this development project the discloser of project information (during the feasibility stage) to the public in general and to the people who are likely to be impacted negatively in particular have been done by way of consultation process. During the consultation session it was observed that the local people are aware of this project through local newspaper, published from time to time.

8.4. 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 frame work 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.

8.5. 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 DPS
- Villagers
- Village Council/Town Council/Panchayat.
- Local voluntary organizations and CB0s/NG0s
- Government agencies and departments

8.6. 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.

8.7. CONSULTATION DURING PROJECT PREPARATION

The Census/Survey Team carried out preliminary consultations through Focus Group Discussions (FGDS) and meetings with the DPs 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 DPs. During the survey, intensive discussion and consultation meetings were conducted with large number of DPs in nearly every affected village wherein policy related issues; displacements and other related issues were discussed. Suggestions and comments by DPs 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. Village Council members were contacted to inform the people. The Team also had informal meetings with village head and other district level government officials, leaders of local level organization /association, truckers association, and village women groups.

8.8. PLAN FOR FURTHER CONSULTATION IN THE PROJECT

The effectiveness of the R&R program is directly related to the degree of continuing involvement of those affected by the Project. Several additional rounds of consultations with DPs 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 RP 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 DPs 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 Implementation Unit (PIU) will conduct information dissemination sessions in the project area and solicit the help of the local community/ leaders and encourage the participation of the DP's in Plan implementation.

During the implementation of RP, 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.

8.9. INFORMATION DISCLOSURE

To keep more transparency in planning and for further active involvement of DPs and other stakeholders the project information will be disseminated through disclosure of resettlement planning documents. The EA will submit the following documents to MoRT&H for disclosure on their 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 (Assamese) and distributed to DPs.

9. GENDER IMPACT AND MITIGATIVE MEASURES

9.1. INTRODUCTION

The social economical survey and census survey to the project sites identified some critical social issues related to gender impacts associated with project impacts. Typically, vulnerability is relatively higher among this group. Dislocation and loss of livelihood caused by road widening and development may further aggravate their disadvantaged situation, unless special attention is paid to them. This chapter particularly examines the issues from social safeguard considerations to develop specific mitigation measure.

9.2. WOMEN'S PARTICIPATION IN THE PROJECT

The gender composition of DPs shows that the female accounts for 49% and male accounts for 50%. The gender equality is visible in higher sex ratio among DPs i.e. 966 against state level statistic having 958.

The Gender Development Index (GDI) value for India is very low and the socio-economic profile of the project area shows much lower socio-economic standing for women. They are largely involved in domestic work and have very low economic participation rate (i.e. productive or gainful employment). In the project, women are affected in a variety of ways. For example, they face hardship and stress and continue to suffer during the transition period until the time the project -affected households are able to regain their lost income and livelihood. Often, the duration of this process is lengthened due to delays in payment of compensation, rehabilitation assistance and implementing the R&R., reconstructing the livelihood systems. The longer the transition period, more are the miseries for women. During project implementation, project affected women will receive preferential treatment for the civil work in the project. Each field team of the RAP implementation agencies/partner agencies shall include at least onewoman investigator/facilitator. The PIU will ensure that the women are consulted and invited to participate in group-based activities to gain access and control over the resource as a part of the RAP. The monitoring and evaluation team(s) shall include woman. Further, during RAP implementation, NGO's will make sure that women are actually taking part in issuance of identity cards, opening accounts in the bank, receiving compensation amounts by cheque in their names. This will further widen the perspective of participation by the women in the project implementation. The implementing agencies will provide training for upgrading women's skill for alternative livelihoods and income restoration.

9.3. HIV/ AIDS AND HEALTH RISKS

HIV/ AIDS are major development challenges in India. Given the epidemic nature of the problem, it may reverse India's achievements in health and development.

According to National AIDS Control Organization (NACO) HIV estimates for 2011, India has close to 4 million HIV infected people. This is less than one percent of the adult population but still more than any country in the region. It is estimated that HIV infection could grow to 5 percent of adult population – more than 37 million by 2018/16 without successful intervention. HIV infection is typically concentrated among the poor marginalized groups including sex workers, drug users, migrant labourers and truck drivers. These groups, particularly the truckers drive the HIV/AIDS epidemic and many studies indicate that infection is spreading rapidly to the general population. Recently, the Government of India (GOI) has shown increasing commitment to HIV/AIDS control. GOI established a consortium like collaboration of external partners (UNAIDS, USAID, DFID,CIDA and others) to provide technical and financial assistance to NACO to design and help implement GOI's national policy on HIV/AIDS control before mass spread into general community. There is need to improve awareness level in the state, particularly in the project area. In recognition of the importance of HIV/AIDS issue, EA has decided to carry out HIV/AIDS Awareness Campaign under this project through the use of NGOs. Information and education campaign on HIV/AIDS and other sexually transmitted diseases (STDs) will be conducted by a qualified NGO during project implementation. The campaign will target the project construction workers at campsites, truckers at truck stops and roadside eateries and the public at large along the alignment. The NGO will work closely with the relevant state agencies and other existing networks dedicated to prevention work for further building up of awareness programs in the project area. HIV/AIDS awareness brochures would also be developed for distribution to local communities, local markets, truck/bus stations and other appropriate places to increase awareness about risks/dangers of HIV/AIDS. This would ultimately lead to lowering the risk for the general community in the project affected area.

The Project State Assam stands second in prevalence of Aids/HIV amongst the North Eastern states and was only next to Manipur and Mizoram as per NACO reports on 2011. Assam, having a population of around 12 lakh, has 3,699 HIV/Aids infected people including 983 women, while 141 people have died in the state since 1990 when the first HIV case was detected, a study by the Mon-based NGO, the AssamAIDS International Network said. The state is now estimated to have 356 full-blown Aids cases with those in the age range of between 25 and 34 years being the highest. According to the Assam State Aids Control Society (NSACS), sexual contact was a major cause of the high incidence of HIV/Aids, followed by blood transfusion and sharing of syringes and needles by drug users.

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10. REHABILITATION AND RESETTLEMENT PLAN

The procedure mentioned in this chapter 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 enmassein plain areas, or two hundred or more families enmassein 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.

Every declaration made in our policy 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 panchayatsor municipalities and other prominent place or places in the affected area and the resettlement 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 that are landless (not having homestead land, agricultural land, or either homestead or agricultural land) and below poverty line, but residing continuously

for a period of not less than three years 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 surveyor 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 arid 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.

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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) Alist 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 sabhasin rural areas and in public hearings in urban and rural areas where gram sabhasdon't exist.

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

The consultation with the gram sabhaor the panchayatsat 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 two hundred or more 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 4 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

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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.

11. ENTITLEMENTS, ASSISTANCE AND BENEFITS

11.1. Definition of DPs and Eligibility

The project will have three types of displaced persons 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 inits 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. DPs entitled for compensation, assistance and rehabilitation provisions under the sub project are:

All DPs 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

DPs 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 as decided by the EA. DPs 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.

11.2. Entitlements

The entitlement provisions various categories of DPs 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, 2013and Assam RFCTLARR Rules, 2015 or replacement of land if available. If the residual plot(s) is (are) not viable, i.e., the DP becomes a marginal farmer, three options are to be given to the DP, subject to his acceptance which are (i) The DP 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 DP is from vulnerable group, compensation for the entire land by means of land for land will be provided if DP 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 and Assam RFCTLARR Rules, 2015 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, whereas, the vulnerable encroachers only, who are having structure within the proposed ROW will get compensation for affected properties. 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 DPs 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 Cropswill 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 DPs 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 Livelihooddue 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 transitional 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 DPs 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 DPs 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 DPs, (ii) Employment opportunity for DPs 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 DPs 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 DPs 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.

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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 (Vulnerable households including BPL, SC, ST, WHH, disabled and elderly) will be paid with Special Assistance which will be one time lump sum assistance of Rs. 50,000/ to vulnerable households. This will be paid above and over the other assistance(s) as per this entitlement matrix.

Other Unanticipated Impacts (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.

12. 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 DPs living below poverty line (BPL), SC, ST, women headed households, the elderly and the disabled. 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.

Table 9.3: Entitlement Matrix

Sl	Type of Loss	Unit of	Entitlement	Entitlement Details
A. LOSS OF LAND				
1.	Loss of Agricultural land	a)Titleholder b)DPs withcustomary landright	a)Compensation atReplacementcost b)Specialprovision forvulnerable group	a) Cash compensation at replacement cost as determined according to RTFCLARR ACT 2013, Assam RFCTLARR Rules, 2015 which includes additional Rs. 5 Lakh as cash compensation or replacement of land if available. b) If the residual plot(s) is (are) not viable, i.e., theDP becomes a marginal farmer,1 any of thefollowing three options are to be given to theDP, subject to his acceptance: The DP remains on the plot, and thecompensation and assistance paid to thetune of required amount of land to beacquired. Compensation and assistance are to beprovided for the entire plot including residualpart, if the owner of such land wishes that hisresidual plot should also be acquired by theEA, the EA will acquire the residual plot andpay the compensation for it. If DP is from vulnerable group, compensationfor the entire land by means of land for landwill be provided if DP wishes so, provided thatland of equal productive value is available. c) All fees, stamp duties, taxes and other charges0,as applicable under the relevant laws, incurred in the relocation and rehabilitation process, areto be borne by the

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Sl	Type of Loss	Unit of	Entitlement	Entitlement Details
				EA
2.	Loss of homestead /commercial Land	a)Titleholder b)DPs with customary land rights	a) Compensationat Replacementcost	a) Cash compensation at replacement cost asdetermined according to RTFCLARR ACT 2013, Assam RFCTLARR Rules, 2015 which includes additional Rs. 5 Lakh as cash compensation orreplacement of land if available. b) All fees, stamp duties, taxes and other charges,as applicable under the relevant laws, incurred in the relocation and rehabilitation process, areto be borne by the EA.
B. LOSS OF STRUCTURE (RESIDENTIAL/COMMERCIAL/OTHER				
3.	Loss of residential / commercial structures	a)Titleholder b)DPs having structure with customary land right	a) Compensation at replacement cost b) Shifting assistance	a) Compensation of structure will be paid at thereplacement cost to be calculated as per latestprevailing of market rates without depreciation. b) Shifting assistance of Rs. 50000/-. c) Right to salvage material from demolishedstructure and frontage etc. d) Rental assistance as per the prevalent rate inthe form of grant to cover maximum threemonth rentals.
4.	Loss of rental accommodation	Tenants	a) Rental Assistance b)Compensation at replacement cost c) Shifting assistance	a) Rental assistance for both residential & Commercial tenants as per the prevalent ratein the form of grant to cover maximum threemonth rentals. b) Additional structures erected by tenants will also be compensated and deducted fromowner's compensation amount. c) Shifting assistance based on type of house andhousehold assets. d) Any advance deposited by the tenants will berefunded from owners total compensationpackage to the tenant on submission ofdocumentary evidences. e) Right to salvage material from demolishedstructure and frontage etc. erected by tenants.
C. LOSS OF STRUCTURE BY NON-TITLED HOLDER				
5.	Loss of	Squatters	a) No	a) Squatters will be notified and given one

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Sl	Type of Loss	Unit of	Entitlement	Entitlement Details
	structure (immovable assets constructed by squatters and encroachers)	having structure	compensation for land b) Compensation for structures. c) Shifting Assistance	monthtime to remove their assets. b) Compensation for loss of structure at replacement cost. c) Shifting assistance of Rs. 100000/-. d) Right to salvage material from the demolishedstructure.
		Encroachers having structure	a) No compensation for land b) Compensation for structures to only vulnerable household	a) Encroachers will be notified and given onemonth time to remove their assets and harvesttheir crops. b) Compensation for structures atreplacementcost to the vulnerable households only. c) Right to salvage materials from the demolishedstructure.
D. LOSS OF TREES AND CROPS				
6.	Loss of Trees	a) Land holders b) Sharecroppers c) Lease holders	Compensation at Market value to be computed with assistance of horticulture department	a) Advance notice to DPs to harvest fruits andremove trees b) For fruit bearing trees compensation at averagefruit productionfor next 15 years to be computed at currentmarket value c) For timber trees compensation at market costbased on kind oftrees
7.	Loss of Crops	a) Land holders b) Sharecroppers c) Lease holders	Compensation at Market value to be computed with assistance of agriculture department	a) Advance notice to DPs to harvest crops b) In case of standing crops, cash compensation current market cost to be calculated ofmature crops based on average production.
E. LOSS OF MARKET PLACE STRUCTURE BY TITLED HOLDER AND NON-TITLED HOLDER				
8.	Impact on market place/ area on a	Titleholder6 (Owner) losing commercial enterprise in	Relocation Assistance	a) Affected enterprises will be provided with thefollowing options: Selfmanaged reconstruction of shops by theshop operatorswith all benefits as per the entitlement matrix; or

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Sl	Type of Loss	Unit of	Entitlement	Entitlement Details
	minimum of 25 shops/ businesses	the market area		b) Project assisted relocation option will beprovided to thosewhose commercial structure can no longer beused as acommercial enterprise as a result of the Projectimpact. The allotment of the shops in the market complex willbe based onthe ownership status of those affected. c) Shifting assistance of Rs. 50000/- for title holder d) Right to salvage material fromdemolishedstructure at no cost.
		Non-titleholder8 (tenants, leaseholders or squatters) losing commercial enterprise in the market area	Relocation Assistance	a) Affected enterprises will be provided with thefollowing options: Self managed reconstructionof shops by the shop operators with all benefitsas per the entitlement matrix; or b) Project assisted relocation option will beprovided to those whose commercial structurecan no longer be used as a commercialenterprise as a result of the Project impact. Theallotment of the shops in the market complexwill be based on the ownership status of thoseaffected. c) Shifting assistance of Rs. 100000/-. d) Right to salvage material from demolishedstructure at no cost.
F. LOSS OF LIVELIHOOD				
9.	Loss of primary source of income	Titleholders losing income through business	Rehabilitation Assistance	a) Title holders loosing their businessestablishment due to displacement will beprovided with a lump sum transitionalallowance of Rs. 900000.
		Titleholders losing income through agriculture	Rehabilitation Assistance	a) Training Assistance will be provided for incomegenerating vocational training and skillupgradation options as per DPs choice at therate of Rs. 4000 per affected household tothose households loosing their primary sourceof income. b) Employment opportunity for DPs in the roadconstruction work, if available and if so desiredby them.
		Non-titleholder	Rehabilitation Assistance	a) Training would be provided for up gradation ofskills @ Rs. 5000/ - per family to the DPs.

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Sl	Type of Loss	Unit of	Entitlement	Entitlement Details
		s namely squatters and vulnerable encroachers losing primary source of income		b) Employment opportunity for DPs in the roadconstruction work, if available and if so desiredby them, Or c) National/State level job card under NationalRural Employment Guarantee Program.
		Wage earning employees indirectly affected due to displacement of commercial structure	Rehabilitation Assistance	a) This is valid for persons indirectly affected dueto the employer having being displaced, oncase-by-case, based on local wage rates forthree months. b) Employment opportunity for DPs in the roadconstruction work, if available and if so desiredby them, Or c) National/State level job card under NationalRural Employment Guarantee Program.
		Agricultural labourer/ sharecropper	Rehabilitation Assistance	a) Assistance is to be paid as per the prevailinglocal wage ratesfor 200 days. b) Employment opportunity for DPs in the roadconstruction work,if available and if so desired by them, Or d) National/State level job card under NationalRural EmploymentGuarantee Program.
		Licensed mobile vendors and kiosk operators	Rehabilitation Assistance	a) Mobile venders are not eligible forcompensation or assistance. b) Those mobile vendors in possession of apermit from local authorities to operate in theaffected area will be treated as kiosksoperators. c) Kiosk operators and vendors licensed tooperate from affected locations will be entitledto a one time lump sum assistance of Rs. 5000/-
G. LOSS OF COMMUNITY INFRASTRUCTURE/COMMON PROPERTY RESOURCES				
10.	Loss of Common Property	Community	Reconstruction / Cash Compensation at	a) Cash compensation at replacement cost orreconstruction of the community structure inconsultation with the affected community.

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Sl	Type of Loss	Unit of	Entitlement	Entitlement Details
	Resources		replacement cost	
H. ADDITIONAL SUPPORT TO VULNERABLE GROUP				
11.	Additional Assistance to vulnerable groups	Vulnerable households including BPL, SC, ST, WHH, disabled and elderly	Special Assistance	a) One time lump sum assistance of Rs. 50000/ tovulnerable households. (This will be paid aboveand over the other assistance(s) as per thisentitlement matrix).
I. OTHER UNANTICIPATED IMPACTS				
12.	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	Community / Individual	Compensation	a) The contractor shall bear the cost of any impacton structure or land due to movement ofmachinery during construction or establishmentof construction plant b) All temporary use of lands outside proposedRoW to be through written approval of thelandowner and contractor. c) Location of Construction camps by contractorsin consultation with RCD.
13.	**Unforeseen impacts if any**	Any unanticipated impacts due to the project will be documented and mitigated based on the spirit of the principle agreed upon in this entitlement matrix.		

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13. GRIEVANCE REDRESS CELL

There is a need for an efficient grievance redressal mechanism, which will assist the DPs in resolving queries and complaints.Any disputes will be addressed through the grievance redressal mechanism.

Formation of Grievance Redressal Cell (GRC) is 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 DPs. 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 DPs, 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 R&R Entitlement. However, it is expected that the GRCs will play a very crucial role in redressing grievances of the DPs, and will help the implementation of the project as scheduled.

13.1. CONSTITUTION OF GRIEVANCE REDRESSAL COMMITTEE (GRC)

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 DPs; 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 DPs on problems arising out of Land/ Property acquisition.
- To record the grievances of the DPs, categorizes and prioritize and solve them within a month.
- To inform PIU of serious cases within an appropriate time frame; and
- To report to the aggrieved parties about the development regarding their grievance and decision of PIU.

13.2. 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.

The mechanism will be based on proposed laws. The Grievance Redressal Cell (GRC) will be set up at each district. Grievance not resolved amicably at the district level will be routed through PIU to the GRC. Arbitrator may also be appointed for unresolved cases. Arbitrator will be selected by PIU.

The various queries, complaints and problems that are likely to be generated among the DPs will primarily relate to disputes of ownership of assets, identification of legal heirs of deceased property owner and other non-land related issues.

The PIU and office of NH 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 DPs will be informed that they have a right to grievance redressal. The DPs 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.

13.3.Grievance Redressal Mechanism for DPs

The successive grievance redressal stages are illustrated in the flow chart shown below:

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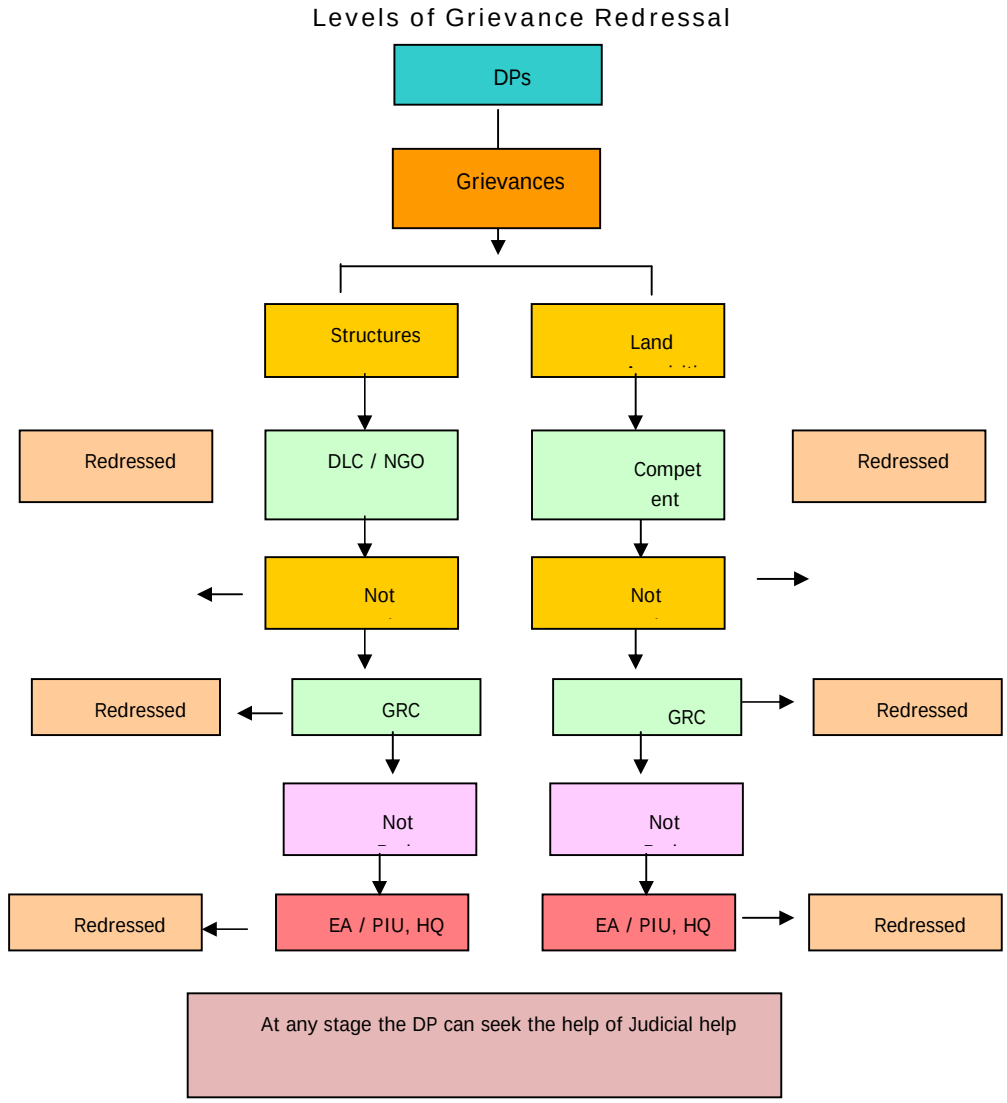
Flow Chart


Levels of Grievance Redressal
DPs
Grievances
Structures
Land
Redressed
DLC / NGO
Compet ent
Redressed
Not
Not
Redressed
GRC
GRC
Redressed
Not
Not
Redressed
EA / PIU, HQ
EA / PIU, HQ
Redressed
At any stage the DP can seek the help of Judicial help

District Level Committees: The first stage will be District Level Committees (DLCs) and the PIU. The DPs will be encouraged to be part of DLCs composed of:

- Representatives of affected persons;
- Panchayat members of the affected villages; and
- NGO/ Civic Body/ Other non-political Organization

33% participation of women from affected families and full participation of women from the women headed households will also be encouraged.

The DLCs and the PIU will meet at regular intervals as decided by the community, specifically for grievance redressing purposes at a pre-decided date, time and place. The DPs 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, it will have to explain to the AP, the premise for not recording the grievance. 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 DPs will present their grievance, concerning compensation for structures / land and R&R assistance to the DLC. The DLC and PIU will examine the grievance, and where required will review with DRO/CA and will do utmost to reach an amicable settlement to the satisfaction of the DPs.

13.4. Role of EA Headquarters

The DPs, who would not be satisfied with the decision of the GRC, will have the right to take the grievance to the EA Head Office for its redressal. Failing the redressal of grievance at EA, the DPs will take the case to Arbitration. The Arbitrator(s) will be independent but appointed by MoRT&H. 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.

14. INSTITUTIONS FOR PLANNING & IMPLEMENTATION

14.1. Introduction

Institutions for planning & implementation of RP vary substantially in terms of their respective roles & 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
- PIU
- DLC/GRC
- Training Institutions
- M&E Agency

14.2. The Process

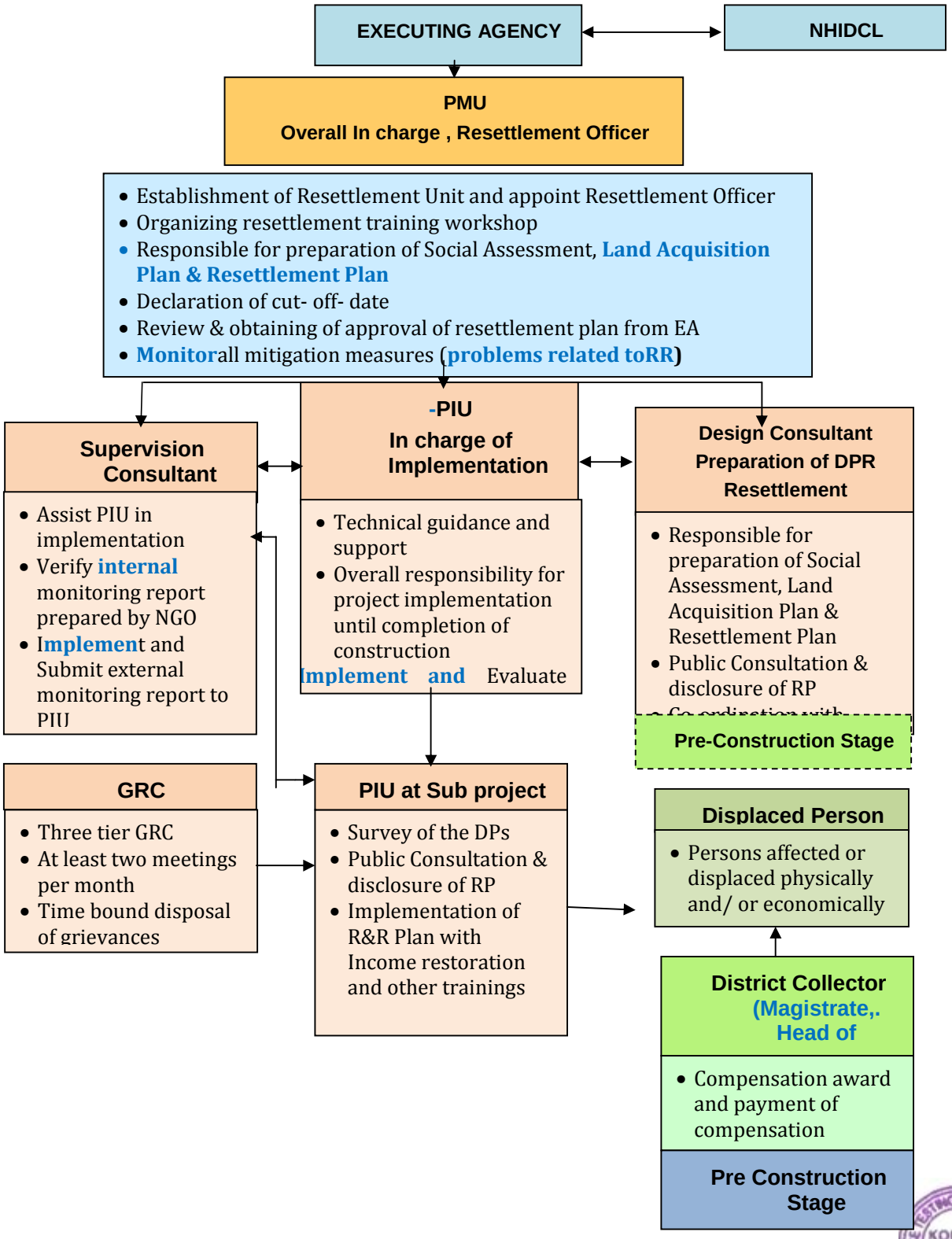
EA will initiate the following activities to commence and implement the RP:

- Establish PIU and field offices.
- Orientation and awareness seminars for Project Implementation Unit (PIU).

Effective RP implementation will require institutional relationships & responsibilities, rapid organizational development & collaborative efforts by EA, State Government&PIU.The ESDU will establish operational links within EA (for e.g. finance for release of money on approval of micro plan) & with other agencies of Government involved in project induced settlement. It will provide means & mechanism for coordinating the delivery of the compensation & assistance entitled to those who will suffer loss.On behalf of EA, ESDU will assume the responsibility for representing the social impact & resettlement component of the project. The ESDU will also be responsible for disseminating the information to the public & providing additional opportunities for public comment.

The ESDU at the apex level will have overall responsibility for policy guidance, coordination, and contingency planning, monitoring and overall reporting during RP implementation.

Figure 9.3: Institutional arrangement for RAP



14.3. Roles and Responsibilities

The role and responsibilities of the various offices in R&R implementation are presented below:

14.4. At Corporate Level

The Project Director :-

- In-charge of overall project activities.
- Participate in the State Level Committees to facilitate land acquisition, pre-construction activities and implementation of R&R activities.

EA:-

- Co-ordinate the implementation of R&R activities with corporate and field staff.
- Appoint PIU for R&R implementation and M&E consultants for monitoring and evaluation.
- Plan and conduct training programs for staff capacity building as well as capacity of field level Staffs.
- Review the micro plans prepared by the PIU.
- Review monthly progress report.
- Monitor the progress on R&R and land acquisition.
- Advice PIU/M&E Agency on policy related issues during implementation.
- Ensure early release of money to PIUs for R&R activities.

14.5. Project Implementation Unit (PIU)

This unit will coordinate the process for land acquisition.Relocation and rehabilitation, distribution of project provided assistance and DPs access to government programs.

RP Implementation Field Offices and Tasks

The GM-PIU will be responsible to carry out the following tasks concerning resettlement of the project:

- Overall responsibility of Implementation of R&R activities of RP.
- Responsible for land acquisition and R&R activities in the field.
- Ensure availability of budget for R&R activities.
- Liaison with District Administration for support for land acquisition and implementation of R&R.
- Participate in the district level committees.

14.6. District Resettlement and Rehabilitation Officer (DRRO)

- Co-ordinate with District Administration for land acquisition and R&R.
- Translation of R&R policy in local language.
- Prepare pamphlets of the policy.
- Printing of the policy and identity cards for the DPs.
- 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 DPs.
- Ensure the inclusion of those DPs who may have not been covered during the census survey; facilitate the opening of joint accounts in local banks to transfer assistance for R&R for DPs and organize disbursement of cheques for assistance in the affected area in public.
- Monitor physical and financial progress on land acquisition and R&R activities.
- Participate in regular meetings.
- Organize Bi-monthly meetings with the PIU to review the progress on R&R.
- Review micro plan & monthly reports submitted by PIU.

14.7. District Level Committee (DLC)

RP will be implemented through District Level Committees that will be established in the district of Bongaigaonin Assam. The committee would include District Magistrate or his representative, District Land Acquisition Officer, Pradhans of PanchayatSamities, representative of affected villages including women, representative of Revenue Department, Line Departments, NHIDCL Assam, 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/ R&R; (ii) approval of the micro-plan on the basis of methodology defined in the RP; and (iii) facilitate the implementation of the RP programs in the project-affected area.

The DLC would also: (i) meet regularly at pre-decided dated specifically for grievance redressing purpose; (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 Government authorities & field offices.

14.8. Coordination with Other Agencies and Organizations

R&R Cell will establish networking relationships with line departments and other Government& non-Government 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. R&R Cell will coordinate with the Project Land Acquisition Officer to expedite the land acquisition process.

Income restoration will be sole responsibility of the Project Authority. NGO will facilitate linkages to be established with the agencies implementing centrally sponsored poverty alleviation programs to restore the income of DPs.

Restoration of community assets such as hand pumps, bore wells will require help from PHED. EA will extensively work on developing lateral linkages for mobilization of resources to benefit the DPs and to achieve the desired results expected from implementation of RP.

The Revenue Department 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 DPs. The representative of these departments/agencies will be in contact with the R&R Cell, which will facilitate the integration of the various agencies, involved in the R&R process.

15. RESETTLEMENT AND REHABILITATION BUDGET

15.1. INTRODUCTION

The resettlement cost estimate for this project includes eligible compensation, resettlement assistance and support cost for RP 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 R&R 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
- Assistance for shifting of the structures
- Special assistance to vulnerable groups for their livelihood restoration

15.2. PrivateAgriculturalLand:

The unit rate for agricultural land has been estimated as per Land Acquisition Resettlement and Rehabilitation Act, 2013 and National Highway Authority of India Act, 1956. 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.

15.3. COMPENSATION FOR RESIDENTIAL/ COMMERCIAL AND OTHER STRUCTURES:

The compensation cost of structures are arrived at by assessment of market value, consultation with DPs and data collected from building contractors and property agents this meets the replacement cost of the structures.

The R & R budget has been calculated on the following basis:-

The R & R budget is calculated on the basis of DLC rates.

The budget for the compensation of affected structures is based on the rates of various types as described in Basic Schedule Rates (BSR), PWD, Govt. Of Assam, 2013.

The average estimated rate for permanent structures without land has been calculated at Rs. 14,000/m2, semi-permanent structures have been calculated at Rs. 12000/m2, and temporary structures have been calculated at the rate of Rs. 5000/m2. The compensation for Toilet is Rs. 8000/ sqm

ASSISTANCE

Shifting allowance: Shifting allowance will be provided to all the affected households losing structures and tenants. The unit cost has been derived on a lump sum basis of Rs. 50,000/- as required by RFCTLARR ACT, 2013.

Rehabilitation Assistance to Employees in Structure: Wage earning employees indirectly affected due to displacement of commercial structure will be provided assistance as per the prevailing local wage rate for 3 plus months i.e. @ Rs. 225/- for 100 days.

Rehabilitation Assistance to Agricultural Labourers/Sharecroppers: Agricultural Labourers/ Sharecroppers will be provided with assistance as per the prevailing local wage rate for 100 days @ Rs. 225/- per day.

Assistance to Vulnerable Households: One time lump sum assistance of Rs. 50000/- will be paid to each vulnerable households. (This will be paid above and over the other assistance(s) as per the entitlement matrix).

15.4. Assistance

Shifting allowance: Shifting allowance will be provided to all the affected households losing structures and tenants. The unit cost has been derived on a lump sum basis of Rs. 50,000/-.

Rental Assistance: Rental assistance to titleholder (structures) and tenants in structures will be provided in the form of grants to cover maximum three months rentals @ Rs. 4,000/- per month.

Rehabilitation Assistance to DPs Losing Business Establishment: Title holders losing their business establishment due to displacement will be provided with a lump sum transitional allowance of Rs. 50,000/-. This rate has been fixed based on the estimates of average income for a period of three months.

Training Assistance to Agricultural Titleholders: Training Assistance will be provided for income generating vocational training and skill up-gradation options as per DPs choice at the rate of Rs. 5,000/- per affected household to those households losing their primary source of income.

Rehabilitation Assistance to Employees in Structure: Wage earning employees indirectly affected due to displacement of commercial structure will be provided assistance as per the prevailing local wage rate for 3 plus months i.e. @ Rs. 146/- for 100 days.

Rehabilitation Assistance to Agricultural Labourers/Sharecroppers: Agricultural Labourers/ Sharecroppers will be provided with assistance as per the prevailing local wage rate for 100 days @ Rs. 173/- per day.

Assistance to Vulnerable Households: One time lump sum assistance of Rs. 50,000/- will be paid to each vulnerable households. (This will be paid above and over the other assistance(s) as per the entitlement matrix).

15.5. COMPENSATION FOR COMMUNITY AND GOVERNMENT PROPERTY

Religious and Community Structures: The religious and community structures are being partially affected and do not require full replacement. However a lump sum provision of Rs. 5,00,000/- per structure is made in the budget to rebuild are enhance the ambience of these structures. However any religious or community structure requires full relocation will be compensated in replacement rate.

15.6. 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 R&R activities. The EA will, in advance, initiate the process and will try to keep the approval for the R&R 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 RP to DPs. The implementing NGO will be involved in facilitating the disbursement process and rehabilitation program.

15.7. R&R BUDGET

The total R&R budget as per the prevailing norms of the state government for proposed project RP works out to Rs.17.38 crore. A detailed indicative R&R cost is given in Table -15.7.1

Table -15.7.1: Estimates of Entitlements

Item	Rate (in Rs. Per Ha)	Total Affected Area (Ha) / Number	Cost (in Rs.)
I. Compensation for losss of Private Property			
1. Loss of Land (agricultural, homestead, commercial or otherwise)			
Effective Average Cost of Urban Land			0
Effective Average Cost of Rural Land			58,250,910.60
Effective Average Cost of Built Up Land			
		Sub Total (A)	58,250,910.60
2. Loss of Structure (house, shop, building or immovable property or assets attached to land			
Type of Structure	Rs. Per Sqm	Area Sqm	
Pucca	14000	0	0.00
Semi Pucca	12000	819.66	9,835,920.00
Kutchcha	5000	1075.36	5,376,800.00
Under Construction	9000	459.31	4,133,790.00
Toilet	8000	2	16,000.00
		Subtotal (B)	19,362,510.00
		100% Solatium for Land and Structure (C)	155,226,841.20
			155,226,841.20
Source:Census Survey onJune-July 2019			
			173,854,062.14

Source: *Census Survey on June - July 2019*

The above estimate is based on rates vide Entitlement Matrix (Dec2018). As escalation of 12% on the said matrix is allowed to arrive at the current cost of R&R = 1.12 x Rs.155,226,841.20 =Rs.₹173,854,062.14nearly Rs.**17.38**crore

The compensation cost of trees and crops would be calculated and reflected in the Environmental Management Plan, so it is deliberately kept aside from the R&R budget, otherwise there would be a possibility of double counting. The Temporary impact during the construction period is to be borne by the contractor and it should be kept in the contract documents of the same.

16. IMPLEMENTATION SCHEDULE

16.1. Introduction

Implementation of RP 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.

16.2. Schedule for Project Implementation

The proposed project R&R 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, RP Implementation phase, Monitoring and Reporting period are discussed in the following paragraphs.

16.3. Project Preparation Phase

The major activities to be performed in this period include establishment of PMU and PIU at project and project level respectively; submission of RP for approval from NH; 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.

16.4. RP Implementation Phase

After the project preparation phase the next stage is implementation of RP which includes issues like compensation of award by EA; payment of all eligible assistance; relocation of DPs; initiation of economic rehabilitation measures; site preparation for delivering the site to contractors for construction and finally starting civil work.

16.5. Monitoring and Reporting Period

As mentioned earlier the internal monitoring will be the responsibility of PMU, PIU and implementing NGO and will start early during the project when implementation of RP starts and will continue till the complementation of the sub-project. The

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independent monitoring and reporting will be the responsibility of Construction Supervision Consultant (CSC) to be hired for the sub project.

16.6. R&R Implementation Schedule

A composite implementation schedule for R&R 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. 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.

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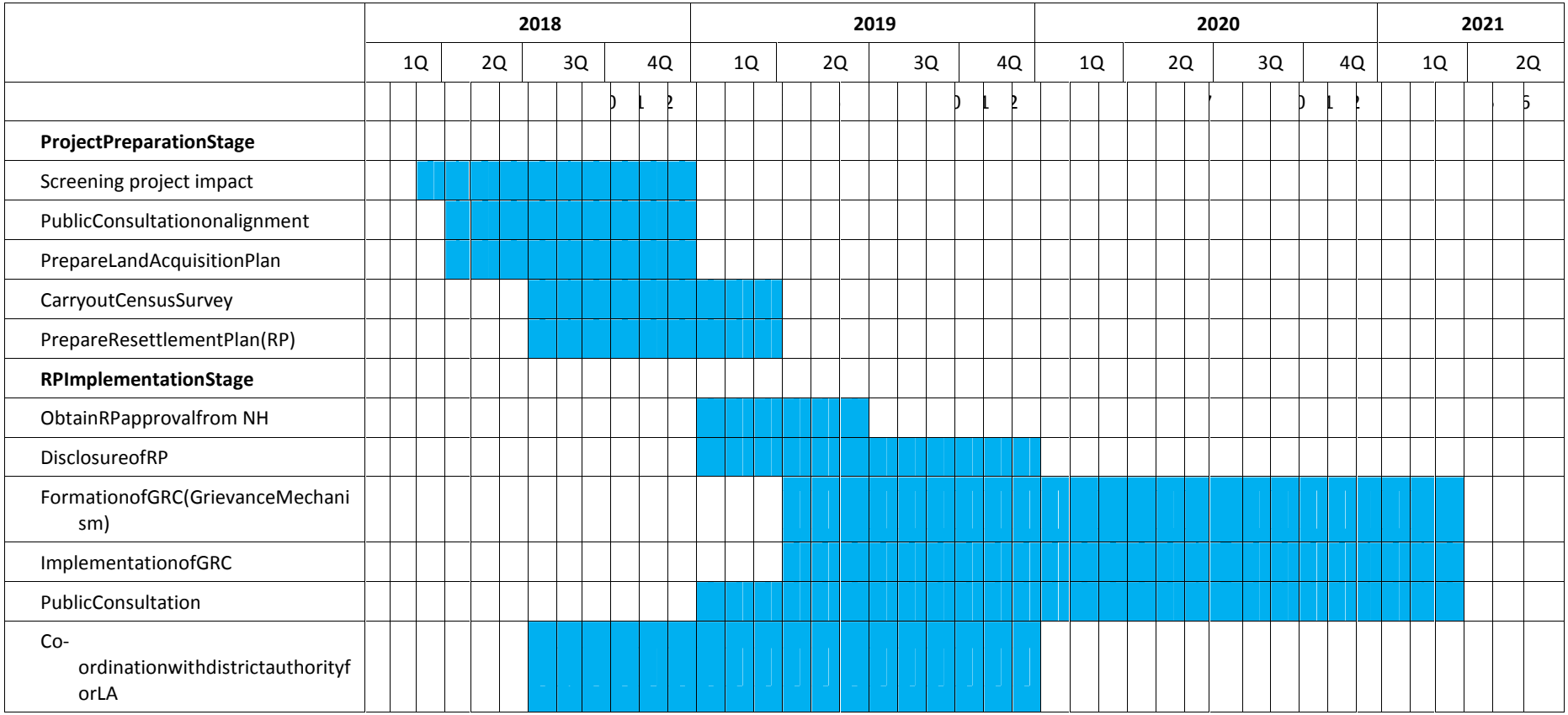
Table 9.4: Implementation Schedule



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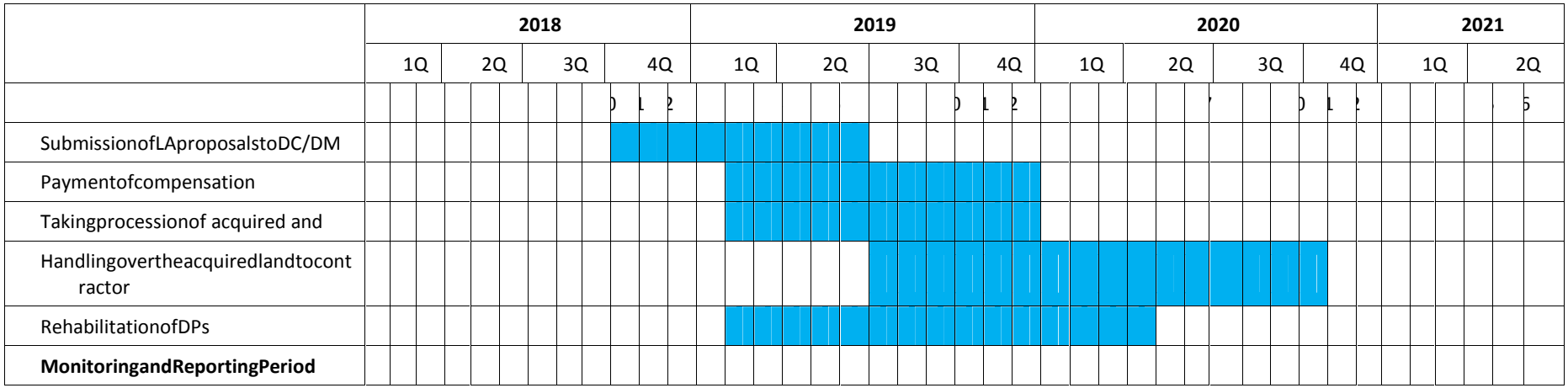

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17. MONITORING AND EVALUATION

17.1. 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 DPs in time and in an efficient grievance free manner. It will be a systematic and continuous process of collecting and analyzing 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 RP. 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.

17.2. 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:

17.3. 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 DPs 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 DP and the numbers
- Identification of different categories of DPs 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

17.4. Relocation Stage

Monitoring during the relocation phase covers such issues as site selection in consultation with DPs, development of relocation sites, assistance to DPs (especially to vulnerable groups) in physically moving to the new site. Likewise, aspects such as adjustment of DPs 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
- DPs who do not relocate
- Payment of compensation
- Livelihood restoration assistance.

17.5. Rehabilitation Stage

Once DPs 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 DPs, 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.

17.6. Input and output indicators related to physical progress of the work will include items as:

- Training of PIU, R0s and other staff completed
- Public meetings held
- Census, assets inventories, assessments and socio-economic studies completed.
- Meeting of DLCs
- Meeting of GRCs
- Grievance redresses procedures in-place and functioning.
- Compensation payments disbursed.
- Relocation of DPs completed.
- Community development activities completed.
- Infrastructure repaired, bus stands, water and sanitation facilities provided.
- Extent of government land identified and allotted to the DPs.
- Monitoring and evaluation reports submitted.

17.7. Reporting Mechanism

As stated earlier one of the main roles of PIU will be to oversee proper and timely implementation of all activities in RP. Internal Monitoring will be a regular activity for PIU and Rehabilitation Manager will oversee the timely implementation of R&R activities. Internal Monitoring will be carried out by the PIU (through the R&R Cell) and its agents, such as NGOs and will prepare monthly/quarterly reports on the progress of RP Implementation. PIU will collect information from the project site and assimilate in the form of monthly progress to access the progress and results of RP 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 mid-way corrective DPs. The reports can broadly be classified as:

- Progress reports during Implementation of the RP
- Qualitative reports highlighting the qualitative aspects

- Financial reports
- Evaluation reports based on benefits and impact of assistance provided.

17.8. Resources Requirement and Database Management

For the PIU 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

17.9. Property and demographic survey of the following affected persons:

- 100%censussurvey 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.

17.10. 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 RP.
- Ensure the quality, sufficiency of funds and on-time delivery of entitlements according to RP. 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 DPs having accurate recollection of their pre-Project income and living standards, develop some quality checks on the information to be obtained from the DPs. Such quality checks could include verification by neighbours and local village leaders. The methodology for assessment should be very explicit.

17.11. 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.

Declaration of Successful Implementation

Provide a summation of whether involuntary resettlement was implemented (a) in accordance with the RP, and (b) in accordance with Policy on Involuntary Resettlement.

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 DPs.

17.12. Reporting Cycle/Frequency

PIU is responsible for supervision and implementation of the RP & 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.

17.13. Participation of affected people in M&E

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

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delivery, efficiency, effectiveness, impact and sustainability. 20% percent random sample of DPs 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 DPs).
- 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 DPs, host village, workers, resettlement staff, and implementing agency personnel using non-sampled methods. In the case of special issues, in-depth case studies of DPs and host populations from various social classes will be undertaken to assess impact of resettlement.

17.14. Impact on Women

The project will have both positive and negative impact on the women of the region. The women, by virtue of their biological difference, 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 RP implementation on the women.

18. CONCLUSION

This Resettlement Action Plan (RAP) will enable to appropriately mitigate the adverse impacts identified through the Social Impact Assessment and the Land Acquisition Plans provided as part of this RAP.

However, this RAP is an indicative for purposed of estimating the extent of impacts and the category of impacts envisaged due to this project development. The final RAP will be based on the actual survey done at the time of the center line marking at the stage of project implementation. This RAP also provides an indicative budget for purposes of allocation of funds for implementation of the RAP under this project. This RAP budget forms the part of the entire project budget.

The public consultation on the focus groups and the stakeholders give the opportunity to address issues, which were already 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.

Decisions regarding providence of the resettlement and rehabilitation entitlement would be done as per the guidelines of EA and Government of India. The DPs may go to the Grievance Redressed Cell and to the Arbitrator as per the provision laid in the Guidelines. It may be noted that the redress to the grievances of the DPs may be done with consideration.

According to the proposed alignment of the Project Road the estimated cost for the various categories of Affected Persons for different purpose and objective of Resettlement and Rehabilitation based on rates vide Entitlement Matrix (December 2015) followed for EA road development works with an escalation of 12% on the said matrix is – would be Rs.17.38crores. The estimated cost of Resettlement and Rehabilitation is not the total socio – economic cost of the project. The PIU should look into the income restoration of the Affected Families with the objective that the families are ‘as well off as before’.

The widening of the Hapachara - Tulungia road gives an immense scope of development of the region in regards of easy accessibility to all the places of the North Eastern region with comfort and helps in immense development of the Commerce both National and International. Other than the development of the commerce sector there would be easy accessibility of the agricultural surplus of the region and the finished industrial products with the rest the country.

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