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SFG3926 V1

JHARKHAND MUNICIPAL DEVELOPMENT PROJECT (JMDP)

-DRAFT-

ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT INCLUDING PHYSICAL AND CULTURAL PROPERTIES MANAGEMENT PLAN

STRENGTHENING, DEVELOPMENT & BEAUTIFICATION OF ROAD BETWEEN KANKO CHOWK TO MEMCO GOL BUILDING CHOWK DHANBAD

Package NCB 01 & NCB 02

VOLUME I- MAIN REPORT

Jharkhand Urban Infrastructure Development Company Limited
(JUIDCO)

November 2017

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Acronyms & Abbreviation

AAQ	Ambient Air Quality
AOI	Area of Influence
BIS	Bureau of Indian Standard
BMTPC	Building Materials & Technology Promotion Council
CD	Cross Drainage
CGWA	Central Ground Water Authority
CoI	Corridor of Impact
CSR	Corporate Social Responsibility
CTE	Consent to Establish
DEM	Digital Elevation Model
DG	Diesel Generator
DI	Ductile Iron
DMC	Dhanbad Municipal Corporation
EHS	Environmental Health Safety
EMP	Environmental Management Plan
EPC	Engineering Procurement Construction
ESR	Elevated Storage Reservoir
FGD	Focus Group Discussion
GoJ	Government of Jharkhand
GRC	Grievance Redressal Cells
HSSE	Health Safety Social Environment
IAI	Indirect Area of Influence
IFC	International Finance Corporation
IMD	Indian Meteorological Department
JMDP	Jharkhand Municipal Development Project
JSEB	Jharkhand State Electricity Board
JSPCB	Jharkhand State Pollution Control Board
JUIDCO	Jharkhand Urban Infrastructure Development Company Limited
KII	Key Informants Interview
LPH	Litres per Hour
MLD	Million Liters per Day
MSL	Mean Sea Level
NCB	National Compeititve Bidding
NH	National Highway
NHAI	National Highway Authority of India
NOC	No Objection Certificate
OP	Operating Procedure
PAP	Projects Affected Persons
PIA	Project Impact Area
PIU	Project Implementing Unit
PM	Particulate Matter
PMU	Project Management Unit
PPP	Process Public Participation
RAP	Resetllement Action Plan
RCC	Reinforced Cement Concrete
RCD	Road Construction Department
RoW	Right of Way
SES	Socio Economic Survey
ToR	Terms of ReferenceBidding
UDHD	UrbanDevelopment and Housing Department
ULB	Urban Local Body
WMP	Waste Management Plan

EXECUTIVE SUMMARY

Introduction

The Urban Development and Housing Department (UDHD), Government of Jharkhand has designed the Jharkhand Municipal Development Project (JMDP) with an objective to improve urban service delivery and urban management capacities in selected Urban Local Bodies (ULBs). JMDP entails planning and implementation of multiple sub-projects across districts in Jharkhand. The Government of Jharkhand has identified the Jharkhand Urban Infrastructure Development Company Ltd. (JUIDCO Ltd.) as the primary implementing agency for executing the JMDP. The Government of Jharkhand is seeking financial support from the World Bank towards the cost of the JMDP.

An Environmental and Social Management Framework (ESMF) has been prepared for the JMDP with the following objectives: to assess and manage the potential environmental and social risks and impacts that may come up during implementation and throughout the project cycle; to ensure the social and environmental sustainability of investments; and to ensure compliance with national environmental and social legislation and World Bank safeguard policies. As required by the ESMF, screening, and categorisation, an Environment and Social Impact Assessments (ESIA) and management plan has been conducted for the Kanko Chowk - Vinod Vihari Chowk (11.7 km) and Vinod Vihari Chowk - Memco Gol Building Chowk NCB-01 and NCB-02 sub-project by consultants independent of DPR consultants, following the requirements of Bank OP 4.01 Category B project. WBG EHS Guidelines, and Industry Sector Guidelines, IFC EBRD Worker Accomodation guidelines have been used to recommend suitable environmental management measures.

Description of Road from Kanko Chowk - Memco Gol Building Chowk

The subproject is proposed to strengthen, develop and beautifyan existing 2 lane road 11 to 4 Lane with cycletrack, pavement, roadside drains, and service lane and improved road furniture, lighting and safety features. This comprises of Kanko Chowk - Vinod Vihari Chowk (11.7 km) and Vinod Vihari Chowk - Memco Gol Building Chowk (8.2 km). The Project design is based on the Comprehensive Mobility Plan for Dhanbad (CMP, 2016), and extensive consultations with multiple-stakeholders and is termed Road 11. Dhanbad Road Sub project for Road 11 will improve road transport services by increasing space available for motor vehicles, with combined service, safety, and environmental benefits; as well as introduction of road design that is friendly to non-motorized transport.

It will also reduce any traffic congestion, travel time and enhancing mobility and road safety on the existing road stretch. The alignment has been selected as there is already 45m ROW availability of land for widening.

An ESIA and RAP report has been prepared by independent agency, and the ESIA consists of descriptionof project, analysis of alternatives, environmental baseline, socio-economic profile of project impact area, details of public consultation, environment and social impact assessment, resettlement action plan and environmental management plan.This document provides JUIDCo and associated officials to mitigate or minimize the negative social and environmental impacts due to the construction and operation of the project and to enhance the positive impact of this project. The impacts relating to the project are localised, straightforward issues and require standard mitigation measures. The ESMP has been prepared to meet the requirements of World Bank Category B project. The document includes the impacts, mitigation measures and appropriate costs for the proposed mitigation measures. Institutional strengthening for environmental management is also an essential part of this document for implementing contract provisions and other environmental mitigation and enhancement provisions.

Applicable Environmental and Social Policies

The key environment and social laws and legislation applicable for Dhanbad Roads NCB-01 and NCB-02 project, are The Water (Prevention And Control of Pollution) Act, 2012; Air (Prevention and Control of Pollution) Act 1981; Construction and Demolition Waste Management Rules, 2016, The Noise Pollution (Regulation and Control) Rules, 2000; PUC for vehicles for construction under Central Motor and Vehicle Act 1988,Building and Other Construction Workers Welfare Cess Act, 1996; The Child Labor (Prohibition & Regulation) Amendment Act, 2016; Indian Forest Act, 1927(Tree felling permission); MOEFCC Fly Ash Notification , 2009; Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016; Solid Waste (Handling and Management) Rules, 2016; Construction and Demolition Waste Management Rules, 2016; Country Labour laws[1] and Street Vendors (Protection of Livelihood and Regulation of Steet Vending) Act, 2014. In addition, a clause and procedures for cultural properties chance finds will be included in the scope work of the contractor.

[1]Contract labour (Regulation and Abolition) Act 1970; Sexual Harassment of Women at the Workplace (Prevention, Prohibition and Redressal) Act, 2013; Employees P.F and Miscellaneous Provision Act, 1952; Child labour (Prohibition and Regulation) Act 1986; Inter-State Migrant Workmen's (Regulation of employment and Conditions of service) Act, 1979; The Building and Other Construction Works (Regulation of Employment and Conditions of Service) Act 1996; Minimum Wages Act 1948; Equal Remuneration Act 1976; Weekly Holidays Act 1942; Employer's Liability Act 1938; Bonded Labour System (Abolition) Act 1976 etc.

World Bank Safeguard Policies applicable to the sub project include OP 4.01 (Environmental Assessment), OP 4.11 (Physical and Cultural Resources) and OP 4.12 (Involuntary resettlement) and World Bank Policy on Access to Information and Disclosure. The project shall also follow WBG EHS Guidelines.

Public and Stakeholder Consultations

Stakeholder consultation was held twice as per OP 4.01, a) during E & S assessment (January – June 2017) and with the ULB after preparation of Draft ESIA in October 2017. During the consultation process, information pertaining to the sub –project like work schedule, procedures involved, project component, likely impacts, entitled grievance redressal mechanisms was disseminated.

Stakeholders such as the public, the ULB, the Land Revenue Department, drinking water and Sanitation Department, Forest Department, Jharkhand State Pollution Control Board were also involved in the consultations. As per the design for the sub-project, seven temples and 2 statues are getting affected due to the road improvement activities and would require complete and partical relocation.

Relocation of religious structure is a sensitive issue and thus needs to be discussed with the local people before finalising the road design. In this context, further Consultation in respect of all the seven religious places were undertaken on 9 June 2017 by JUIDCO. The suggestions arising from the consultations were incorporated, as appropriate, in the designs and mitigation plans.

The summary of public consultation inputs, undertaken as part of ESIA is detailed below:

i. The project does not require any land acquisition and the project activities will be restricted within available ROW.
ii. All the affected households are non-title holders who will be compensated for the loss of structure and other assistance as per the entitlements deatiled in the Entitlement matrix prepared for the sub-project. The relevant provisions of the Entitlement Matrix were made known to the public and a Hindi version of the same would be distributed before mobilization of the contractor. Locals were also informed of skill development training.
iii. People have raised the issue of road safety, dust pollution and noise pollution. They requested for incorporation of traffic safety measures to reduce accidents, once the road is operational.
iv. Budget provisions have also been included in the R&R budget.
v. The consultations for relocation of 7 religious structures were conducted with the local people. People in general agreed to relocate the temples considering the

requirement for better road in the area. But at one location further consultation would be required to convince people to allow for temple relocation.

vi. As suggested by the local people, the contractor should keep a provision for employment of local persons (mainly women), in the project.

Screening, Categorisation and Assessment of Impacts

Screening of the subproject was carried out in line with the checklist attached in Annexure I. Dhanbad Roads NCB-01 and NCB-02 Project is categorized under environment as E-2 and S-1 for Social impacts. As per the ESMF, the project is classified as E2. The projectpotential impacts are moderate, site-specific, straightforward issues; and will require standard mitigation measures, which are easily designed and implemented.

This ESIA identifies the environmental and social impacts that may occur because of the implementation of the sub-project in all its phases; design, construction and operation. The proposed sub project, is not a new road, but will upgrade the strength between Kanko Chowk- Memcogol Chowk by expanding to 4 lane, with cycle track, service land and pavement. It will have impact on 8322 trees, this however will be mitigated through compensatory plantation in 1:2 ratio, (17000 trees) and transplantation of 6753 trees. The project will support all necessary measures for worker health and safety for undertakeing tree felling, transplantation of trees. The project will also invest in ensuring the survival of newly planted trees through dedicated funds and supervision. The construction phase of the project will also impact the livelihood of the vendors and structures currently located on the RoW.

Temporary changes in land use at the borrow area sites is expected, however this is currently wasteland, and will be redeveloped after borrow activity is completed as per the borrow area plan in Annex II. Existing government licened quarries will be used, and no new quaries will be opened. The Project will relocate existing utilities, and 9 cultural properties comprising of7 small temples and 2 statues of local significance. These will be relocated and modified as per the priovisons of the RAP. All necessary management and mitigation has been included in the Physical and Cultural Properties Plan. There is a risk to worker and public health and safety, traffic and accident management during construction stage. In addition, there will be impacts to ambient noise levels, air quality, and an increase in fugtive dust emsisions at active construction sites. All necessary measures to manage road safety, traffic management, and public health and safety have been included in the ESIA and ESMP. Specific management plans and technical guidelines have been developed for Borrow Area management, Waste Management, Top Soil Management, Occupational Health and Safety Management, Emergency Response Action planning, Tree Cutting,

Transplantation and Compensatory Plantation, Physical and Cultural Resource Management Plan and Resettlement Action Plan.

The key positive impacts due to the sub-project are (a) improved linkage between villages, communities and urban areas and, wider access to market facilities, health centres, education, etc.(b) increase in employment opportunities for locals (c) reduced travel time, congestion and pollution impacts (d) improved road safety, pedestrian movement and non-motorised vehicle movement; and (e) introduce a road design standard that is friendly to non-motorized transport.

The project will not involve any land acquisition but will impact 258 households located within the available ROW. All the affected households are non-titleholders. Out of total affected structures, 116 are squatters. The project will also temporarily impact the livelihood of 13 hawkers who do their busniess in open without any structure. They arrange their stuffs along the road in the morning and go away in the evening. As per ESMF categorisation criteria, Dhanbad Roads NCB-01 and NCB-02 project is categorised as S-1. A separate RAP is prepared to meet the requirement of country legislations and World Bank's Operational Policy 4.12 on Involuntary Resettlement.

Environment and Social Management Plan

An Environment and Social Management Plan (ESMP), which elaborate on the identified mitigation measures, and the means of their implementation, the monitoring plan and the costs involved have been prepared along with ESIA. The costs for environmental quality monitoring, personal protective equipment for labour have been provided in the ESMP budget. The ESMP has a budgetary requirement of INR. 73.0 lakhs for the construction phase for NCB1 and NCB 2 respectively. In addition, an overall cost of INR 4.35 crore has been allocated for compensatory plantation, and INR 5.9 crore for tree transplantation activity.

The cost for the ESHS training, setting up of labour camp and its facilities have been included in the Engineering cost. Resettlement Action Plan (RAP) proposes a budget of INR7.28 crore. This has been included in the overall sub-project costs.

Grievance Redressal mechanism

A GRC will be set up at the state and ULB level. The objective is to receive and resolve the affected community's concerns, queries, complaints and grievances about the environmental and social aspects of the Project that could be encountered during implementation as well as to address other social issues pertaining to social cohesion and integration once the sub-

projects implemented. Some means of communicating information on JUIDCO's GRM includes the following:

- Distribution of leaflets to the public places
- Notice boards
- JUIDCO's website
- Telecommunication Tools

The Deputy Project Director (JUIDCO, PMU) will be responsible for ensuring that each sub-project establishes an effective multi-level GRM to handle all grievances related to sub-project activities. The GRM will function at 2 levels: at the community level, where every effort will be made to resolve the issue; and at the sub-project level where, a GRC will be established and as an appeal mechanism at state level. The sub-project level GRC shall be constituted with five persons including a female member.

- One from the ULB / Executing Agency
- Any One Elected Representative (Local Project Area/ preferably female)
- Representative of community Based group of Women such as Mahila Samakhya/ Mahila Mandal.
- A person who is publicly known and accepted by the locals (in the project area) to speak on their behalf (to be identified by the Elected Representatives of the ULB)
- Community Development officer from PIU
- ULB level community organizer or Chief Municipal Officer's representative

The PAP shall require to clarify the area of grievance. The GRC will entertain only grievances related to construction activities affecting the livelihood or loss of property/utility or restriction of access, labour community conflict, construction site management and quality of service during the O&M period. Grievances related to corruption will only be dealt under the anti-corruption laws of the Jharkhand.

The PAP (or his/her representative) may submit his/her complaint in by either written letter, phone, or email to the GRC or, alternatively, raise his/her voice in a public or individual meeting with project staff. A very simple grievance form in local language will also be available at each project site to be filled in by the complainant. Also, complaint boxes shall be placed at ULB office, PIU office and Contractors campsite/office. One person in PIU and Dhanbad contractor office will be designated as complaint officer responsible for reciving all the grievances (oral or written) and maintaining the log of such complaints and action taken. This complaint officer shall facilitate filling the grievance form in case of illiterate complainants. NGO engaged for RAP implementation shall act as facilitator in ensuring that all the complaints/suggestions reach the attention of PIU head especially of the PAPs and

local community. The effectiveness of the GRM shall be tracked through progress report of Construction Supervision and Quality Consultants (CSQC) and NGO facilitating RAP implementation.

The contact details of the registering complaints/suggestions at state level is given below:

Grievance Redressal Cell
Jharkhand infrastructure Development Company Limited
3rd Floor,Pragati Sadan, Kutchery Chowk
Ranchi-834001, Jharkhand
Phone No: 651 2243203
Email: grc.jmdp.juidco@gmail.com

The GRC will meet to try and resolve the matter at community level and make a recommendation usually within 7-10 working days from receipt of complaint. If there is no decision after 10 days, the PAP or any other aggrieved person can refer the complaint to the Deputy Project Director (JUIDCO, World Bank PMU). The Deputy Project Director (JUIDCO, World Bank PMU) will chair an Appeals Committee, which will then examine and address the complaint within 20 days. It is recognised that some complaints may take longer to resolve due to their complexity, for example, those related to land disputes. In such cases, the greived party shall be communicated the possibility of delays with reasons and next actions within 20 days, all submitted complaints and grievances will be registered at the sub-project level and added to a database of JUIDCO-JMDP PIU, which will be monitored regularly by designated JUIDCO-JMDP staff. In addition to the mechanism explained above, PAPs have the right to approach the judiciary of the country.

Gender Issues, Action Plan and Monitoring Indicators

The main gender issues in the project is inequality in accessibility to urban infrastructure and services, safety and security of the women, inequality in participation of women workforce and awareness of women about their rights.

The project will ensure easy accessibility to improved urban infrastructure and services through better roads. Proper street lighting will increase the safety and security of women. There will also be a provision for the contractor to employ local people, preferably women. The RAP implementing consultant/NGO would increase the awareness among the women regarding their rights and opportunities available from the project.

The monitoring indicators shall include number of women employed and their wages through the contractor's progress report and monthly status of the grievance disaggregated by gender (GRM).

Institutional and Implementation arrangement for ESMP Supervision

The State PMU in Ranchi at JUIDCO will be overall responsible for addressing environmental and social safeguard measures. An environmental and social specialist is already in place in the PMU. The PMU will be supported by a Project Implementation Unit (PIU) at Dhanbad, responsible for day-to-day supervision of the implmentation of the ESMP and RAP. The PMU specialists will also train and strengthen the capacities of specialists in the PIUs and other implementing entities. The project shall hire qualified consultancy firm/civil society organisations/NGOs for the implementation of RAP and other social mobilisation/IEC activities under the Project.

The contractor's team will include a qualified EHS Engineer to implement the ESMP and associated environmental quality monitoring.

Construction Supervision and Quality Control Consultants are also in the process of being hired, and will contain a dedicated Environment, Social, Health and Safety Officer to verify compliance with ESMP, labour management, occupational health and safety requirements, and waste management procedures. The CSQC consultant team will also contain a dedicated Construction safety officer to supervise worksite safety. The scope of work for the CSQC is outlined in Annex XII.

The Project Management Consultants (PMC) hired by JUIDCo PMU shall provide additional support of social and environment specialists to the PMU and PIU to coordinate, review, support and monitor all respective safeguards aspects of the Dhanbad Roads NCB-01 and NCB-02 Project.

The compliance of the ESMP, labour management and OHS management by the contractor shall be monitored and assessed during construction by the PIU and CSQC consultant, and formal inspections by the PMU staff. There will also be a safeguard audit of the works which shall be carried out by an independent consultant.

The JUIDCo PIU will submit monthly ESMP monitoring checkilists as per Annex XI. JUIDCo PMU will submit Quarterly Environmental and Social safeguards reqorting which includes progress and compliance on ESMP and RAP to the World Bank.

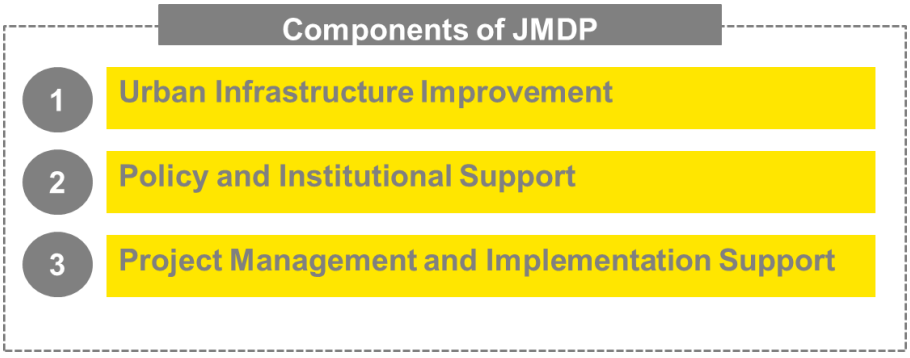
1 INTRODUCTION

1. The UrbanDevelopment and Housing Department (UDHD), Government of Jharkhand (GoJ), has created Jharkhand Municipal Development Project (JMDP) with an objective to improve urban service delivery and urban management capacities in selected Urban Local Bodies (ULBs). Jharkhand Urban Infrastructure Development Company Ltd. (JUIDCO Ltd.) has been identified as the primary implementing agency for the JMDP.

> "JUIDCO" is a company created under the administrative control of Urban Development Department, Government of Jharkhand for formulations, implementation and monitoring of various central/state sponsored urban infrastructure development schemes in the state of Jharkhand. JUIDCO has been undertaking implementation of Water Supply Projects in the urban areas across the state of Jharkhand, besides projects in the other sectors.

2. The JMDP includes upgradation of municipal infrastructure (expansion of coverage, and construction and rehabilitation of basicinfrastructure systems, such as water supply, roads, municipal buildings, etc.) and associated operation and maintenance support. The JMDP primarily has three components, as shown in figure below.

Figure 1: Components of JMDP



3. These components entail planning and design of multiple sub-projects, across different districts in Jharkhand. The priority sub-projects have been identified by the Government of Jharkhand based on technical, environmental, social and financial sustainability of the investments.

4. An Environmental and Social Management Framework (ESMF) has been prepared by JUIDCO for the JMDP with the following objectives:
   - to assess and manage the potential environmental and social risks and impacts that may come up during implementation and throughout the project cycle;

- to ensure the social and environmental sustainability of investments; and to ensure compliance with national environmental and social legislation.

Above project entails planning and design of multiple sub-projects, located across different districts in Jharkhand, the approach adopted involved preparation a guiding document, “Environmental and Social Management Framework (ESMF)". Based on the ESMF developed, the Environment and Social Impact Assessments (ESIAs) were conducted for priority sub projects.

As per WB policy 4.01, an ESMF is an instrument that examines the issues and impacts associated when a project consists of a program and/or series of sub-projects, and the impacts cannot be determined until the program or sub-project details have been identified. The ESMF sets out the principles, rules, guidelines and procedures to assess the environmental and social impacts. It contains measures and plans to reduce, mitigate and/or offset adverse impacts and enhance positive impacts, provisions for estimating and budgeting the costs of such measures, and information on the agency or agencies responsible for addressing project impacts.

5. The aforesaid objectives can potentially be achieved with appropriate financing support for infrastructure improvements and by introducing a broad range of improvements in urban policies, planning, and revenue enhancement. As required by the ESMF, Environment and Social Impact Assessments (ESIAs) are being conducted for the selected priority sub-projects.

6. In view of the above, the Government of Jharkhand is seeking financial support from the World Bank towards the cost of the JMDP and intends to apply part of the proceeds in hiring consulting firms for preparing an Environmental and Social Management Framework (ESMF) and Environment and Social Impact Assessments (ESIA) for priority sub projects. The sub-projects have been identified by the Government of Jharkhand based on technical, environmental, social and financial sustainability of the investments.

1.1 Brief Description of Sub-Project

7. The proposed roads are located in Dhanbad cityof Jharkhand state, located about 147 km north-east of the state capital city of Ranchi. The nearest railway station is in Dhanbad and nearest airport is BirsaMunda Airport, Ranchi (150km). The sub-project is conceived based

on the Comprehensive Mobility Plan for Dhanbad (CMP, 2016). Details of selected roads for which ESIA is being undertaken is listed in Table 1.

Table 1: Selected road for ESIA

S.No	Road Name	Road Id	Length (Km)	Packages	Existing Configuration	Proposed Configuration
1	Kanko Chowk - Vinod VihariChowk	11-A	11.7	NCB-01	2 Lane	4 Laning with Cycle Track and Service Roads
2	Vinod VihariChowk - MemcoChowk - GoI Building Chowk	11-B	8.291	NCB-02	2 Lane	4 Laning with Cycle Track and Service Roads
Total			**19.991**			

1.2 Scope of the ESIA Study

8. The objective of ESIA is:
   - Identification of the project activities
   - Description of existing environment and social conditions of the area
   - Assessment of potential impacts associated with the project activities
   - Mitigation and monitoring measures proposed for impacts identified and
   - Incorproation of stakeholder suggestions and feedback
   - Preparation of an environment and social management plan which includes implmementation arrnagements for supervision.

9. As per the ToR, the scope of work for ESIA study broadly entails the following:
   - Desk review of relevant technical sub-project documentation, such as the Detailed Project Report, Comprehensive Mobility Plan for Dhanbad, design drawings, maps and location plans, designs, associated studies, etc.
   - Site visits and surveys of sub-project sites and relevant areas of influence to verify social and environmental site conditions and anticipate potential risks and impacts including an estimate of their scope, magnitude, and likely duration.
   - Determine which specific World Bank safeguards policies would be applicable and which instruments for assessment and planning are required.
   - Conduct detailed stakeholder consultations with the government, ULB, potential PAPs and public.
   - Based on analysis of environmental and social conditions and identification of anticipated risks and impacts, develop management and mitigation measures/plan,

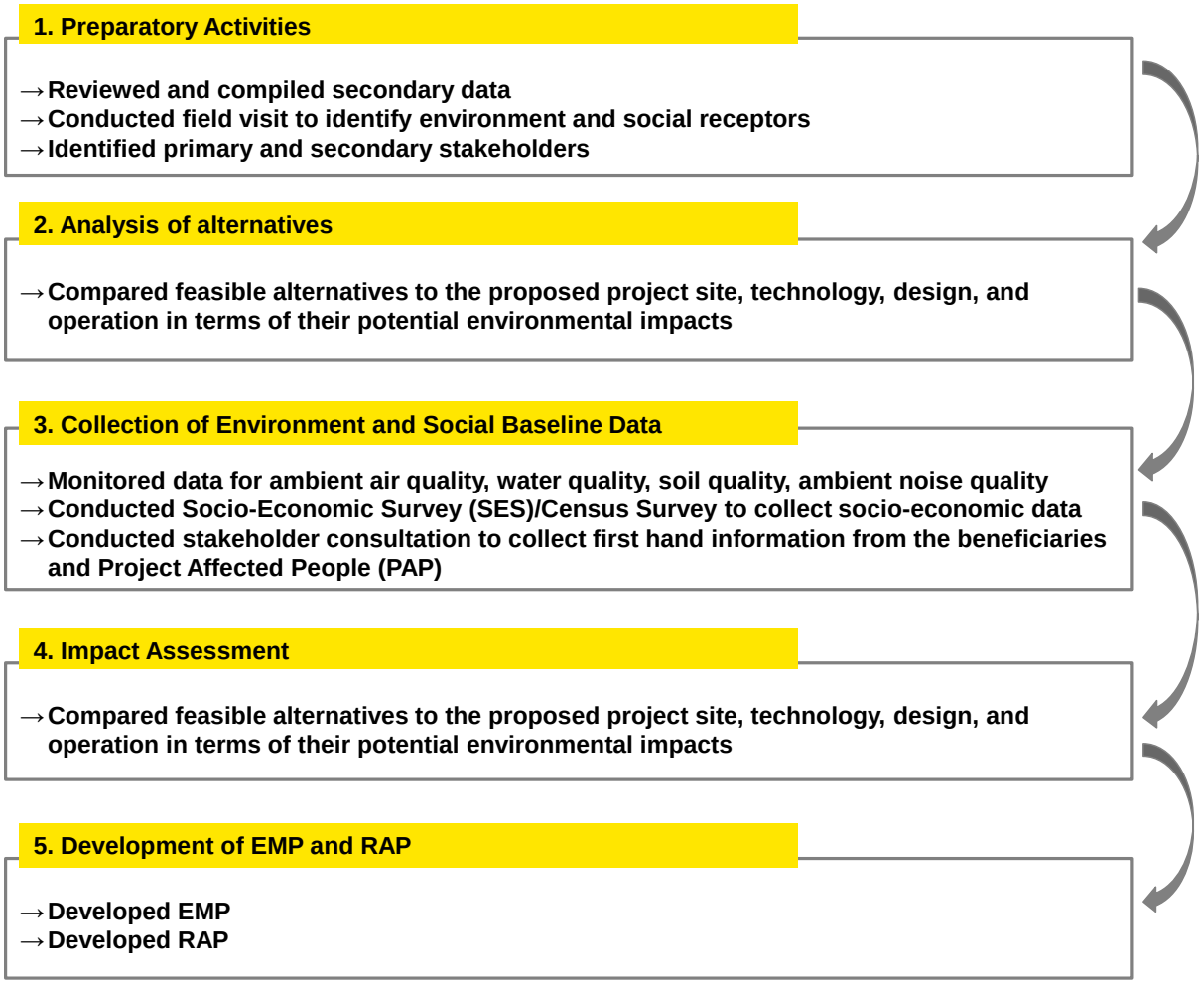
monitoring plan, institutional responsibilities, capacity building plan as well as arrangements for any required permits and licensing.

- Support the disclosure and consultation process following the local regulations and the Bank requirements and include in the final version of the ESIA how the issues raised during the consultation process were addressed.
- Develop detailed Management Plans (e.g. EMP, R&R, Vulnerable Groups, etc.) as required for the bidding documents.

1.3 Approach and Methodology

10. This section of the report details the step by step approach followed for conducting the ESIA in the Dhanbad town. An overview of the steps followed is presented in the figure below.

Figure 2: Overview of methodology followed for conducting ESIAs



1.3.1 Preparatory Activities

11. Preparatory activities included review as well as compilation of existing secondary information pertaining to the project area and mobilization of the technical team involved. Field visits were planned and conducted with the following objectives:
    - Assessing existing environmental conditions
    - Identifying potential environmental and social impacts
    - Identifying possiblemitigation measure
    - Identifying interested and affected individuals or parties
    - Preparation of a strategy for the Process for Public Participation (PPP)

1.3.2 Analysis of Alternatives

12. The feasible alternatives to the proposed project site, technology, design, and operation were analysed in terms of their potential environmental and social impacts.

1.3.3 Collection of Environmental and Social Baseline Data

13. This section details the methodology adopted for establishing the environment and social baseline.

A. Environment Baseline

14. The baseline environmental status is important to understand the existing physical and biological characteristics along with cultural and social status of residing community. The data presented in this section is based on field surveys, monitoring, stakeholder's consultations and secondary data collection (drainage, topography, climate, soils, land use, flora and fauna, traffic forecasts, physical and cultural properties). The information on the baseline environmental conditions (Water/Air/Noise quality and Soil monitoring), forms the basis to analyse the probable impacts of the proposed project vis-à-vis the present background environmental quality of the core study area.

    In case of environment baseline, sampling of air quality, water quality (surface and ground), soil quality, noise levels were undertaken in the first week of March,2017.The sampling locations for monitoring of air, water, soil, and noise quality were identified based on the following:
    - Existing topography
    - Locationof water bodies
    - Location of sensitive receptors (such as hospital, schools.)
    - Wind direction and location of village//sensitive areas

- Accessibility, power availability and security of monitoring equipment

15. The details of the parameters monitored have been presented below

- **Ambient Air Quality**: Ambient air quality was monitored at five locations for parameters including Particulate matter(<10 micron), Particulate matter (<2.5 micron),SO_xandNO_x.
- **Water Quality**: Information on water quality was generated by collecting and analysing surface samples from five locations for physical, chemical and bacteriological parameters and the quality was asseesedagainst the CPCB standards for 'designated best use of surface water'.
- **Soil Quality**: Soil quality was assessed by collecting four soil samples from six locations.Thecollected soil samples were analysed for the physical and chemical parameters.
- **Ambient Noise Quality**: Ambient noise quality was monitored for 24 hours at five locations within the study area.
- **Land Environment**: Information regarding topography, geology, seismicity, ecology and land use pattern was collected through various field visits as well as secondary research.

B. Social Baseline

16. As the first step, the secondary documents such as Census Data, ULBs data, etc. were reviewed for collecting basic socio-economic information. Further, the Socio-Economic Survey (SES) was conducted with an objective to assess the socio-economic profile of the project area. The SES was carried out through Multistage Proportional Random Sampling (with replacement) procedure with 95% confidence level in the Project Impact Area (PIA). The SES captured the socioeconomic baseline of the PIA and helped in assessing the benefits and impacts of the project with respect the actual prevailing situation.
17. As the next step, Census Survey was conducted with an objective of generating information on the following:
    - Inventory of affected assets
    - Categorization and measurements of potential loss
    - Physical measurements of the affected assets/structures
    - Identification of affected trees and crops
    - Household characteristics, including social, economic and demographic profile
    - Identification of non-titleholders
    - Assessment of potential economic impact, including temporary loss.

18. The census survey covered 100% structures affected within the proposed ROW as per the corridor of impact of the DPR and drawings provided.In addition to SES and Census Survey, a series of public consultations were also conducted during January and March 2017 after finalization of the methodology, protocol and communication strategy by the JUIDCO, the World Bank and other relevant stakeholders. The stakeholder consultations were conducted through focus group discussions, individual interviews and formal as well as informal consultations. The vulnerable sections of PAPs and women were also included in the consultation process in the site level meetings. The public consultation helped in ensuring peoples' participation in the planning and implementation phase and further facilitated in disclosure of the project details to would be PAPs and the beneficiaries.
19. In conformance withthe World Bank principles of consultation and disclosure, consultations were arried out across the selected locations with the following key objectives:
    a) Understand the community concerns and issues
    b) Disclose environmental and social issues that may arise due to the project and discuss suggestions for mitigation measures
    c) Assess the present-day project site's characteristics and definitive social, livelihood, and environmental impacts
    d) Consult with affected communities and/or entities on the proposed project alternatives to minimize adverse impacts and enhance beneficial ones
    e) Obtain a consensus on the proposed activity, potential impacts and suggested mitigation measures

1.3.4 Impact Assessment and Management Plan

20. Primary and secondary data collected for establishing the baseline, were analysed for identification of potential environmental and social impacts that may occur during different phases of the project. For each of the identified impacts, measures to avoid and/or mitigate these have been recommended in the Environment and Social Management Plan (ESMP), Physcial and Cultural Properties Management Plan and Resettlement Action Plan (RAP). A relevant monitoring plan has been proposed to ensure effectiveness of the management measures.
21. The sub-steps followed for conducting impact assessment and developing management plan are given below:
    - Reviewed literature related to the project
    - Conducted field visits to the project area
    - Conducted stakeholders consultations with technicians/managers about the project
    - Establish environmental and social baseline of the project area

- Identified potential environmental and social impacts, considering the characteristics of the project and the biophysical and socioeconomic characteristics of the area
- Developed recommendation of mitigation measures to be implemented to mitigate the negative environmental and social impactsdue to the project activity

1.4 Layout of the Report

22. The ESIA report has been organized into the following sections:

- **Section 1: Introduction** - The section provides a brief introduction to the sub-project, scope of the ESIA and methodology followed for developing the ESIA.
- **Section 2: Project Description** - The sub-project details in terms of location and components have been presented in this section.
- **Section 3: Legaland Regulatory Framework** -This section details out the laws and regulations of the Government of India at central and state level, which are applicable on the proposed sub-project. Further, this section also reviews the applicability of the sub-project activities tothe World Bank's safeguard policies
- **Section 4: Analysis of Alternatives**- This section presents the 'with project' and 'no project' scenarios, as well as an analysis of the various sub-project design options.
- **Section 5: Environmental Baseline** -The findings of the baseline studies conducted and secondary information collated have been presented in this section.
- **Section 6: Social Economic Profile of the Project Impact Area (PIA) -**The socio-economic profile of the state, district and the PIA have been presented in this section.
- **Section 7: Public Consultations and Disclosure -** This section presents the summary of the public consultations including key informant interviews and indepth interviews with primary and secondary stakeholders.
- **Section 8: Environmental Impact Assessment -**This section presents the environmental impact assessment with details on thelikelyimpacts identified forvarious phases of the project. The mitigation measures for the impacts have also been presented.
- **Section 9: Social Impact Assessment** - This section presents the social impacts due to the project activity.
- **Section 10: Environment and Social Management Plan**-The measures to avoid and mitigate environmental and social impacts across different phases of the project cycle with allocation of responsibilities and monitoring plan for reviewing

effectiveness of the measures havebeen presented in this section. The cost of implementation of EMP has also been presented.

2 PROJECT DESCRIPTION

2.1 Objectives of the sub-project:

23. The State of Jharkhand has shown consistent economic growth and financial strength over the last decade. Dhanbad being an important industrial and mining city of the State has latent demand to upgrade its key road infrastructure. To meet this demand, Comprehensive Mobility Plan of Dhanbad, 2016 has suggested improvement of road network including development of junctions and public transport. Government of Jharkhand through JUIDCO intends to develop urban infrastructure of Dhanbad and strengthen, develop and beautify arterial, sub-arterial and collector streets.The subproject is proposed to upgrade 2 lane road to 4 Laning with cycletrack and servicelanein order to improve road transport services within Dhanbad city by reducing traffic congestion and enhancing mobility within the city through roads and junction's improvement. The road will serve as a bypass route for the through traffic. Such improvement is expected to yield multidimensional socioeconomic benefits suchas improved economic activity, efficient business operations and reduced losses in resource utilization.

2.2 Site Setting

24. The proposed sub-project is situated within Dhanbad city, in Dhanbad district in the state of Jharkhand. Dhanbad is majorly based on coal mining activity and is one of the busiest commercial centres in India. It is the largest city and second largest urban agglomeration in Jharkhand after Jamshedpur. DhanbadMunicipal Corporation (DMC) has been divided into five circles namely Dhanbad Municipality, JhariaNotified Area Committee (NAC), Katras NAC, Sindri NAC, and Chhatanr NAC. In total, DMC comprises 55wards with 11 wards in each circle.It is located on Golden Quadrilateral Highway (New Delhi - Kolkata, NH 2) andNH 32. It is well connected with Kolkata (270 km in south east), Jamshedpur (150 km in south), Ranchi(150 km in south east), and Gaya (220 km in north westNorth West) and Patna (330 km in north west).
25. The current road is of 19.991 km 2 lane road and is proposed to be upgraded to 4 Laning with CycleTrack and Service lane. The road has been divided into 2 parts – NCB-01(0.00 KM to 11.70 km) and NCB-02(11.70 km to 19.991 km). The pre-dominant land use around 500m radius of the proposed road is agricultural land.An airport(chainage 13+800 km – 14-750 km) is situated alongside the Grand Trunk Road at Barwadda.The proposed road has1

major bridge and 2 minor bridge. The roads proposed for development have adequate right of way for the sub-project and is provided intable below:

Table 2: Details of Available Right of Way

Sl.No	Road ID	Land Owner	Road Section (Chainage)	ROW Width (m)
1	11-A(NCB-01)	RCD	Km 0.0 to km 11.7	45
2	11-B(NCB-02)	RCD	Km 11.7 to km 12.3	45
			Km 12.3 to km 13.9	52
			Km 13.9 to km 20.0	45

Source: DPR

2.3 Major Utilities along the existing road

26. The utilities present within the ROW are described below. Utilities above ground are high tension lines and poles and pylons, low tension electric lines and poles, transformers, junction boxes, telecommunication poles, and water supply network, have been identified for all the project roads which need relocation.

Electricity Lines

27. Electricity lines such as high tension lines, low tension lines, transformers, junction boxes, distribution lines, which require relocation havebeenidentifiedfor the proposed sub-project. The details of number of electric poles or pylons, total length of electric lines is listed in **Table 3**.

Table 3: Electric Poles or Pylons present in NCB-01&02

Category	Units	Quantity
Electric lines (HT)	Length (m)	19,348
Electric lines Less than 11KV		7087
Isolated Electric Poles	Number	54
Electric Box		5
Transformer Points		53
Lamp Post		192

Source: DPR

Tubewells and Handpumps

28. The handpump and tubewells present in the existing road has been presented in Table 4

Table 4: Tubewell and Handpumps in current road side

S.No	Chainage	Side
Tubewell		
1	0.010	RHS
2	0.086	LHS
3	0.090	RHS
4	0.735	RHS
5	0.920	RHS
6	0.990	LHS

S.No	Chainage	Side
7	1.830	LHS
8	1.928	RHS
9	3.180	RHS
10	4.850	LHS
11	4.870	LHS
12	4.930	LHS
13	6.050	RHS
14	6.860	LHS
15	6.880	RHS
16	19.870	LHS
Handpumps		
17	9.07	LHS
18	9.32	LHS
19	9.5	LHS
20	10.65	LHS
21	11.435	LHS
22	11.94	LHS
23	11.99	RHS
24	12.51	LHS
25	12.55	LHS
26	15.18	RHS
27	15.27	RHS
28	15.35	LHS
29	15.54	RHS
30	18.63	LHS
31	19.67	LHS

Source: DPR

Telecommunication Line

29. Details of the Telecommunication lines present in Road No.11 (NCB-01&02) are presented in **Table 5**.

Table 5: Details of road wise telecommunication lines

Category	Units	Number
Isolated Telecom Poles	Numbers	15
Telephone Box		1
OFC Pillar		24

Source: DPR

Water Supply Line

30. As per the estimate provided by Drinking water and Sanitation department, GoJ, the details of Water Supply pipe lines present in Road No.11 (NCB-01&02) are presented in Table 6

Table 6Details of water supply pipelines

S.No	Water supply Pipeline (Diameter)	Length (Meter)
1.	1000 mm	2700
2.	900 mm	2450
3.	700mm	5100
4.	600 mm	5400
5.	500 mm	600
6.	400 mm	3700
7.	350 mm	1200
8.	300 mm	2700
9.	200 mm	2500
10.	150 mm	2300
11.	100 mm	800

Source: Estimate provided by DW&SD, GoJ

Bridges&Culverts

31. Thebridges and culverts for traffic movement present in the exisitingroad,have been presented in
32. Table **7**. There are 41 culverts on Road 11, all culverts are RCC slab culverts with a span ranging between 1 to 3 m; the deck width at culverts location is typically 11 m on Road 11, and the height of culvert varies typically between 2 to 3 m;
33. The condition of culverts on Road 11 is generally good. Therefore, half of culverts on Road 11 can be widened to accommodate wider road cross-section proposed while others need to be reconstructed due to hydraulic inadequacy. At two locations (Ch Km 7.4, and Km 17.7), the existing culverts are to be replaced with 1x 10 m bridges.

Table 7: Bridges and Culverts present in existing road

S.No	Feature	Chainage
Bridges		
1	Major Bridge	0+0.389
2	Minor Bridge	2+0.407
3	Minor Bridge	9+0.956.
Culverts		
4	C-1 (1/1)	0+143
5	C-2 (1/3)	0+601
6	C-3 (2/1)	1+276
7	C-4 (2/2)	1+547
8	C-5 (4/1)	3+120
9	C-6 (4/2)	3+462
10	C-7 (4/3)	3+770

S.No	Feature	Chainage
11	C-8 (5/1)	4+265
12	C-9 (5/2)	4+717
13	C-10 (5/3)	4+896
14	C-11 (6/1)	5+263
15	C-12 (6/2)	5+657
16	C-13 (6/3)	5+805
17	C-14 (7/1)	6+089
18	C-15 (7/2)	6+332
19	C-16 (7/3)	6+465
20	C-17 (8/1)	7+262
21	C-18 (8/2)	7+423
22	C-19 (9/1)	8+014
23	C-20 (9/2)	8+244
24	C-21 (9/3)	8+961
25	C-22 (10/1)	9+435
26	C-23 (10/2)	9+692
27	C-24 (10/3)	9+958
28	C-25 (11/1)	10+062
29	C-26 (12/1)	10+995
30	C-27 (12/2)	11+246
31	C-28 (12/3)	11+590
32	C-29 (13/1)	11+739
33	C-30 (13/2)	12+450
34	C-31 (14/1)	13+832
35	C-32 (15/1)	14+280
36	C-33 (15/2)	14+518
37	C-34 (16/1)	15+175
38	C-35 (16/2)	15+248
39	C-36 (16/3)	15+578
40	C-37 (17/1)	16+350
41	C-38 (18/1)	17+277
42	C-39 (18/2)	17+673
43	C-40 (19/1)	18+337
44	C-41 (20/1)	19+134
45	C-42 (21/1)	19+922

Source: DPR

Pavement

The summary of existing pavement composition which includes average, minimum and maximum thickness of every layer for each homogeneous section of Road No. 11 is presented in Table 8.

Table 8: Summary of Existing Pavement Composition

Road ID	Bituminous (mm)			Granular Base/ Sub base (mm)			Remarks
	Min	Max	Average	Min	Max	Average	
11	40	65	55	325	805	400	

Source: DPR

34. The existing pavement details obtained from survey have been presented in Table 9.

Table 9: Existing Pavement Status

S.No	Road Id	Chainage(KM)	Location(LHS/RHS)	Crust Thickness (mm)				
				BT	WMM	WBM	GSB (Morrum based)	FMC(%)
1	11 -A	0+200	LHS	60	0	45	330	5%
2		1+300	RHS	55	0	50	290	7%
3		2+700	LHS	60	0	50	350	8%
4		3+800	RHS	60	0	45	470	10%
5		4+550	LHS	50	0	40	320	5%
6		5+700	RHS	55	0	60	300	5%
7		6+750	LHS	50	0	45	320	6%
8		7+800	RHS	60	0	40	290	5%
9		8+800	LHS	60	0	60	310	7%
10		9+700	RHS	65	0	45	290	6%
11		10+700	LHS	50	0	65	320	9%
12		11+650	RHS	55	0	60	350	5%
13	11-B	12+700	LHS	55	0	70	320	4%
14		13+800	RHS	50	0	90	360	8%
15		14+800	LHS	45	0	65	320	4%
16		15+700	RHS	50	0	60	290	4%
17		16+700	LHS	40	0	55	360	6%
18		17+700	RHS	58	0	60	290	5%
19		18+800	LHS	47	0	55	270	5%
20		19+800	RHS	50	0	125	680	6%

Source: DPR

Inventory of Trees

35. Total 8322 number of trees, are currently in the RoW of Road number 11. Out of these, 1579 number of trees greater than 14-inch girth will be felled while 6753 number of trees less than 14-inchgirth will need to be transplanted in the RoW. The detail list of trees to be affected by the project has been presented in Annexure XVII.

Major Permanenet Structures

36. The major features alongside theroad has presented in Table 10.

Table 10: Major Features alongside proposed road

S No.	Chainage	Side	Type of Structure	Location	Distance from Existing Centerexisting Centre Line (Mt)
1	00+000	Left	Waiting Shed and TilkaMajhiStatue	Within RoW	14
2	00+000	Left	Hanuman Temple	Within RoW	12.33
3	00+700	Left	Kali Temple	Within RoW	21.93

S No.	Chainage	Side	Type of Structure	Location	Distance from Existing Centerexisting Centre Line (Mt)
4	00+900	Left	Statue	Within RoW	9.79
5	00+900	Left	Newly built Temple	Within RoW	9.93
6	00+900	Right	Waiting Shed	Within RoW	6.83
7	01+900	Left	Waiting Shed	Within RoW	8.22
8	02+700	Right	Waiting Shed	Within RoW	8.35
9	02+700	Right	Temple at Ganduba	Within RoW	6.17
10	03+200	Right	Abandoned Shed	Within RoW	9.54
11	04+800	Right	Waiting Shed	Within RoW	7.37
12	05+700	Right	Waiting Shed	Within RoW	12.34
13	07+100	Right	Hanuman Temple	Within RoW	10.93
14	07+700	Right	De-Nobili School	Outside RoW	27.91
15	08+100	Right	Waiting Shed	Within RoW	9.25
16	08+700	Left	Waiting Shed	Within RoW	11.09
17	08+800	Left	School	Outside RoW	30.28
18	09+500	Left	Hanuman Temple	Within RoW	7.68
19	11+000	Right	Hanuman Temple	Within RoW	7.32
20	11+400	Left	Waiting Shed	Within RoW	9
21	15+000	Left	Kasturba SevaSadan	Outside RoW	22.81
22	16+300	Left	Bisheswar Nursing Home	Outside RoW	23.09
23	16+400	Left	RajkiyaAmbedkarAbasiya High School	Outside RoW	30.14
24	18+900	Right	Waiting Shed	Within RoW	11.02
25	19+200	Left	B.Y.S.N Inter Collage	Outside RoW	30.54

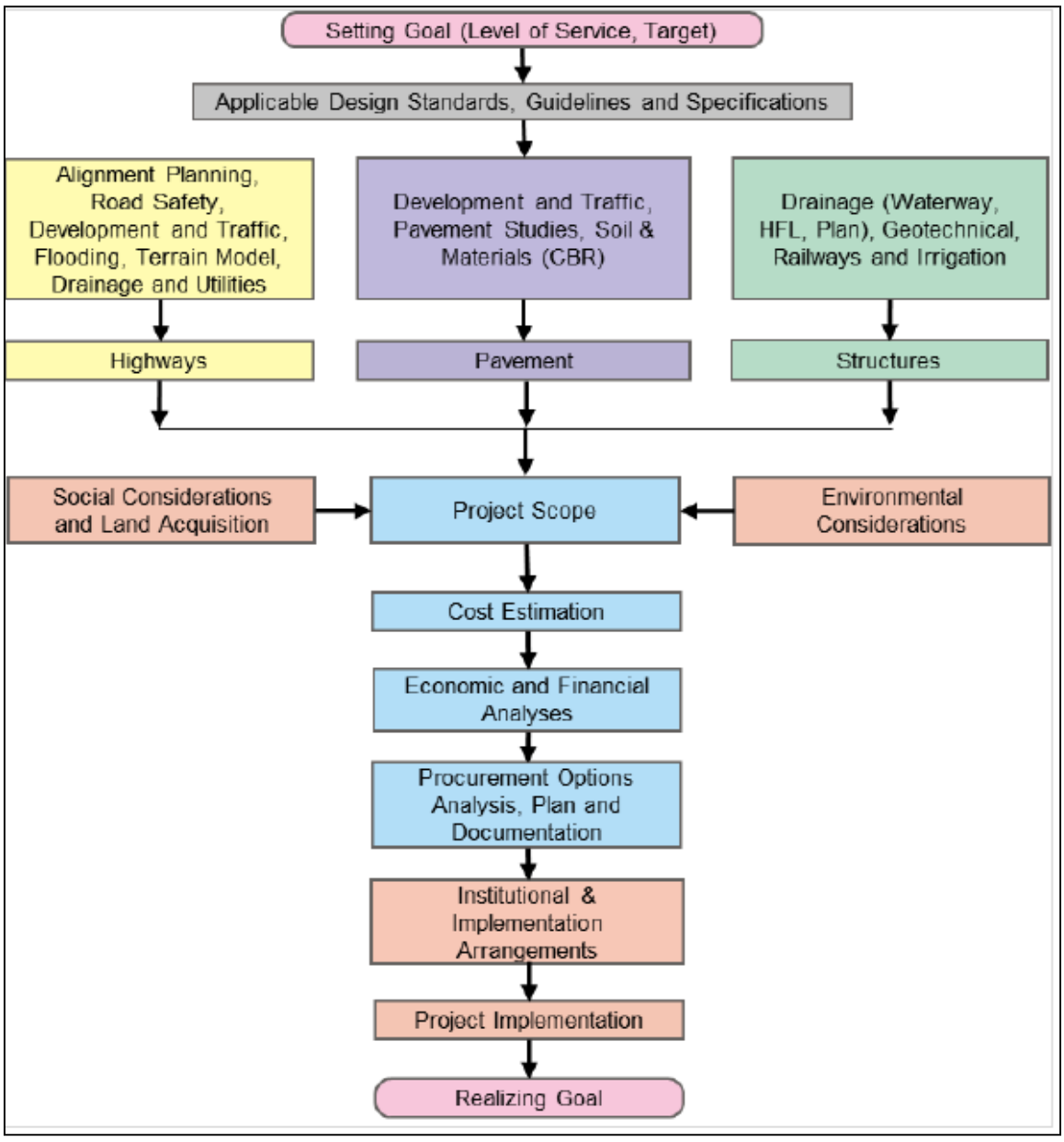
Cultural/ HistoricalSignificance

37. The proposed road has temples and statues of local signifcance.The temples located near Road Number 11 are less than 100 years old. If during strengthening of roads any articles of importance is discovered, then ‘chance find’ procedure as provided in ESMP to be followed.

2.4 Proposed Road Standard

2.4.1 Road Design Process

38. Detailed design is a key and integral part of project formulation and implementation. The road design process to be followed has been presented below in**Error! Reference ource not found.**



Source: DPR

2.4.2 Design Speed

39. Design speed, speed for which road shall be designed, is the most critical design parameter. This has implication on road user safety, natural environment, communities living along the road, road user costs, project development costs, and viability of the project. The design speed in turn is a function of road type, terrain, and land use. Road

No.11 is an arterial road. As per DPR study, the speeds achieved of Road No. 11has been provided in Table below.

Table 11: Road Length, Ruling speed and Minimum Speed

Road Id	Road Name in short	Length (km)	Ruling speed(km/hr)	Minimum speed(km/hr)[2]
1	Kanko Chowk - GoI Building Chowk	20	80-100	10-50

2.4.3 Pavement Design

40. Pavement for new construction in widening, realignment and reconstruction reaches of Road No. 11 has been proposed to be designed based on effective subgrade CBR, material characteristics and design traffic. The design standards followed are:

- New flexible pavement is designed in accordance with IRC-37: 2012 (Flexible Pavement Design Guidelines);
- Flexible Overlay designed in accordance with IRC: 81-1997 [Guidelines for Strengthening of Flexible Pavements using Benkelman Beam Deflection (BBD) technique];
- Rigid pavement is designed according to IRC: 58-2015 and
- Pavement for service roads is designed as per IRC: 37- 2012.

41. The design traffic for Road No. 11 have been presented in **Table 12**

Table 12: Design Traffic for Project Road- 11

S.No	Road Id	20-year design life		15-year design life	
		Estimated Design Traffic (msa)	Adopted Design Traffic(msa)	Estimated Design Traffic (msa)	Adopted Design Traffic(msa)
1	11	57	60	37	40

Source: DPR

2.4.4 New Flexible Pavements

42. Cycle track has been proposed for Road No. 11 and its configuration are proposed to be kept equivalent to main carriageway in view of construction ease and no wearing course (BC) will be required over the binder course (DBM). Instead of wearing course a proper seal coat in the form of painting is being provided over the binder course. Pavement layer thickness charts as per IRC 37–2012 from Plate no. 1 to Plate no. 20 have been referenced for pavement design and presented in table below

[2] *minimum speed applicable mostly near the approaches to junctions*

Table 13: Pavement Design for New Construction /Widening Section

Sl. No	Road ID	Design CBR (%)	Traffic (msa)	Pavement Composition			
				BC	DBM	WMM	GSB
1	11	8	40	40	90	250	200
2	Service Road	8	10	40	60	250	200
3	Cycle Track	8	-	-	80/90	250	200

Source: DPR

2.4.5 Road Sign Marking

43. Pavement marking for Road 11 has been proposed depending upon the requirement for each location and conforming to IRC: 35. These markings have been applied to road centre line, edge line, continuity line, stop line, give way lines, diagonal/chevron markings, and zebra crossing and at parking area. Summary of pavement markings provided on for Road No 11-A and 11-B is presented below

Table 14: Summary of Pavement Marking

Type	Side	Road Length (Running Metre)
Project Road No. 11A (NCB-01)		
Edge Line		
Main Carriage Way	Both	46,800
Centre Line		
Main Carriage Way	Centre	23,400
Service Road	Centre	NA
Project Road No. 11(NCB-02)		
Edge Line		
Main Carriage Way	Both	33,164
Centre Line		
Main Carriage Way	Centre	16,582
Service Road	Centre	NA

Source: DPR

2.4.6 Road Signs

44. Road No. 11 will be provided with elaborate system of traffic signs and markings. The proposed traffic signs in proposed road number 11 for various situations/location will be in accordance to IRC: 67-2012 and Two/Four Laning Manual. The three types of road signs viz., mandatory /regulatory signs, cautionary /warning signs and informatory signs have been proposed as given in IRC: 67 and Section 800 of MoRT&H Specifications. Proper signs have been proposed for main carriageways, service and slip roads and other project highway facilities. These are depending on the situation and function in terms of location, design configuration, and in compliance to the colour scheme. Summary of Traffic Signs proposed is presented in**Table *15***

Table 15: Summary of Traffic Signs Proposed

Signage	Unit	Road Id	
		11-A	11-B
Advance direction/Destination Sign (800x600)	No	13	15
School Ahead Sign (900 triangle)	No	1	1
Side Road Ahead (900 triangle)	No	10	15
Hump/Speed Breaker (900 triangle)	No	10	13
Left/Right Curve Sign (900 triangle)	No	20	10
Speed Limit (600 dia.)	No	12	4
Object Marker/Bus bay (One way) (300 x 900)	No	34	50
Flag Type Direction Sign (1640 x 575)	No	15	13
Single Chevron Sign	No	74	54
Delineators	No	34	42
Hospital	No	2	2
Fuel station	No	2	2

Source: DPR

2.4.7 Road Side Safety Barriers

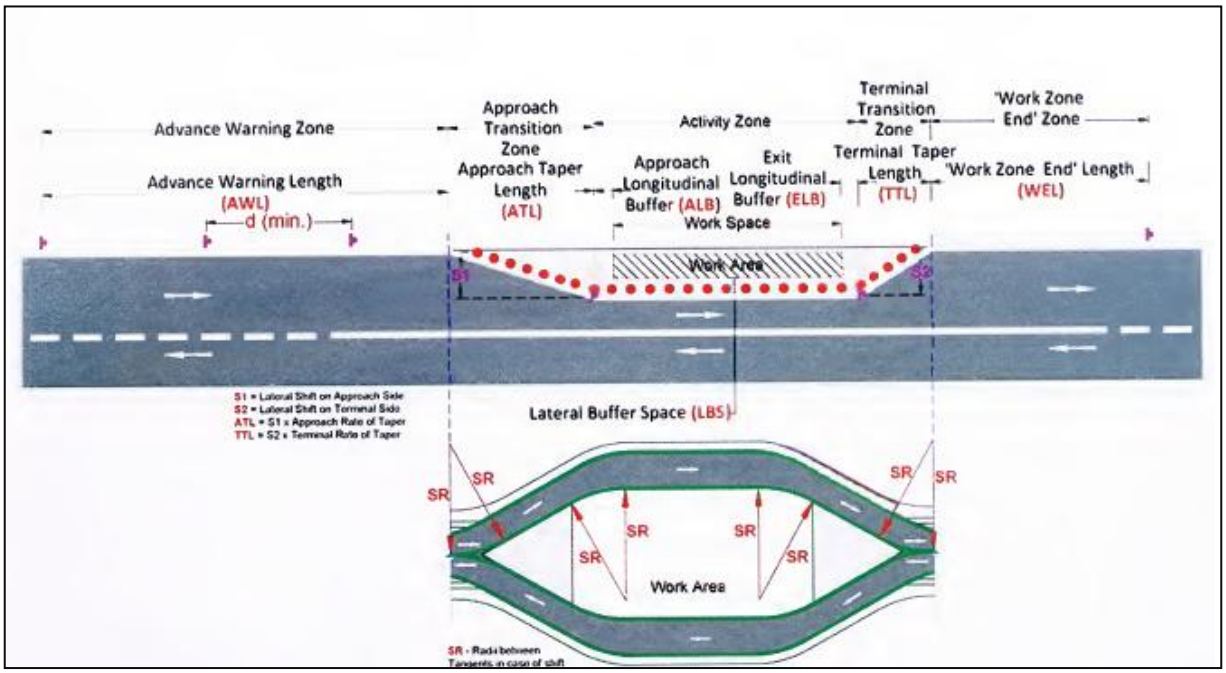
45. Metal Beam Crash Barriers in accordance with MoRT&H guidelines/circular are proposed on Road Number 11 where the following characteristic are observed:

- Median is depressed, flushed or with width less than 4.5 m. The barriers shall be for both directions of travel;
- Between main carriageway and footpath in bridges; and
- On curves having radii up to 450 m for complete length of curves including transitions and 20 m further before and after the curve.
- Technical specifications for crash barriers shall be as per IRC: SP: 84-2014.

2.4.8 Safety during Construction

46. Traffic diversion plan during construction for Road No. 11 shall be prepared as per IRC: SP: 55-2014 for the project roads. Separate traffic diversion plan shall be prepared for structures and cross drainage works. The width of temporary diversion is being proposed to be equal to the width of existing carriageway but not less than 5.5 m, for existing two lane roads. Typical Traffic Control Zone based on IRC: SP: 55-2014 is presented below.

Figure 3: Typical Traffic Control Zone



Source: DPR

2.4.9 Drainage

47. IRC: SP: 42-2014 Guidelines of Road Drainage; and IRC: SP: 50-2013 Guidelines on Urban Drainage standards have been followed to design the road side drainage of the proposed Road No. 11. Camber (transverse slope) of surfaced areas (carriageways, paved shoulders cycle tracks, and parking areas) proposed is 2.5% and is in line with IRC: SP: 42-2014 Para 4.4.2 as applicable for roads with kerb. Longitudinal slope along the road will be maintained above 0.5%, due to the gently undulating terrain prevailing in Dhanbad.

48. All proposed project roads are planned to have covered concrete drains. The drains are proposed on both sides for roads for both package NCB-01 & 02.Inner dimensions of drain are 0.85 m base width for proposed road under NCB-01 & NCB-02. Internal depth of drain will vary from 0.7 to 2.0 m with the depth of flow ranging from 10 to 40 cm. A free board of 15 cm above flow and below GSB layer (40 cm below nearest road level) have

been proposed to be added to the depth of drain. Discharges near outfalls (typically culverts and bridges) from proposed drains will be in the range of 0.2 to 0.9 m^3/sec. The resulting velocity at outfalls will typically range between 1.0 to 4.5 m/sec with an average value of 2.6 m/sec, whereas permissible velocity for concrete drains is 6.0 m/sec.

2.4.10 Improvement of Bridges

49. Three existing bridges on Road 11are listed below:

- Major Bridge 11-01, Km 0.389, 1x26 RCC T Beam and Slab + 1x52 PSC Girder, 2 Lane wide
- Minor Bridge at Km 2.407 RCC T Beam and Slab
- Minor Bridge at Km 9.956 Slab bridge also 2 Lane wide

50. The first two bridges are observed to be hydraulically adequate, but all the bridges are located in the centre of RoW and entire ROW is being proposed to be developed, so all the bridges will be dismantled and developed. The proposed bridges to be developed in Road No 11 are:

- Major Bridge 11-01, Km 0.389, 3 x 26 m RCC T Beam with Slab
- Minor Bridge 11-02, Km 2.407, 1 x 16 m RCC T Beam with Slab
- Minor Bridge 11-03, Km 7.423, 1 x 10 m RCC Slab
- Minor Bridge 11-04, Km 9.956, 1 x 10 m RCC Slab
- Minor Bridge 11-05, Km 17.760, 1 x 10 m RCC Slab

51. All the above bridges will have four parts, two covering main carriageways (LHS, and RHS, 12.5 m wide each) and two covering Service Roads (LHS, and RHS, 9.5 m each).

2.4.11 Improvement of Culverts

52. There are 42 culverts on Road 11.All culverts are RCC slab culverts with a span ranging between 1 to 3 m.Carriageway width at culverts location have been observed to be typically 11m on Road 11, and generally narrower on other roads. The height of culvert varies typically between 2 to 3 m; and the foundations are of open type due to good foundation soils. The condition of culverts on Road 11 have been observed to be good compared to the rest of the proposed roads. Therefore, half of culverts on Road 11 have been proposed to be widened to accommodate wider road cross-section proposed; while other culverts are proposed to be reconstructed due to hydraulic inadequacy. At three locations (Chainage Km 7.4, Km 9.7, and Km 17.7), the existing culverts are proposed to be replaced with 1 x 10 m bridges.

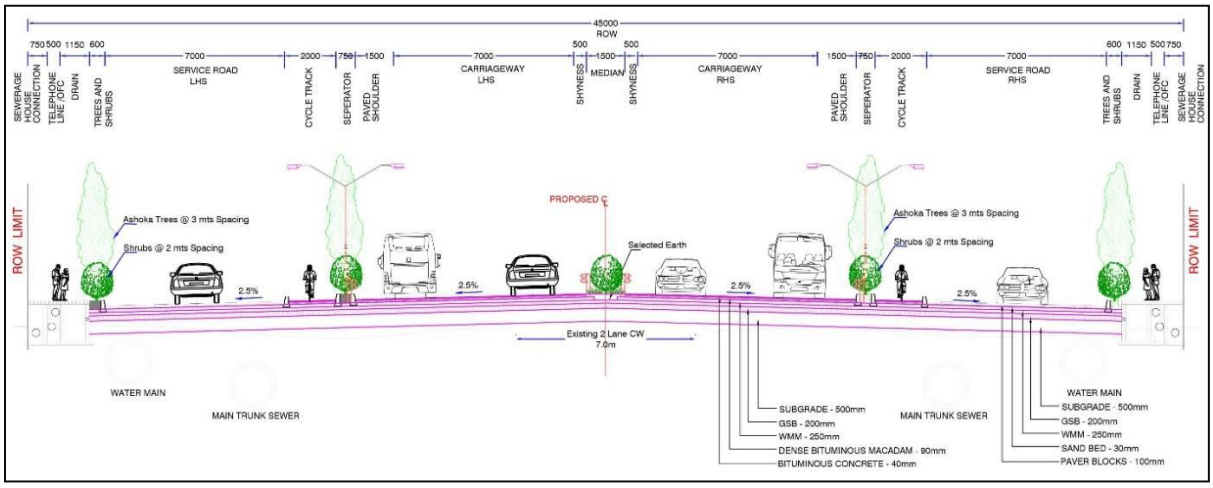
2.4.12 Cross- sectional elements

53. Cross-sectional elements of Road No. 11 will include the following:

- Number of carriageways and lanes;
- Shoulder types and widths;
- Cycle tracks and auto-rickshaw lanes;
- Service roads;
- Median width, if applicable;
- Car Parking;
- Hawkers Zone;
- Covered Drain with Footpath; and
- Road camber

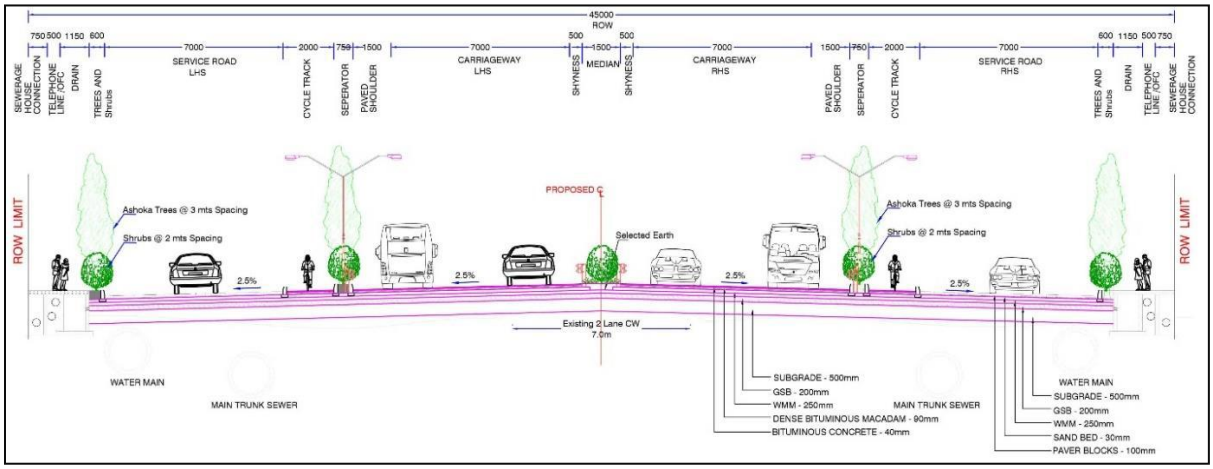
54. Number of carriageways proposed are two for Road No. 11. Lanes are 3.5 m wide. As the road is within DMC area, it will be provided with paved shoulders that will be 1.5 m wide. Cycle tracks are proposed on Roads 11 of 2 m width and 19.99 km length. Road 11 has more land potential for development and is likely to have truck traffic diverted on to in the immediate future. Therefore, to segregate through traffic from local traffic, 7 m wide service roads are provided in both directions. Separate bridges are also proposed for service roads to ensure uninterrupted flow of local traffic. Median width in case of 4 Laning sections varies between 1.5 to 3.0 m. Typical cross section of NCB-01 has been presented in **Figure 4** and of NCB-02 have been presented in **Figure 5**&**Error! Unknown switch argument.**

Figure 4: Cross-section of 11A - 45 m ROW 4 Laning with 2 Service Roads, Urban Arterial



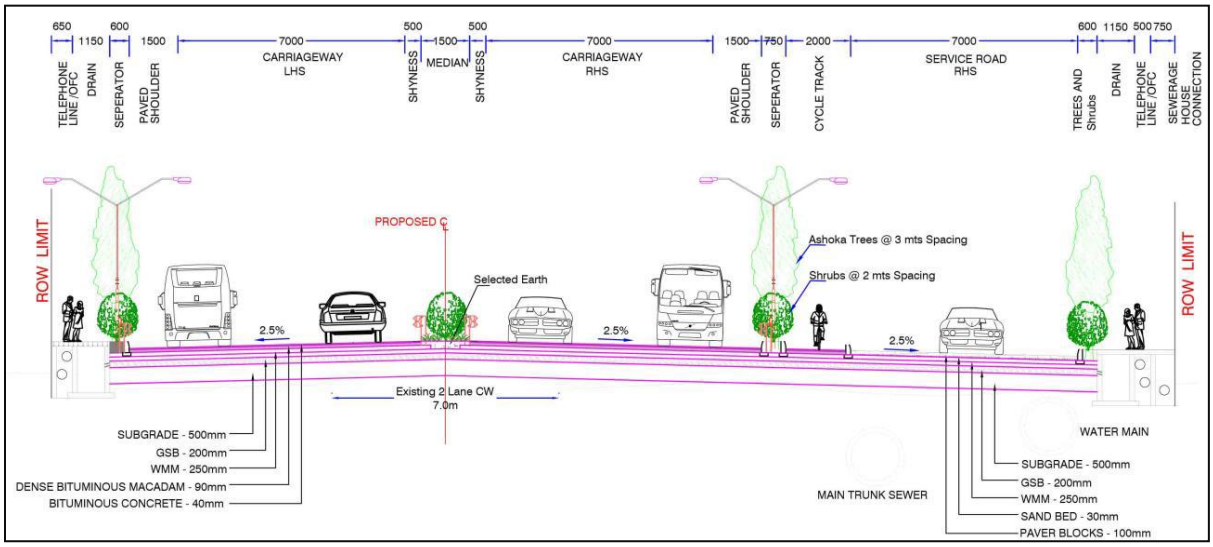
Source: DPR

Figure 5: Typical cross section of 11B (i) - 45 m ROW 4 Laning with 2 Service Roads, Urban Arterial



Source: DPR

Figure 6: TCS 11B(ii) - 45 m ROW 4 Laning with 1 Service Road, Urban Arterial



Source: DPR

2.4.13 Landscaping & Plantation

55. The project will have an impact on 8302 number of trees. Out of these, 1560 number of trees will be cut while 6742 number of trees will be transplanted. However, approximately 17000 number of trees will be planted as a part of compensatory plantation against theimpacted trees.Trees and shrubs will be planted at the median and along the road side as shown in figure 5,6 and 7.

2.4.14 Roadside Furniture

56. The proposed road side furniture for Road No. 11 are:

- **Road Boundary Stones (RBS)**

Road boundary stones are proposed to be provided at the boundary on both sides of the Right of Way. These shall be spaced at 200 m. The boundary stones shall be of cement concrete as per Type Design given in IRC: 25. The boundary stones shall be painted with cement primer and enamel paint and marked 'RBS' by paint.

- **Kilometre and 200 m Stones**

57. Kilometre and 200 m stones will be provided as per technical specifications along the sub-project road on either side. The design and placement of these highway stones, the dimension of stones, size, colour, arrangement of letters will be as per IRC: 26-1967 and IRC: 8-1980.

- **Roadside Railings/ Pedestrian Guard rails**

58. Pedestrian guard rails shall be provided to guide the pedestrian to the selected crossing /identified locations. The design and provision of these facilities shall be in accordance with IRC: 103.

- **Road Delineators**

59. These are roadway indicators, hazard markers and object markers as given in IRC: 79-1981.Roadway indicators Circular Iron Posts of 1.0 m height or concrete or any manufactures product with retro-reflective reflector of at least Type IV sheeting as per criteria, placement and spacing given in IRC:79 shall be provided This will include low embankments and flat curves where crash barriers are not provided.

60. Hazard Markers shall be provided as given IRC: 67:2012. In addition, the objects close to the road shall be painted with black and yellow stripes using the paint conforming to IS: 164.

61. Object Markers shall be provided as given in IRC: 79 and IRC: 67. All physical objects above the Finished Road Level (FRL) that are falling within 3m from the carriageway edge line shall be illuminated with Object Hazard Markers (OHM). The objects shall include foot path or utility poles or parapet or concrete barrier of Major Bridge, Minor Bridge, Culverts, RE wall start of Underpass or flyovers. The Object Hazard Marker shall be either left OHM or right OHM or Two way Hazard markers with respect to position of object to the traffic. In addition, the kerbs in the medians/traffic islands shall be painted with black and white stripes (black and yellow stripes at hazardous locations) using the paint conforming to IS: 164.

- **Cat's Eyes (Road Studs)**

62. Cat's eyes or road studs are provided along the project road on centre line, on kerb side marking and on road edge marking to demarcate traffic movement especially during night time.

2.4.15 Project Facilities

63. The proposed facilities for road 11 to be developed has been described below:

- **Pedestrian Facilities**

64. Pedestrians are vulnerable to being involved in accidents. Therefore, adequate consideration has been given to their safety through provision of facilities such asfoot over bridge (chainage 7.55km and 9.35 km), street lights, zebra crossings, signages, etc.

- **Footpaths (sidewalks)**

65. The sidewalks have been proposed in the built-up sections, on both sides, by barrier type (non-mountable) kerb of height 200 mm above the adjacent road surface.

- **Pedestrian Crossing Facility**

66. The proposed project has been provided with safe crossing facilities for the pedestrians. The following provisions has been provided:

a) At-Grade Pedestrian Crossing (Pedestrian Crosswalk): Pedestrian crosswalks at all important intersections and such other locations where substantial conflict exists between vehicular and pedestrian movements (like bus bays, schools and settlement areas etc.).

b) The zebra crossings have been provided with warning sign and also informatory sign. On approach to school, warning sign shall be provided and zone shall be provided with footways and speed limit sign (Refer IRC: SP: 67-2012).

- **Service Roads**

67. Service Roads are proposed on Road 11 to provide access to abutting properties and to ensure that the vehicles entering the project road from other village roads shall not enter directly on the main carriageway.

- **Street Lighting & High Mast Lighting**

68. Street lighting and high mast lighting have been proposed at the following locations of the Project:

a) Built-up sections on the Project Highway both in the median of main carriageway;
b) On the service roads on either side; and
c) High mast lighting at all the junctions.

]

2.5 Construction Phase Detail

2.5.1 Water Requirement

69. The average water requirement during construction phase for NCB-01 will be 88,360 kl and for NCB-02 will be approximately 71,133 kl. Water required for construction will be sourced through tankers from government approved sources.

2.5.2 Power Requirement

70. The power requirement during the construction phase for NCB-01 & NCB-02 will be met through temporary electric connection from Jharkhand State Electricity Board (JSEB), and if required then low emission D.G. set with acoustic enclosure will be used.

2.5.3 Diesel Requirement

71. During the construction phase, for NCB-01 approximate 17.7 lakh litres of diesel will be required and for NCB-02, 12.9 lakh litre of diesel will be required for running the construction equipment. On-site diesel is proposed to be stored in 100 litres drums and will be kept in a designated storage area with all safety precautions.

2.5.4 Raw Material Requirement

72. For the construction of the entire project complex, raw materials like steel, sand, stone and cement will be required. The approximate estimated quantities for the raw materials, their source and mode of transport for NCB-01 & 02 are provided in **Table 16**.

Table 16: Estimation of raw material for construction

List of Construction materials	Average Quantity for NCB-01	Average Quantity for NCB-02	Source of Material	Mode of transportation and storage site
Cement	20367 metric tonnes	12033 metric tonnes	Authorized agency shops	Truck
Stone Aggregates	831232 cu m	601216 cu.m	Gobindpur Quarry &Crusher,Palani Quarry &Crusher,Baliapur Quarry & Crusher	Truck
Steel	3346metric tonnes	1813 metric tonnes	Authorized agency shops	Truck
Sand	31437 cu m	19626 cu.m	Govt. Approved local	Truck

List of Construction materials	Average Quantity for NCB-01	Average Quantity for NCB-02	Source of Material	Mode of transportation and storage site
			quarry/suppliers	
Earthwork	310221 cu m	252613 cu.m	Currently JUIDCO[3] through its DPR consultant has identified 3 borrow areas in Kanko village, Dharkiro village, and Lewatand village	Truck
Bitumen	3727 metric tonnes	2799 metric tonnes	Authorized agency shops/dealers	Truck

Source: DPR
Note: All the raw material shall be procured from the existing government approved quarries.

2.5.5 Machinery requirement

73. For the construction of the road project, the following machinery will be required:

- Excavator
- Dumper
- Compactors
- Static and dynamic road rollers
- Pavers
- Hot mix plant
- Concrete mixers
- Compressors
- Vibrators

2.5.6 Labour requirement

74. For the construction of the road project, the expected required number. of skilled labours and unskilled labours for NCB-1 are 61 and 298 respectively. About 20% (70 nos.) of skilled labours and unskilled labours may come from outside the Dhanbad city. The labour camp for 70 nos. of labour shall be expected, the remaining number of labours shall be employed from nearby villages/areas. Out of 61 nos. of skilled labours, it is expected that about 15-20% shall get the rented accommodation by the contractor.

75. The expected required number of skilled labours and unskilled labours for NCB-II are 36 and 164 respectively. About 20% (40 nos.) of skilled labours and unskilled labours may come from outside the Dhanbad. The labour camp for 40 nos. of labour is expected, the

[33] Soil Investigation report of probable areas have been presented in Annexure VII

remaining number of labours shall be employed from nearby villages/areas. It is expected that about 15% of skilled labours shall get the rented accommodation by the contractor.

76. The construction cum labour camps will be set up on an area of approximately 2 acres for NCB-01 and NCB-02. The labour camps are proposed near Gargaria village located at 3.0 Km from Kanko Chowk and Velatan village which are about 3.3 km away from the sub-project site i.e. Memco-gol building Chowk.

3 LEGAL & REGULATORY FRAMEWORKAND PROJECT CATEGORIZATION

77. This chapter details out the legal and regulatory framework under the ambit of which the ESIA was undertaken. It also reviews the national and state laws of Jharkhand relevant to the scope of activities under the sub-project, and, discusses the implications for the sub-project design and implementation.

78. Infrastructure development activities such as road construction may pose critical impacts on the environment largely from two perspectives. Firstly, the direct effects of construction which results in disturbance on environmental and social systems especially on property rights.Secondly, the indirect effects through economic activities which are created in the post-construction phase which have both negative and positive impacts on the environment and social setting of the nearby areas. Considering the implications, there is a need to manage the environmental and social impactsunder a legal framework both at national and state level.

3.1 Applicable National & State Laws and Regulations

79. An overview of the applicable environmental laws and regulations for this sub-project is provided in the table below:

Table 17: Applicable Environmental Regulations of Government of India and Government of Jharkhand

S.No	Act/Rules	Purpose	Applicable Yes/ No	Remarks on Applicability/ Non-Applicability	Regulatory Authority
	Environmental Regulations				
1	Environment Protection Act, 1986 The Environment (Protection) Rules, 1986	To protect and improve overall environment	Yes	As most environmental notifications, rules and schedules in India are issued under this Act, an Environmental Statement needs to be submitted annually by the entity to whom Consent to Establish and Consent to Operate is being granted by the state Pollution Control Board.	MoEF&CC, GoI, State Govt.CPCB, JSPCBs
2	Air (Prevention and Control of Pollution) Act, 1981 and Air (Prevention and Control of Pollution) Rules, 1982	To control air pollution by controlling emission of air pollutants, as per the prescribed standards	Yes	This act will beapplicableduringconstruction. Applicable for establishment of crusher and batching plant etc.	JSPCB
3	Water Prevention and Control of Pollution) Act, 1974- Water (Prevention and Control of Pollution) Rules, 1975	To control water pollution by controlling discharge of pollutants as per the prescribed standards	Yes	This act will be applicable during construction. Applicable for establishment of crusher and batching plant etc.	JSPCB
4	The Forest (Conservation) Act,1980	To check deforestation by restricting conversion of forested areas into non- forested areas	No	There is no diversion of forest land for non-forest activities i.e. forest land required for the sub-project.	Forest Department, State Government and Ministry of Environment and Forests, Government of India

S.No	Act/Rules	Purpose	Applicable Yes/ No	Remarks on Applicability/ Non-Applicability	Regulatory Authority
5	Wild Life (Protection) Act, 1972	To protect wildlife through National Parks and Sanctuaries	No	The proposed projects is not located in protected areas and there are no points of wildlife crossings in proximity to project locations	Chief Conservator Wildlife, Wildlife Wing, State Forest Department and Ministry of Environment and Forests, Government of India
6	Environmental Impact Assessment (EIA) Notification 2006 Amendment S.O. 3999(E) dated December 2016	Sets out the procedure of conducting EIA for projects and activities covered under the Notification to obtain Environmental Clearance (EC)	No	Road strengthening does not require prior EC. However for borrow areas EC is required from DEIAA.	MOEF&CC/ SEIAA
7	Solid Waste (Handling and Management) Rules, 2016	Lays down the methods of handling Municipal Solid Waste (MSW) and its scientific disposal	Yes	All solid waste generated during construction (e.g., at labour camp, disposal of construction waste, disposal of unsold material from felled trees, etc.) of the sub-project has to be handled and disposed as per the prescribed rules.	JSPCB, Government of Jharkhand
8	Construction and Demolition Waste Management Rules, 2016	Every waste generator shall prima-facie be responsible for collection, segregation of concrete, soil and others and storage of construction and demolition waste generated and deposition to collection	Yes	Construction waste will be generated during the construction phase. Emphasis on the roles and accountability for waste management, segregation, recovery, reuse, recycle at source, should be addressed in the management of construction and demolition waste.	JSPCB, Government of Jharkhand

S.No	Act/Rules	Purpose	Applicable Yes/ No	Remarks on Applicability/ Non-Applicability	Regulatory Authority
		centre or handover to authorised processing facilities			
9	Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.	Stipulates the method of segregating, storing managing and disposing hazardous and other wastes regulated under the Rules	Yes	Applicable to the hazardous waste (waste oil from diesel generator sets, oil soaked cotton, used oil filters) generated during construction and operational phases	JSPCB, Government of Jharkhand
10	Biological Diversity Act 2002 and Biological Diversity Rules 2004	The Biological Diversity Act, which came into force in February 2003, aims to promote conservation, sustainable use and equitable sharing of benefits of India's biodiversity resources. It provides for establishment of a National Biodiversity Authority at national level, State Biodiversity Boards at state level and Biodiversity Management Committees at the level of Panchayats and Municipalities	No	The -project known, is not located in proximity to any ecologically sensitive areas	Forest Department, State Government and Ministry of Environment and Forests,
11	The Noise Pollution (Regulation	The standards for noise for day and night have been promulgated by	Yes	Applicable to all noise generating construction activities and construction equipment deployed at	JSPCB, Government of Jharkhand

S.No	Act/Rules	Purpose	Applicable Yes/ No	Remarks on Applicability/ Non-Applicability	Regulatory Authority
	and Control) Rules, 2000	the MoEF&CC for various land uses		worksite	
12	Fly Ash Notification , 2009	The notification states the use of fly ash based products in construction activities	Yes	Applicable, as per MoEFCC guidelines the sub-project will use flyash from nearby thermal power station	JSPCB
13	Public Liability and Insurance Act, 1991	Protection from Hazardous materials and accidents.	Yes	Project may require storage of hazardous waste for construction purpose.	JSPCB, Government of Jharkhand
14	Eco-sensitive Zone (ESZ) Notifications	The activities in areas around Wildlife Sanctuaries and National Parks are regulated from the perspective of conservation of wildlife,	No	The current project is not located in the ESZ.	Monitoring Committee for ESZ in the State
15	The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989	It provides measures, regulations and controls so as to reduce environmental, safety and health risks while manufacturing, handling and storage of hazardous chemicals.	Yes	Applicable as during construction phase, projects may have to store hazardous chemicals at site.	JSPCB, Government of Jharkhand
16	Jharkhand Minor Mineral and concession Rules	Regulates prospecting of minerals including minor minerals such as building stones, gravel, ordinary clay, ordinary sand.	Yes	Building materials such as sand, soils, aggregate would need to be obtained from licensed quarries and areas.	District Collector State Department of Mining
17	Indian Forest Act, 1927, (Tree felling permission)	Necessary permissions and	Yes	Applicable as the subproject involves felling of 1579nos. of trees for	Divisional Forest Officer, Dhanbad

S.No	Act/Rules	Purpose	Applicable Yes/ No	Remarks on Applicability/ Non-Applicability	Regulatory Authority
		Specific procedures are to be followed in case of tree felling. In Jharkhand, it is mandatory to acquire permissions from the concerned Divisional Forest Officer (DFO) and Principal Chief Conservator of Forests (PCCF) and High Power Comittee		widening of roads. The requisite permissions for tree felling have been applied for and the necessary site invetsigations have been undertaken and proceedings of the High Power Coorindation Committee have been obtained. .	
	Occupational Health & Safety				
1	Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996	It regulates the employment and conditions of service of building and other construction workers and provides for their safety, health and welfare	Yes	This is applicable as the construction works will employ 10 or more workers,	District Labour Commissioner and Buildings Inspector
2	Central Motor Vehicle Act, 1988	To check vehicular air and noise pollution.	Yes	This rule is applicable as vehicles deployed for construction activities and construction Machinery.	Motor Vehicle Department
3	Explosive Act, 1984	Safe transportation, storage and use of explosive material	Yes	Applicable as the project require transporting and storing diesel, Oil and lubricants etc.	Chief Controller of Explosives
4	Gas Cylinder Rules, 2016	Stipulates conditions on import, transport, storage, **use**, filling and possession of any compressed gas cylinders so as to	Yes	Applicable as oxygen or oxyacetylene gas will be used for cutting during construction activities. LPG cylinders may also be used.	Chief Controller of Explosives

S.No	Act/Rules	Purpose	Applicable Yes/ No	Remarks on Applicability/ Non-Applicability	Regulatory Authority
		reduce associated risks and hazards to the environment, health and safety			
	Labour Welfare				
1	Workmen Compensation Act, 1923	It provides for payment of compensation by employers to their employees for injury by accident i.e. personal injury or occupational disease.	Yes	Construction workers will be involved in the project	District Labour Commissioner
2	Inter-state Migrant Workers Act, 1979	It protects workers whose services are requisitioned outside their native states in India Contractor who employs or who employed five or more Inter-State migrant workmen need to obtain registration under this act	Yes	Interstate migrant workers will be involved in the projects	District Labour Commissioner
3	The Child Labor (Prohibition & Regulation) Amendment Act, 2016	It prohibits employment of children in certain specified hazardous occupations and processes and regulates the working conditions in others.	Yes	Construction workers will be involved in the project	District Labour Commissioner
4	Minimum Wages Act, 1948	Payment of minimum rate of wages as fixed	Yes	Construction/daily wage workers will be involved in the projects	District Labour Commissioner

S.No	Act/Rules	Purpose	Applicable Yes/ No	Remarks on Applicability/ Non-Applicability	Regulatory Authority
		and periodically revised by the State Government			
5	Building and Other Construction Workers Welfare Cess Act, 1996	An Act to provide for the levy and collection of a Cess on the cost of construction incurred by employers.	Yes	Sub-project will involve construction workers	District Labour Commissioner
	Resettlement and Rehabilitation				
1	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act -2013 and Jharkhand Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Rules-2015	Fair compensation for acquisition of: (i) Land and other immovable assets; (ii) resettlement of displaced population due to LA and (iii) economic rehabilitation of all those who are affected due to land acquisition. The Act also covers the Lease Holders, Share Croppers and Tenant.	No	No land acquisition will be undertaken for the sub-project.	Revenue Department of respective under the District Collector.
2	The Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act	Grants legal recognition to the rights of traditional forest dwelling communities.	No	The sub-project does not have forest dwellers and, no forest land will be used for the infrastructure components	Ministry of Tribal Affaires, GoI and Department of Tribal Welfare of various State Government and Panchayati Raj

S.No	Act/Rules	Purpose	Applicable Yes/ No	Remarks on Applicability/ Non-Applicability	Regulatory Authority
4	The Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act, 2014.Jharkhand street vendor (Protection of livelihood and regulation of street vending),Rules 2014.	The Act aims to protect the rights of urban street vendors and to regulate street vending activities. It provides for Survey of street vendors and protection from eviction or relocation; issuance of certificate for vending; provides for rights and obligations of street vendors; development of street vending plans; organizing of capacity building programmes to enable the street vendors to exercise the rights contemplated under this Act;	Yes	The projects are likely to impact 116 squatters including 13 street vendors.	ULBs and State Government.
5	Chota Nagpur Tenancy Act, 1908.	The Act provides for rights of tribal communities/ indigenous people in the State of Chota Nagpur plateau area. The basic objective of the Act was to restrict the transfer of tribal land to non-tribal. .But in case of development project, section 46 allows for transfer of	No	The sub-project is located in tribal belt of the Chota Nagpur area of Jharkhand. The proposed sub-project has avoided any impact on land by restricting the Design within available RoW.	Land Revenue Department, District Commissioner

S.No	Act/Rules	Purpose	Applicable Yes/ No	Remarks on Applicability/ Non-Applicability	Regulatory Authority
		land only with permission of District Commissioner			

3.2 World Bank Safeguard Policies

80. The objective of the World Bank's environmental and social safeguard policies is to prevent and mitigate undue harm to people and their environment during the development process. These policies provide guidelines for World Bankand borrower staff in the identification, preparation and implementation of programs as well asprojects. Safeguard policies provide a platform for the participation of stakeholders in project design, and are an important instrument for building ownership among local populations (World Bank, 2006). The applicablesafeguard policies are presented in the sub-sections below.

Table 18: Applicability of WB Safeguard Policies for the Project

WB Safe Guard Policy	Key Features	Applicability
OP 4.01- Environmental Assessment	▶ Potential environmental consequences of projects identified early in project cycle. ▶ EAs and mitigation plans required for projects with significant environmental impacts or involuntary resettlement. ▶ EAs to include analysis of alternative designs and sites, or consideration of "no option". ▶ Requires public participation and information disclosure before Board approval.	Applicable. According to OP 4.01 environmental issues have been identified in the integrated Environment and Social Impact Assessment and Environment and Social Managment Plan (ESMP) is prepared. A seperate Resettlement Action Plan (RAP) is also prepared.
OP 4.12 - Involuntary Resettlement	▶ Implemented in projects which displace people ▶ Requires public participation in resettlement planning as part of SA for project ▶ Identification of "those who have formal legal rights to land (including customary and traditional rights recognized under the laws of the country. ▶ Intended to restore or improve income earning capacity of displaced populations in addition to their resettlement. ▶ Intended to provide compensation for lost assets and other resettlement assistance to "those who have no recognizable legal right or claim to the land they are occupying. ▶ Some project interventions are likely to trigger issues such as those related to land acquisition, loss of assets and impact on livelihood sources. Identification of any potential impacts and mitigation measures to address likely impacts is proposed. ▶ Transfer of Government land under different tenure systems could trigger adverse impacts such as loss of access to natural resources – firewood, fodder, water etc and loss of sources of income/ livelihood/ shelter/ homestead.	Applicable. The project will have impact on about 258 households, primarily non-titleholders (Squatters and Encroachers) who are mostly commercial entities. A separate Resettlement Action Plan is prepared.
OP 4.11 Physical Cultural Property	▶ Purpose is to assist in the preservation of cultural property, such as sites having archaeological, paleontological, historical, religious and unique cultural values. ▶ Generally seeks to assist in their preservation and avoid their elimination. Discourages financing of projects that may damage cultural property.	Applicable Presence of 7 temples, and 2 statues along NCB-01. details with regards to the structures is presented in Annexure XIII PCR Plan. A clause for

WB Safe Guard Policy	Key Features	Applicability
		Chance finds and the procedures have also been outlined in Annex XIII

3.3 IFC EHS Guideline

1. **Table 19** presents the IFC EHS guideline applicable for the project.

Table 19: IFC EHS guideline applicable to project

Safeguard Policies	Objective	Applicability	Safeguard
IFC: General EHS Guidelines	The (EHS) guidelines contain performance level and measures on environmental, occupational health and safety for construction, community health and safety to be followed during the construction, operation and decommissioning phases.	Applicable, as the sub-projects will involve construction, operational and de-commissioning activities.	The sub-project will adhere to the performance level and measures provided in the IFC general EHS guidelines, Mitigation measures proposed including OHS management plan (Annex VI) has been prepred using the EHS gudelines, and to provide the contractor with the guidance in implementing the required measures.
IFC Workers' Accommodation: Processes and Standards: Guidance Note	This Guidance Note addresses the processes and standards that should be applied to the provision of workers' accommodation	Applicable, as the sub-projects will involve setting up of labour camp during construction phase.	The plan to be followed for setting up of the labour camp has been provided in AnnexureIV. This plan is prepared in reference to

			the Workers accommodation: processes and standards (A guidance note by IFC and EBRD). The objective of this plan in Annex VII is to provide guidance to the contractor or other agency involved in setting up of the construction and labour camp for keeping the health & Safety of workers and impacts of setting up such camps on the local community in consideration while developing and establishing such camp.

Project Categorization

81. As per the primary screening conducted in Annex 1, Dhanbad road project of NCB-01 &02 package is categorized as E-2 and S-1 (shown in Table-3). As per ESMF catgeorisation, category E-2 corresponds to Bank Category B project. Hence the ESIA requirements of Catgeory B project as per OP 4.01 have been followed under the ESIA for Dhanbad Road 11 NCB-01 and NCB-02, including preparation of ESMP following OP 4.01 Annex C.

Table 20: Environmental Categorization of Projects

Category	Description	
E-2	Project is categorised as E-2 if its potential adverse environmental impacts are less severe than those of E-1 projects. E2 projects are expected have less adverse and more limited, fewer, site-specific, likely reversible reversible environmental impacts. Mitigation measures can be more easily designed/implemented.	All impacts, environmental and social concerns associated with proposed project have been addressed in the ESIA, and the appropriate mitigation and monitoring measures have been provided in ESMP, RAP. All impacts from tree cutting, construction related issues, waste generation have been identified, and appropriate mitigation measures have been incorporated in the document. The project will not result in significant adverse and diverse impacts or that affect an area broader than the sites or facilities subject to physical works. It does not impact environmentally sensitive areas, habitats, or involve large quanitites of hazardous material. JUIDCO has engaged an independent agency different from DPR consultant to carry out an ESIA for Dhanbad Roads NCB-01 and NCB-02 project, to meet the requirements of OP 4.01 Category B project. The development of the ESIA involved stakeholder consultations, and separate consultations with the temple communities. A separate discussion with the ULB and stakeholders was held on an advanced draft of the ESIA and ESMP.

Table 21: Social Categorization of Projects

Category	Description	Type of Project
S-1	Significant with adverse irreversible social impacts	▶ If it involves acquisition of private land and affects more than 200 persons or 50 households ▶ If it involves physical displacement.
S-2	Moderate with minimized social impacts	▶ If impacts are limited to less than 200 persons or about 50 household of minor nature
S-3	Minor with direct or indirect social impacts.	▶ No private land acquisition or no loss to PAPs.

E& S permissions required

82. **Planning Stage**

- Tree Cutting Permission from DFO, Dhanbad

83. **Pre-Construction Stage**

- NOC for utility shifting from concerned departments
- NOC from the Gram Panchayat / ULB for borrow areas
- NOC from the Gram Panchayat / ULB for area designated for disposal of construction waste
- Permission to withdraw water for construction from surface water sources such as Rivers/Ponds from Irrigation Department.
- Quarry License from State Department of Mines and Geology from Dept. of Mining; Concerned District Administration; SEIAA; JPCB

84. **Construction Stage**

- Approval from ULB for withdrawal of water for construction purpose
- NOC from JSPCB for Storage, handling and transport of hazardous material
- NOC for transporting and storing diesel, oil and lubricants etc from Chief Controller of Explosives
- CTE & CTO from JSPCB for batching plant, hot mix plant, DG set(>15 kVa) Labour license from Department of Labour
- Inter-state migrant worker License from District Labour Commissioner

- PUC certificate for vehicles involved during construction activity under Central Motor and Vehicle Act 1988 from motor vehicle department, GoJ
- NOC for establishment of labour camps from designated ULB.
- Labor license from Labour Commissioner.

4 ANALYSIS OF ALTERNATIVES

For this sub-project, the analysis of alternatives for the sub-project has been made at two levels. *Firstly*, the alternative analysis was done considering the "with and without project scenarios" which considered the potential social impacts, both positive and negative, of the sub-project. *Secondly*, an analysis has also been made during design finalisation taking into consideration the requirement in meeting the design standards for smooth flow of traffic and also impact of the opted designs on structures along the road. Both the analysis is detailed in the below section:

4.1 "With Project" and without Project" scenario

85. In the case of 'no-project' scenario the existing roads will be considered as it is. The road network is narrow and unable to cater to heterogeneous traffic movement. The proposed roads have deteriorated in many parts and the current roads attract incremental costs in repairs. Frequent maintenance and gravel quarrying poses financial and environmental costs. Due to the bad road, road safety is low, travel times are unduly long and journeys cumbersome and uncomfortable.

86. Dhanbad city has a population of 11,62,472 (2011) and has the total registered vehicle population of 4,62,000 (2011). With the normal growth rate of population at 2.5% per annum, vehicle growth is expected at 5% per annum, leading to an addition of about 100,000 vehicles by 2020. Population growth, increase in traffic volumes and economic development will exacerbate the already critical situation. The existing unsafe conditions and the adverse environmental consequences, would continue to worsen in the absence of the proposed improvements. Therefore, the no-action alternative is neither a reasonable nor a prudent course of action for the proposed project, as it would amount to failure to initiate any further improvements and impede economic development. Table 22 presents details of impacts in two scenarios (i) "with project" and (ii) "no-project".

Table 22: Overview of positive and negative impacts in two scenarios: (i) with project and (ii) no-project impacts

Sl.No	Impacts in "Project" Scenario		Impacts in "No-Project"Scenario	
	Positive	Negative	Positive	Negative
1	▶ Reduction in wastage of fuel and in emissions	▶ Minor changes in	Nil	▶ Increase in travel time.

	from the vehicles, as the movement of trucks is expected to minimise with the improvement of Road No.11. ▶ The imporvements to Road No. 11 will also reduce the traffic congestion within Dhanbad. ▶ Smooth movement of commercial vehicles due to improved roads. ▶ Better level of service in terms of improved riding quality and smooth traffic flow. ▶ Reduction in accident rate. ▶ Reduction intransportation costs.	land use pattern ▶ Loss of structures and livelihood. ▶ Temporary loss of livelihood ▶ Short term increase in dust due to earth work during construction at micro-level.		▶ Increase in fuel consumption. ▶ Increase in dust pollution and vehicular emissions. ▶ Increase in accident rate. ▶ Further deterioration of the Road No. 11. ▶ Traffic congestion due to movement of trucks within the city.
2	▶ Better access to services. ▶ Improved quality of life.	▶ Increase in speed may lead to accidents in congested areas.	Nil	▶ Dust pollution. ▶ Bad road conditions delay access to services including emergency response services.
3	▶ Employment to local workers during the execution of the project.		Nil	▶ Overall slowing of economic growth.
4	▶ Strengthening of local economy.		Nil	▶ In absence of the project, it is extremely difficult to generate funds for such a massive improvement of the road infrastructure from its own resources.

4.2 Project alternative

87. With the finalisation of 'with project' scenario, the next level of analysis was carried out to decide the most feasible design which will have meet the design standards and will also have minimum environmental and social impacts. The project involves only upgradation of the existing infrastructure and does not involve construction of any structure. As per the recommendations provided by Indian Road Congress (IRC), higher Right of Way is needed for the proposed sub-project. However, several consultations have

been undertaken to avoid acquisition of additional land to ensure minimum negative impacts on the society and environment. Two design options with different cross-sections and facilities were considered before finalising the design. Both these options along with their proposed specifications have been detailed in **table 22** below.

Table 23: Alternatives considered

Option – I	The typical cross section comprises of a) RoW – 45 m b) Number of Lane – 4 c) Service Road – present d) Cycle Tracks – present
Option –II	The typical cross section comprises of a) RoW – 35 m b) Number of Lane – 4 c) Service Road – absent d) Cycle Tracks – absent

88. All the design options can have a range of environmental impacts that will require concomitant mitigation measures to ensure residual impacts are not significant. The advantage and disadvantage of Option - I and II from social and EHS point of view have been presented in Table 24.

89. Option I and Option II can have a range of social impacts both positive and negative. Although impact on Non-titleholders (258 PAH) is higher for the selected option 1, the advantages to the roadside communities will be more from pollution, safety and convenience point of view. The chosen option allows for segregation of slow moving traffic, from high speed vehicles and heavy vehicles such as trucks by providing for separate service lane, cycle lane and footpath along with street light facilities. The selected option will also lead to impact on 7 religious structures out of which three would require to be fully relocated.

90.

Table 24: Advantages and Disadvantages of Options considered for design of road

Option –I	Advantages: a) Service road have been considered under this alignment. The service road can be used as an alternative by local traffic police and road users who are vulnerable (such as bicycle riders/pedestrians) to the higher speeds and higher volume. b) Reduction in traffic congestion
	Disadvantages: a) The design will lead to relocation of 7 temples that are falling within the RoW b) Consent of locals are needed prior to relocation of the temples. Identification of land for relocation of templewill pose a challenge c) Approxiamate felling of 1560 trees

Option – II	Advantages: a) The temples present in the RoW will not need relocation, which may preserve the local sentiments b) No alternate land has to be identified for relocation of temple Disadvantages: a) During operation phase of the road, mass gathering may occur during festive season near the temple, which may lead to increase in accident rate. b) Absence of service road may expose vulnerable road users (bicycle riders/pedestrians) to the higher speeds and higher volume on the main road. This may pose a safety risk. c) Junction configuration designs may be compromised due to non-availability of RoW. d) Approxiamate felling of 1000 trees

91. Initial consultations undertaken as part of the project activities indicate that the relocation of temple can be possible. Option –I design have been considered for the ESIA.

5 ENVIRONMENTAL BASELINE

5.1 Introduction

92. This section presents the existing environmental baseline status of the sub-project area.

5.2 Area of Influence

93. The area of Influence is the area likely to be affected by the sub-project, including all its ancillary aspects, such as access roads, disposal areas, labour camps, as well as unplanned developments induced by the project (e.g. spontaneous settlement, logging, or shifting agriculture along access roads). The Direct Area of Influence (DAI) can be defined considering the geographical area that may be directly affected by the potential environmental impacts of a certain activity. The Indirect Area of Influence (IAI) can be defined as the geographical area that may be indirectly affected by the potential environmental impacts of a certain activity.

94. The Direct Area of Influence is the area directly affected by development of the road, and will be 50 m around the project components. Given that the sub-project crosses a number of urban settings, the socio-economic DAI also encompasses a portion of the population living around the project area. The indirect area of Influence of the project is areas which will receive residual impacts of the activities carried out within the direct area of Influence. This area is larger because the activities carried out in the project area will affect the neighbouring regions in terms of noise propagation, disturbance of fauna, physical impacts of soil removal, etc.

95. Since the project is in urban settings, the socioeconomic IAI comprises neighbouring human settlements to the project area, namely the communities living along the project area, the communities whose livelihoods, economy and income come from DAI and the communities using the same access roads that the project plans to use. **Table 25** below presents the criteria used to determine the DAI and IAI of this project.

Table 25: Criteria used to determine the DAI and IAI of this project

Aspect	Direct Area of Influence	Indirect Area of Influence
Land	Construction activities may affect 50 m around the construction areas	Construction activities may affect 100 m around the construction areas
Air Quality	Construction Activity may	Construction Activity may affect 500

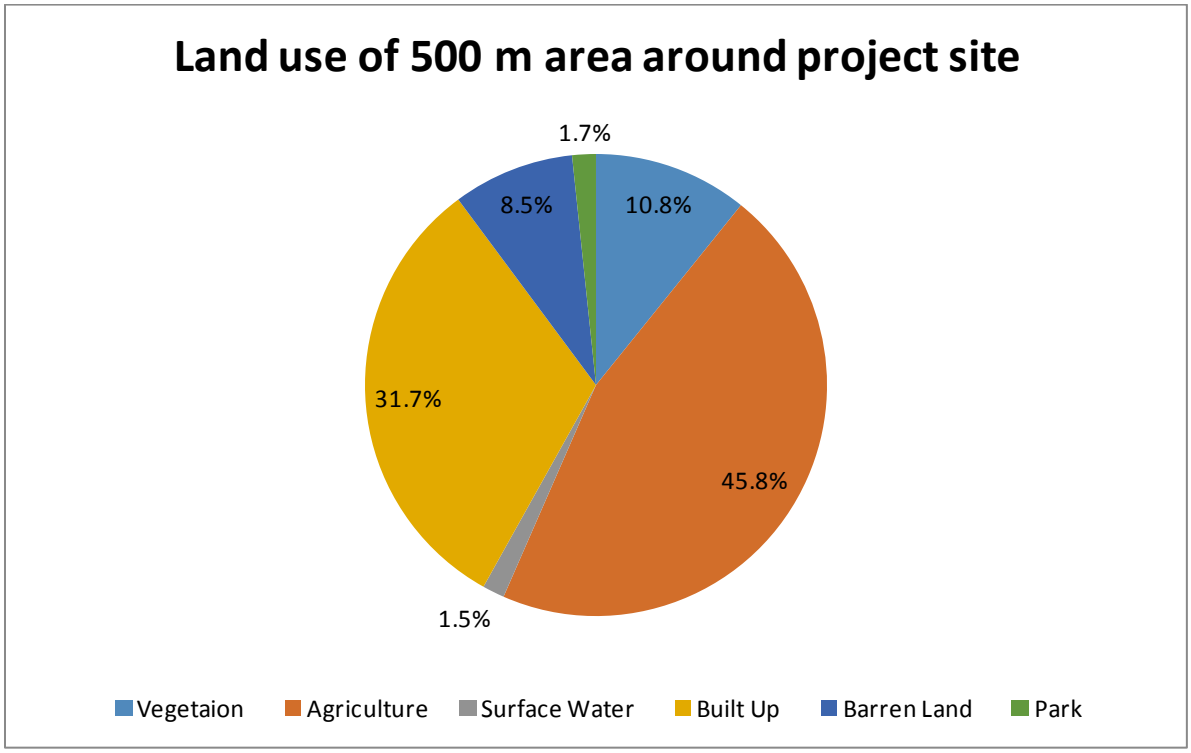
Aspect	Direct Area of Influence	Indirect Area of Influence
	affect air quality 100 m around the construction area	m around the construction area.
Noise	Construction activities may affect 500 m around the construction area.	Construction activities may affect 500 m around the construction area.
Water	Water bodies located within 50 m distance may be affected.	Water bodies located within 150 m distance may be afffected.
Biodiversity/Vegetation	Vegetation within the RoW will be directly impacted through clearance.	Terrestrial diversity within 1 km radius could be indirectly impacted.
Infrastructure (e.g. utilities, schools, hospitals, businesses, etc.)	Utilities within the RoW will be directly impacted during construction.	Users of the utilities, infrastructure and services that are directly impacted will be affected.
Cultural and religious properties	Temples and statues within ROW will directly be affected during construction	Construction activities may affect the accessabilityto temples within 200m from ROW
Economic activities (e.g. trade)	The area where the project will be developed, may imply compensations. Road hawkers, encroachers etc.	People conducting business along the DAI may lose income and livelihood from trade.

5.3 Land Environment

5.3.1 Land use

96. 45.8 percent of agricultural land is present500 malong the road stretch.Built up area along500 m of the proposed road is 10.8 percent. The land use along 500 m the proposed area has been presented in **Figure 10**.

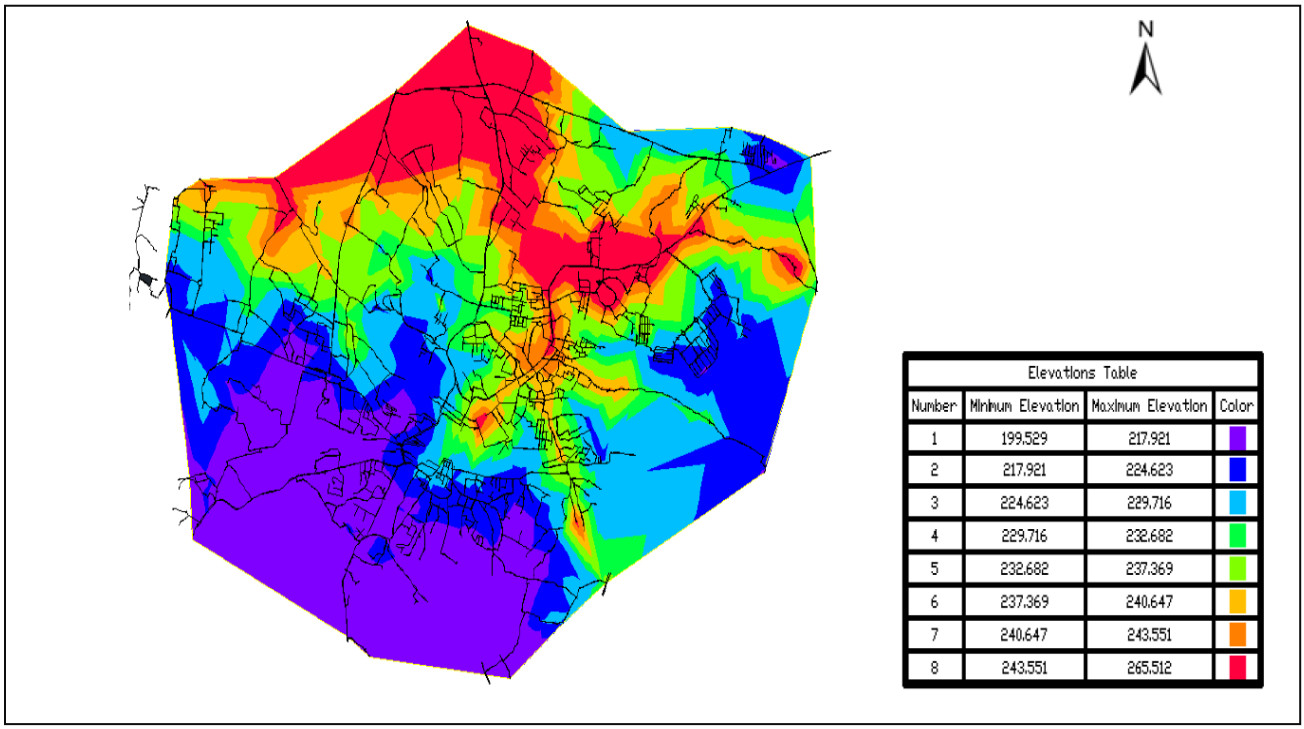
Figure 7:Land use along500 m of the proposed road project



5.3.2 Topography

97. The town is situated around National Highway-2 (NH-2) and National Highway-32 (NH-32). Dhanbad is famous for its coal mining and has some of the largest mines in India. The town slopes from Northwest to Southeast, with levels varying from 265.5m to 125m. Figure 8 presents the Digital Elevation Model (DEM) map of DMC.

Figure 8: DEM Map of Dhanbad



Source: DPR

5.3.3 Geology

98. Major portion of Dhanbad district is covered by metamorphic rocks. As per Jharkhand geological map.The study area include rock types of ChotaNagpur granite and gneisses of Achaean age. Below presents the geological map of the study are*a in Figure 12.*

99. ***Error! Reference source not found.***The main geomorphic features and landforms in the tudy area are as follows:

- Alluvial Plains: These are found near the river tracts and consist of gravels, sands, silt, clay etc.
- Pediplain (PM): These are developed over granite gneiss and Meta sediments. High frequencies of lineaments are found. These are found in Govindpur block and parts of Tundi block

5.3.4 Hydrogeology

100. Groundwater occurs in the area under unconfined condition in the weathered zones at shallow depths in most of the litho units in the Achaeans and almost all the litho units in the Gondwanas. Groundwater occurs under confined to semi-confined condition where the fractures are deep seated and are unconnected with the top weathered zone. Aquifer geometry-The aquifer geometry for shallow and deeper aquifer has been established

through hydro geological studies, exploration, the surface and subsurface geophysical studies in the district covering all geological formations. The aquifer can be divided into two zones – shallow and deeper aquifer.

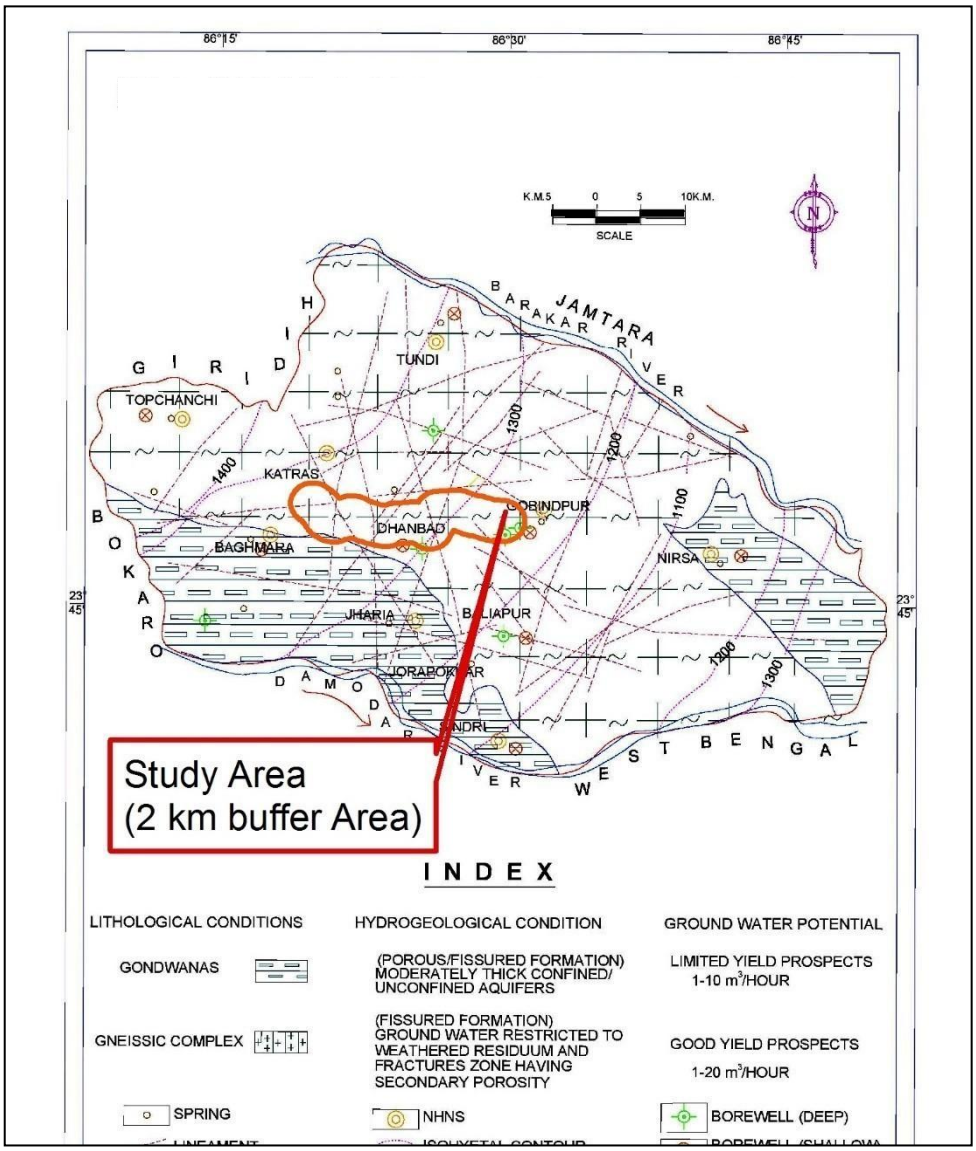
- **Shallow aquifer:** The shallow aquifers are being taped through dug wells, dug cum bore wells or shallow bore wells drilled to the depth of 60 m. The weathered mantle and shallow fractures constitute the shallow aquifers. The thickness of weathered mantle varies from 5 to 25 mbgl. The well inventory data suggest that the maximum depth of dug well in granite gneiss and Gondwana is 17 m and 25 m respectively. Exploration in granite gneiss indicates that shallow fractures are less productive. Many dug wells and hand pumps get dried up during summer.
- **Deeper aquifers**: Deeper aquifers depends on groundwater conditions. Groundwater conditions in various litho units are usually described under two broad heads:

a) *Porous Formations*: The main members of the porous formations are the Newer and Older alluvium of the Recent and sub-recent age. Recent alluvium is found in very thin veneers in topographic depressions along the Damodar River. Insignificant occurrences may also be noticed along Barakar River and in some major tributar of these two. They cannot however, be considered as potential aquifers.

b) *Fissured Formations*: Achaeans meta-sedimentary, the granites, intrusive metabasics and the Lower Gondwana sedimentary constitute the productive aquifer. The first three types are consolidated formation and the last one is a semi consolidated formation.

Figure 14below presents the Hydrogeological map of Dhanbad district showing the project area.

Figure 9: Hydrogeological map of Dhanbad district

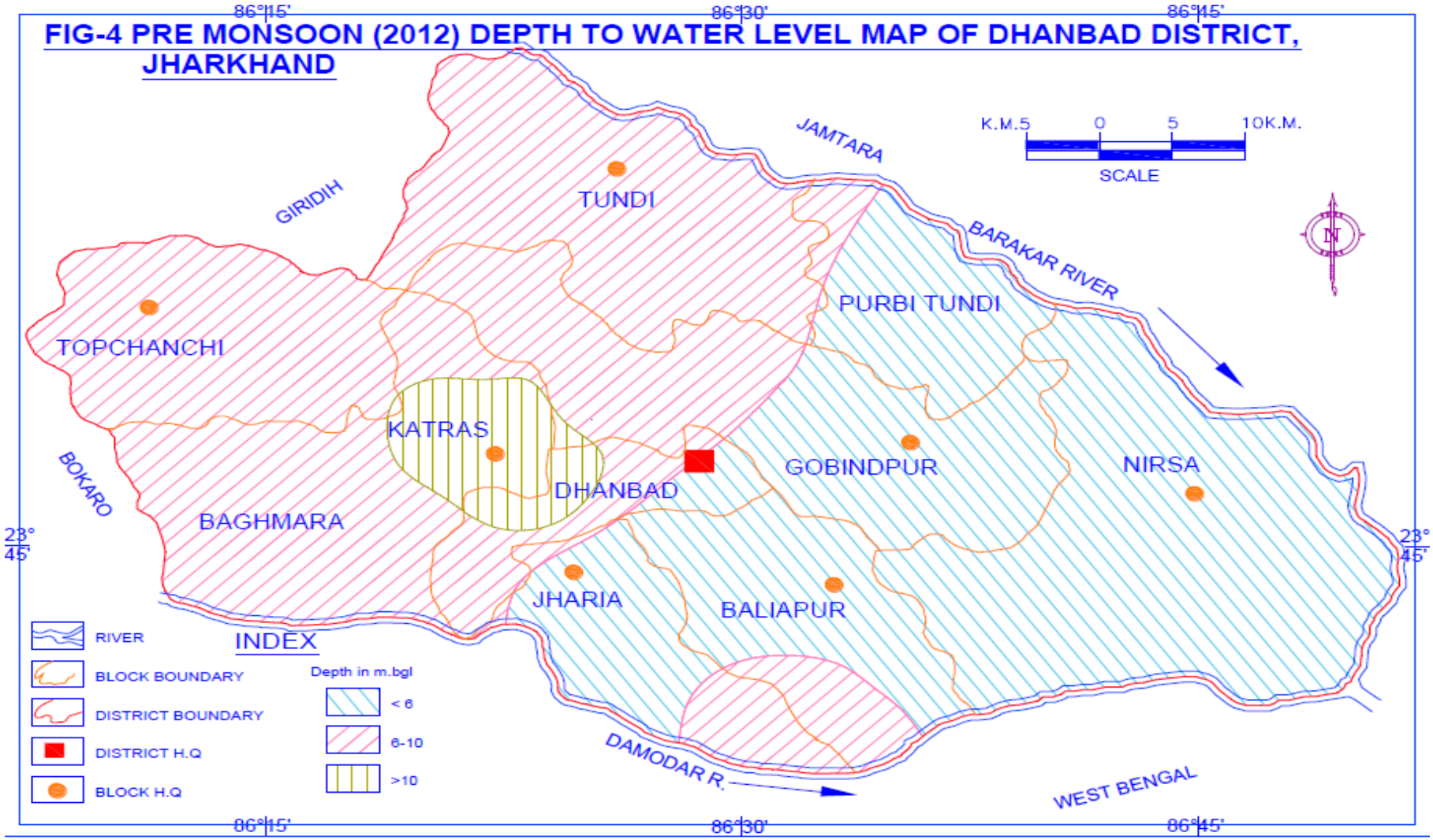


Source: CGWB

5.3.5 Ground Water Status

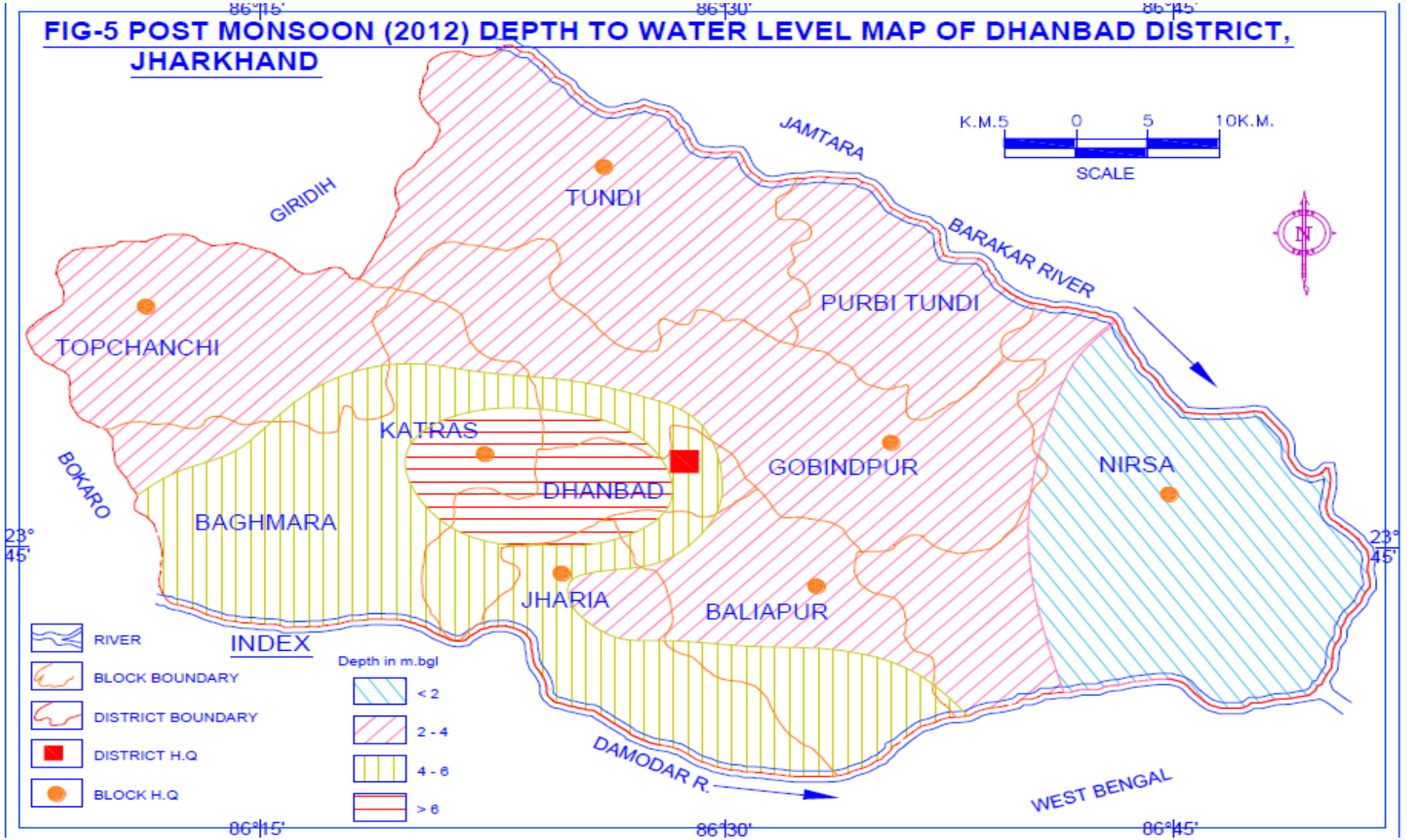
101. As per CGWB report of 2012-13, pre-monsoon depths to water level map of dug wells show water level between 1.29-14.60 mbglGovindpur, area which is 3 km from project site show water level between 8-10 mbgl. The seasonal ground water fluctuation map for dug well data is prepared based on the inventory wells of pre and post monsoon data. The map depicts that maximum (about 55 percent) area falls under 2-4m range while 20 percent area comes under 4-6m range and 20 percent area under 6-8 m. range while about 5 percent under 0-2 m range. Figure 10 and Figure 11 presents the pre-monsoon and post monsoon ground water depth of Dhanbad district.

Figure 10:Pre-monsoon ground water depth of Dhanbad



Source: CGWB

Figure 11: Post-monsoon ground water depth of Dhanbad



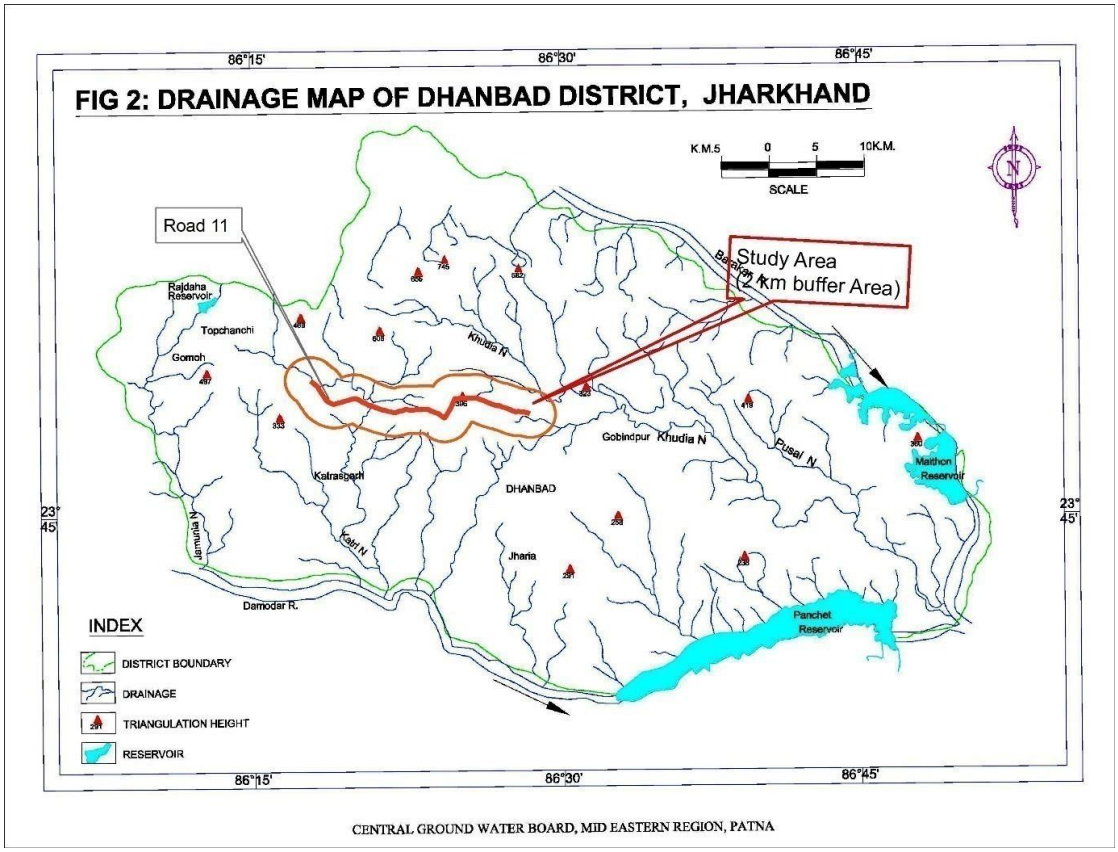
Source: CGWB

5.4 Surface water bodies & cross drainage

102. The drainage system of the district is the part of Damodar sub-basin. All the rivers that originate or flow through the district have an easterly or south easterly course. In the project area, River Katriflows from west to east in the project area. The drainage of the project site is first order. The drainage mapof the study area is presented in **Figure 12**.Around 7 surface water bodies (ponds) are present within the 150-m radius of the project area.

S.No	Name of the Surface Water Body	Cordinates	Area (Ha)	Distance from Centre Line	Direction from Centre Line	Uses
1	Near Jamuatand	23.83131N, 86.31617E	0.91	114 m	LHS	Used by communities for washing clothes, bathing and chaat puja
2	Near Ganduba	23.8268 N, 86.34376 E	0.15	67 m	RHS	Used by communities for washing clothes, and chaat puja
3	Near Mount Litera Zee School	23.819372 N, 86.366494 E	0.03	52 m	RHS	Used by communities for washing clothes, and chaat puja
4	Near Bhuli	23.819216 N, 86.375878 E	0.93	39 m	RHS	Used by communities for washing clothes, bathing and chaat puja
5	Near Studio Masum	23.818738 N, 86.406281 E	0.23	135 m	RHS	Used by communities for washing clothes, bathing and chaat puja
6	Near velatanr	23.82823 N, 86.44466 E	0.53	140 m	LHS	Used by communities for washing clothes, and chaat puja
7	CCWO colony	23.82377 N 86.46795 E	2.54	86.4	RHS	Used by communities for washing clothes, bathing and chaat puja

Figure 12: Drainage map of study area



5.5 Natural Hazard

5.5.1 Seismicity

103. The Dhanbad district falls in Zone III as per the revised seismic map of India (IS:1983-2002). The Zone III having moderate damage risk zone and vulnerable to earthquakes of intensity (MSK VII)according to Building Materials and Technology Promotion Council's (BMTPC) Vulnerability Atlas.

5.5.2 Floods

104. The Dhanbad district does not fall under area liable to floods.As reported by DMC, the flood prone areas in Dhanbad town are few low lying areas located in Ward No. 25, 26, 28 and 29. River Khatri is a seasonal river and not prone to flood.The proposed road sub-project area is not in the flood prone area of Dhanbad.

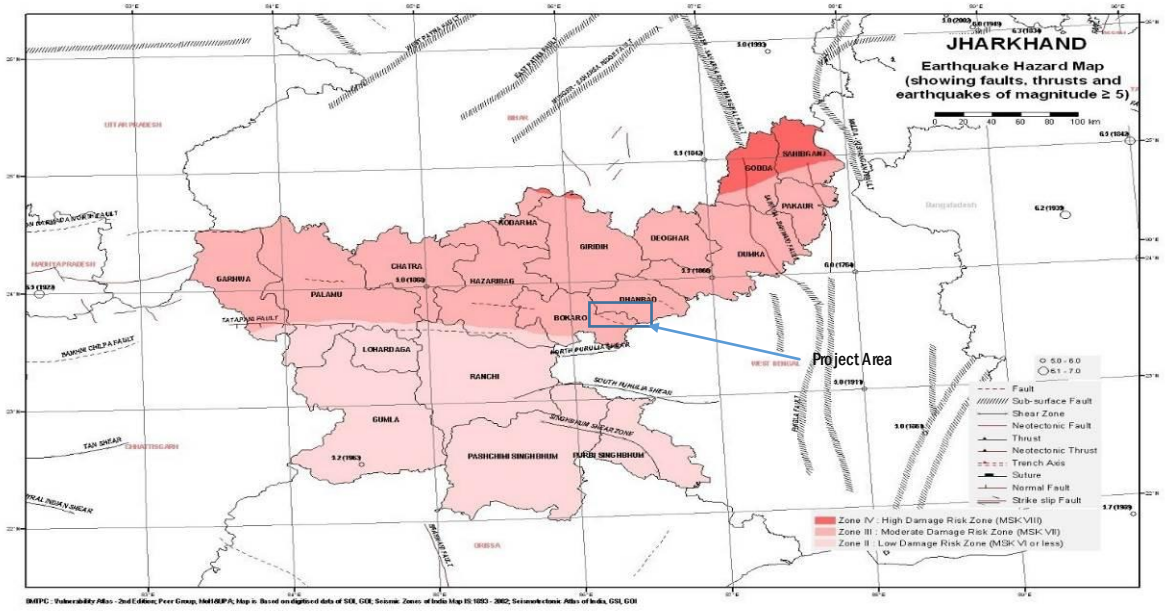
5.5.3 Wind Hazard

105. According to Wind Hazard Map of Jharkhand, eastern part of Dhanbad district falls under High Damage Risk Zone – B (V_b=47 m/s) and the western part of the district falls in in Moderate Damage Risk Zone – B (V_b=39 m/s).

106. The seismicity and wind hazard of the state of Jharkhand has been presented in

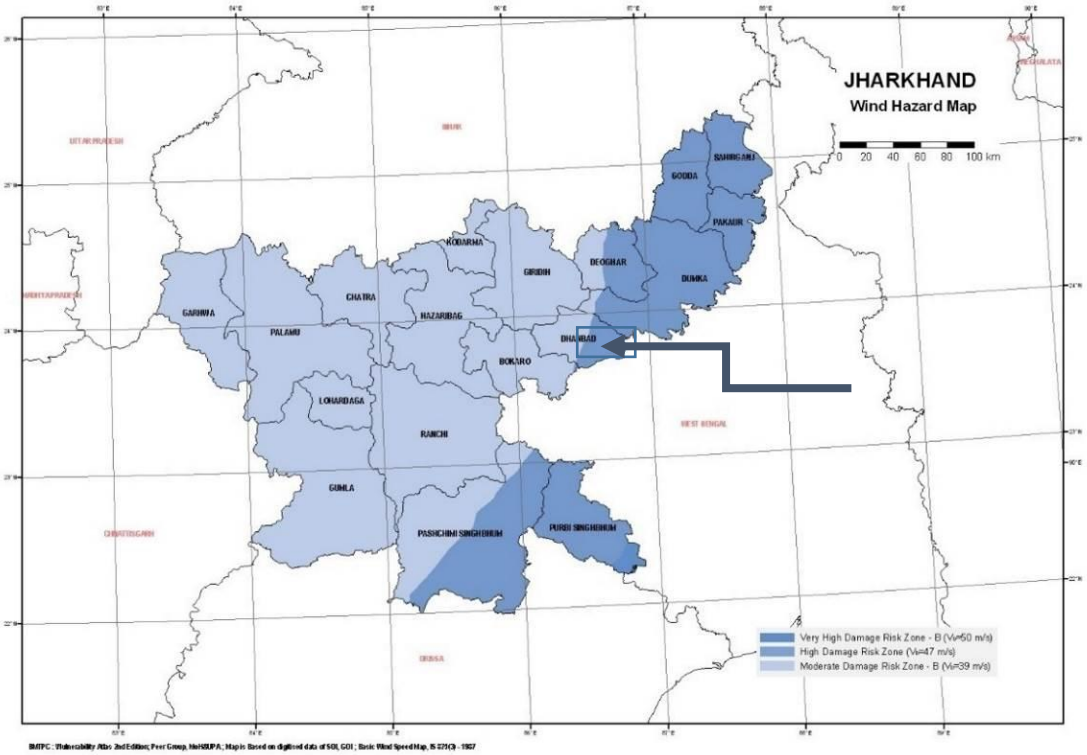
Figure 13 and Figure 14. Dhanbad city falls under seismic zone III, therefore the design of roads will be undertaken as per Indian Road Congress IRC 006: Standard Specifications and Code of Practice for Road Bridges, Section II – Loads and Stresses (IRC:6-2014) which incorporates design for areas with Seismic activity, in order to prevent damage to the road due to earthquake.

Figure 13: Earthquake Hazard Map



Source: BMTPC

Figure 14: Project area marked on Wind Hazard Map



Source: BMTPC

Project Area

5.5.4 Soil

107. Soil samples were collected from study area at two locations during March 2017.The details of the soil sampling locations are described Table 26and locations are shown in Figure 15.

Table 26: Soil Sampling Locations

Sl. No	Sampling Locations	Location Code	Geographical Coordinates		Land Use	Distance from centre Line	Remarks
			Latitude (N)	Longitude (E)			
1	Memco more	S 1	23.82519	86.46028	Agricultural Land	**73 m**	RHS of the Road
2	Kanko to vinodbiharichowk	S 2	23.83025	86.31647	Agricultural Land	**28 m**	LHS of the Road

Note: The soil samples at each location were collected from different depths of 0 to 15 cm (D-1), 15 to 30 cm (D-2), 30 to 60-cm (D-3) and 60 to 100cm (D-4) at each location).

108. Soil sampling locations were chosen based on site sensitivity and prevailing activities within 500m of study area. Samples were collected by hand driven sampling augers from surface at different depths.

109. The samples were packed in dependable, waterproof containers and analysed as per ASTM, USEPA IS: 2720, M.L. Jackson (Soil Chemical Analysis).

Figure 15: Soil Sampling Locations

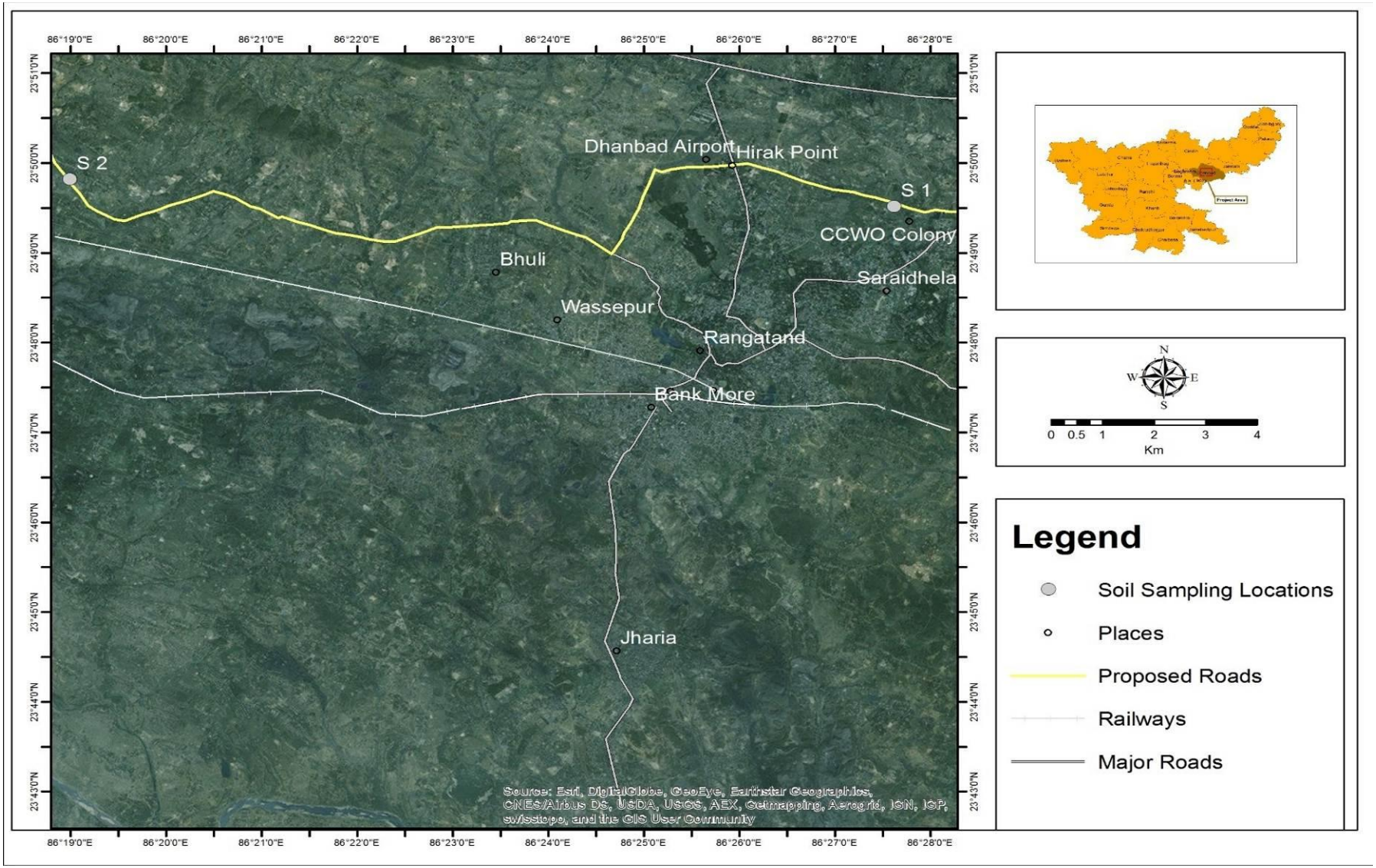


Table 27: Physio-Chemical Characteristics of Soil of Road No 11

Sl. No.	Parameter & Unit		Method	Unit	Sampling Location	
					S 1	S 2
1	Texture	Sand	International pipette method	%	69	70
		Silt		%	3.6	6.9
		Clay		%	27.4	23.1
2	Porosity		Stochastic method	%	15.5	20.6
3	Bulk Density		Weighing bottle method	g/cm3	1.3	1.4
4	Water holding capacity		Saturation moisture percentage	%	72	75
5	pH		Electrometric method	--	7.7	6.9
6	Conductivity		Electrometric method	mho/cm	126	143
7	Magnesium		Titrimetric method	meq/100gm	5.1	5.2
8	Calcium		Titrimetric method	meq/100gm	4.3	6.9
9	Alkalinity		Titrimetric method	%	17	9
10	Chloride		Mohr's titration method	mg/l	14.2	13.9
11	Sodium		Direct air acetylene flame method	ppm	70.4	60.3
12	Potassium		Direct air acetylene flame method	ppm	6.9	5.7
13	Organic carbon		Walkely& black method	%	0.41	0.27
14	SAR		Specific absorption rate	meq/l	32.47	24.52
15	Nitrogen		Alkaline permanganate method	Kg/ha	298	187
16	Salinity		Electrometric method	Kg/ha	29.5	42.5

110. The soil texture for all the locations were observed to be sandy clay loam. The clay percentage in samples varied from 23.1% and 27.4%. As per the standard soil classification as given in Table 28 soil sample S1 was observed to be neutral and S2 was observed to be slightly alkaline.

Table 28: Soil Classification

pH	Classification	Soil Samples
<4.5	Extremely acidic	
4.51-5	Very strong acidic	
5.01-5.5	Strongly acidic	
5.51-6	Moderately acidic	
6.1-6.5	Slightly acidic	
6.51-7.3	Neutral	S1
7.31-7.8	Slightly alkaline	S2
7.81-8.5	Moderately alkaline	
8.51-9.00	Strongly alkaline	
>9	Very strongly alkaline	

Source: http://www.esf.edu/pubprog/brochure/soilph/soilph.htm

5.6 Air Environment

5.6.1 Climate and Micro-meteorology of the study area

111. The climate of the study area is classified as tropical monsoon climate with following four main seasons:

- Winter season: January and February
- Pre-monsoon season: March to May
- Monsoon season: June to September
- Post monsoon Season: October to December

IMD Meteorological Data

112. The secondary data on surface meteorology based on IMD data for ambient temperature, atmospheric pressure, relative humidity and wind speed at Dhanbad observatory is summarised in Table 29.

Table 29: Climatology of Dhanbad: Ambient Air Temperature, Relative Humidity, Vapour Pressure and Wind Speed

Month	Temperature (Mean daily in °C)				Relative Humidity in %		Vapour Pressure (hPa)		Wind Speed
	Max Daily	Min Daily	Highest	Lowest	8:30 hrs	17:30 hrs	8:30 hrs	17:30 hrs	In km/hr
Jan	25.4	6.7	29.0	10.5	65	48	12.0	12.6	5.3
Feb	28.3	13.0	33.4	8.6	57	40	12.4	12.7	6.6
March	33.6	17.6	38.4	13.1	48	32	14.1	13.3	5.8
April	37.9	21.9	42.4	17.5	51	32	19.3	15.9	6.6
May	38.1	23.4	43.4	18.4	64	43	25.8	21.2	6.7
June	35.2	23.9	41.8	20.8	77	65	30.3	28.0	6.8
July	31.7	23.2	35.6	21.3	87	80	31.6	31.3	6.9
August	31.2	23.0	34.2	21.0	88	82	21.3	31.3	6.3
Sept	31.4	22.5	34.5	20.4	85	78	30.1	29.8	6.0
Oct	31.3	19.6	34.1	15.9	75	67	24.4	24.6	4.3
Nov	29.0	15.1	32.1	11.4	65	57	17.1	17.6	3.9
Dec	25.6	10.8	28.9	7.5	64	52	12.7	13.2	4.4
Avg	**31.6**	**18.7**	**44.5**	**6.3**	**69**	**56**	**21.8**	**21.0**	**5.8**

IMD, 2012

Table 30: Climatology of Dhanbad: Rainfall, Cloud amount and Weather Table

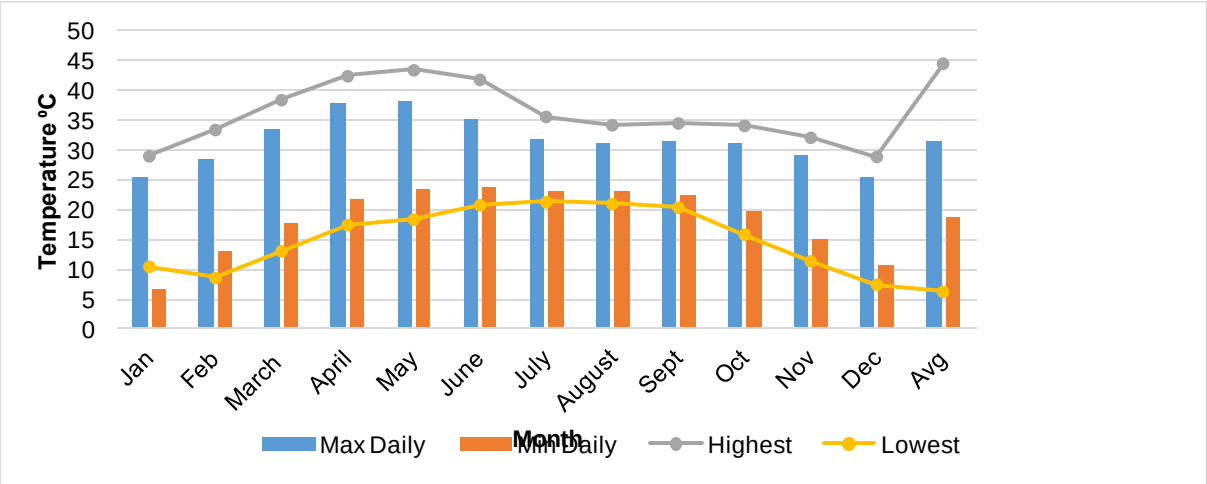
Month	Rainfall (mm)			Cloud Amount (Oktas)		Weather Phenomena					
	Monthly Total	Avg. No of rainy days	Max - 24 hourly	All Clouds		Average Number of days with					
				8:30 hrs	17:30 hrs	PPT (0.33 mm or more)	Hail	Thunder	Fog	Dust Storm	Squall
Jan	11.9	1.2	42.9	1.0	1.1	1.8	0.0	0.4	0.0	0.0	0.0
Feb	24.9	1.7	90.6	1.3	1.5	2.9	0.1	0.9	0.0	0.0	0.0
March	23.5	2.2	48.2	1.3	1.6	3.2	0.1	2.2	2.5	0.0	0.0
April	25.2	2.4	42.6	1.8	2.0	3.5	0.1	3.3	1	0.2	0.0
May	62.1	4.3	93.0	2.4	3.0	5.9	0.1	4.4	0.1	0.2	0.0
June	235.4	11.8	173	5.0	5.6	14.2	0.1	6.0	0.1	0.1	0.0
July	367.9	18	198.1	6.4	6.6	21.9	0.0	5.5	0.3	0.0	0.0
August	325.7	16.9	272.0	6.1	6.2	20.6	0.0	4.5	0.2	0.0	0.0
Sept	282.4	11.6	234.0	4.6	5.2	15.7	0.0	4.5	0.4	0.0	0.0
Oct	109.1	4.6	183.1	2.2	2.4	6.0	0.0	1.5	0.4	0.0	0.0
Nov	9.0	0.9	89.4	1.0	1.2	1.3	0.0	0.1	2.4	0.0	0.0
Dec	7.5	0.6	39.4	0.8	0.8	0.8	0.0	0.0	4.6	0.0	0.0
Average				2.8	3.1						
Total	1484.6	76.2				97.8	0.5	33.2	21.1	0.5	0.0

IMD, 2012

Temperature

113. The monthly temperature variation is shown in Figure 16.As per the data recorded at meteorological station, Dhanbad, the temperature begins to increase from March till June. April and May are the hottest months with highest temperature of 38.1°C recorded in May month. The lowest temperature of 7.5 °C was recorded in month of December. The daily mean minimum temperature varies from 6.7 °C in January to 23.9 °C in June, whereas the daily mean maximum temperature varies from 25.4°C in January to 38.1°C in May.

Figure 16: Monthly Temperature Variation



Relative Humidity

114. The mean relative humidity in different months is shown in Figure 17**.** The relative humidity is generally high during the period of monsoon from June to October. It is about 69% during morning hours and 56% during evening hours. The minimum humidity of 48% is recorded in March and maximum relative humidity of 88% is experienced in August. Maximum 24 hourly rainfall is shown in Figure 18**.** The annual average rainfall in the region is about 1484.6mm spreading over 76.2 days. Maximum rainfall occurs during month of July (367.9 mm) and minimum during the month of December (7.5 mm).

Figure 17: Relative Humidity

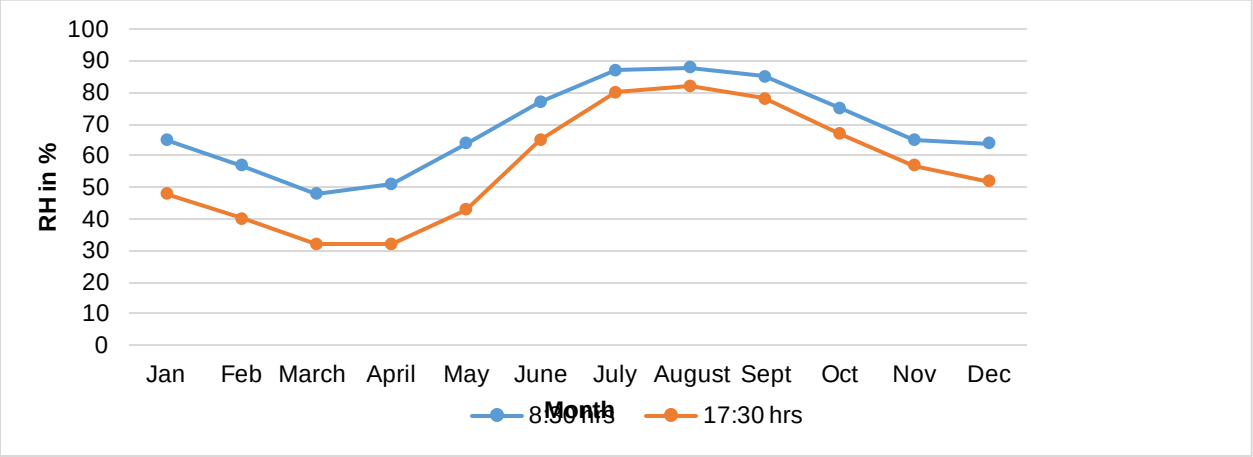
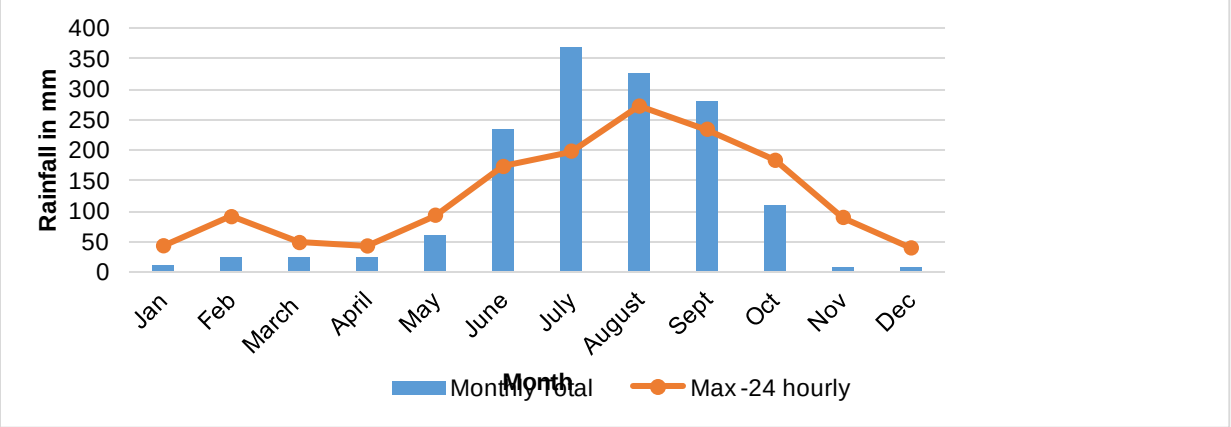


Figure 18: Rainfall Details



Cloud Cover

115. Coud cover ranges from5 oktasto 6.6 oktas in the monsoon period from June to September.

Wind Speed/Direction

116. The mean wind speed is recorded to be highest in the month of June at 10.8 kmph and lowest in the month of December at 7.1 kmph. The predominant wind direction is recorded to be from East and West during the summer season (March – May), West duringthe monsoon season (June – September), East and Calm during post monsoon season (October-November) and winter season (December – February). Wind direction details as per IMD for the period recorded at Dhanbad meteorological station has been presented in **Table 31**.

Table 31: Wind Direction

Month	Morning Time Predominant Wind			Evening Time Predominant Wind		
	I	II	III	I	II	III
January	Calm	NW	W	Calm	NW	NE
February	Calm	NW	W	Calm	NW	SE

March	Calm	NW	W	Calm	NW	SE
April	Calm	SE	W	Calm	NW	SE
May	SE	Calm	SW	SE	Calm	NW
June	SE	Calm	SW	SE	Calm	NE
July	Calm	SE	SW	Calm	SE	SW
August	Calm	SE	NE	SE	Calm	NE
September	Calm	SE	NE	SE	Calm	NW
October	Calm	SE	NE	Calm	SE	NW
November	Calm	NW	NE	Calm	NW	NE
December	Calm	NW	W	Calm	NW	NE

5.6.2 Ambient Air Quality

117. A total of seven monitoring locations representing residential, high traffic zone and commercial setup were selected to determine air quality levels within the study area. The locations of the monitoring stations were based on preliminary analysis of the meteorological conditions, particularly predominant/frequent wind directions. Logistical considerations such as accessibility, security, availability of reliable power supply, etc., were also considered while finalizing the locations of AAQM stations. Details of the AAQM stations are summarized in Table 32.

Table 32: Description of Ambient Air Quality Monitoring Stations

Sl.No.	Station Code	Coordinates		Location Description	Distance from Centre line	Remarks
		Latitude	Longitude			
1	AAQ1	23.81864	86.37097	Nagribua, bhuli	23	Residential area in LHS of road no 11
2	AAQ2	23.82619	86.31917	Yogeshwar More, Kanko more	13	Residential area in LHS of road no 11
3	AAQ3	23.82172	86.3880	Abhinov Bharti Public School	20	Residential area in RHS of road no 11
4	AAQ4	23.82183	86.41397	Near asarfi Hospital	20	Hospital area in LHS of road no 11
5	AAQ5	23.828994	86.448826	Near Residential, Hirak road	18	Residential area in RHS of road no 11
6	AAQ6	23.83258	86.42439	Nagnagar, Dhanbad	27	Residential area in LHS of road no 11
7	AAQ7	23.83353	86.43225	Sri Ram Hospital, Herak road	12	Residential area in RHS of road no 11

118. The ambient air quality monitoring (AAQM) was in first week of March for each of the locations on a 24-hours schedule. The equipment was kept in open space away from vegetation and the height of samplers monitoring was kept in range of 3 – 5 m. Monitoring was done as per the Guidelines for Ambient Air Quality Monitoring, National Ambient Air Quality Series NAAQMS/25/2003-04 for the following parameters:

- Respirable Suspended Particulate Matter (RSPM/ PM_{10})
- Fine particulate Matter (FPM/ $PM_{2.5}$)
- Sulphur Dioxide (SO_x)
- Nitrogen Dioxide (NO_x)

119. For the collection of samples for PM_{10}, SO_x and NO_x, Respirable Dust Samplers (RDS – APM 460 BL) (make: Envirotech) along with gaseous sampling impingers were used. For the collection of $PM_{2.5}$, Fine Particulate Sampler (Model APM 151), make Envirotech was used. Sulphur Dioxide (SO_2) was collected by drawing air through absorbing solution of sodium tetrachloromercurate (EPA modified West &Gaeke Method) and NO_2 was collected by drawing air through the mixture of absorbing solutions of sodium hydroxide and sodium arsenite (Na-Arsenite modified Jacobs &Hochheiser Method). The measurement for both SO_2 and NO_2 was done colorimetrically. All the analyses were carried out as per IS-5182.

Results of AAQM are presented in **Table 33**.

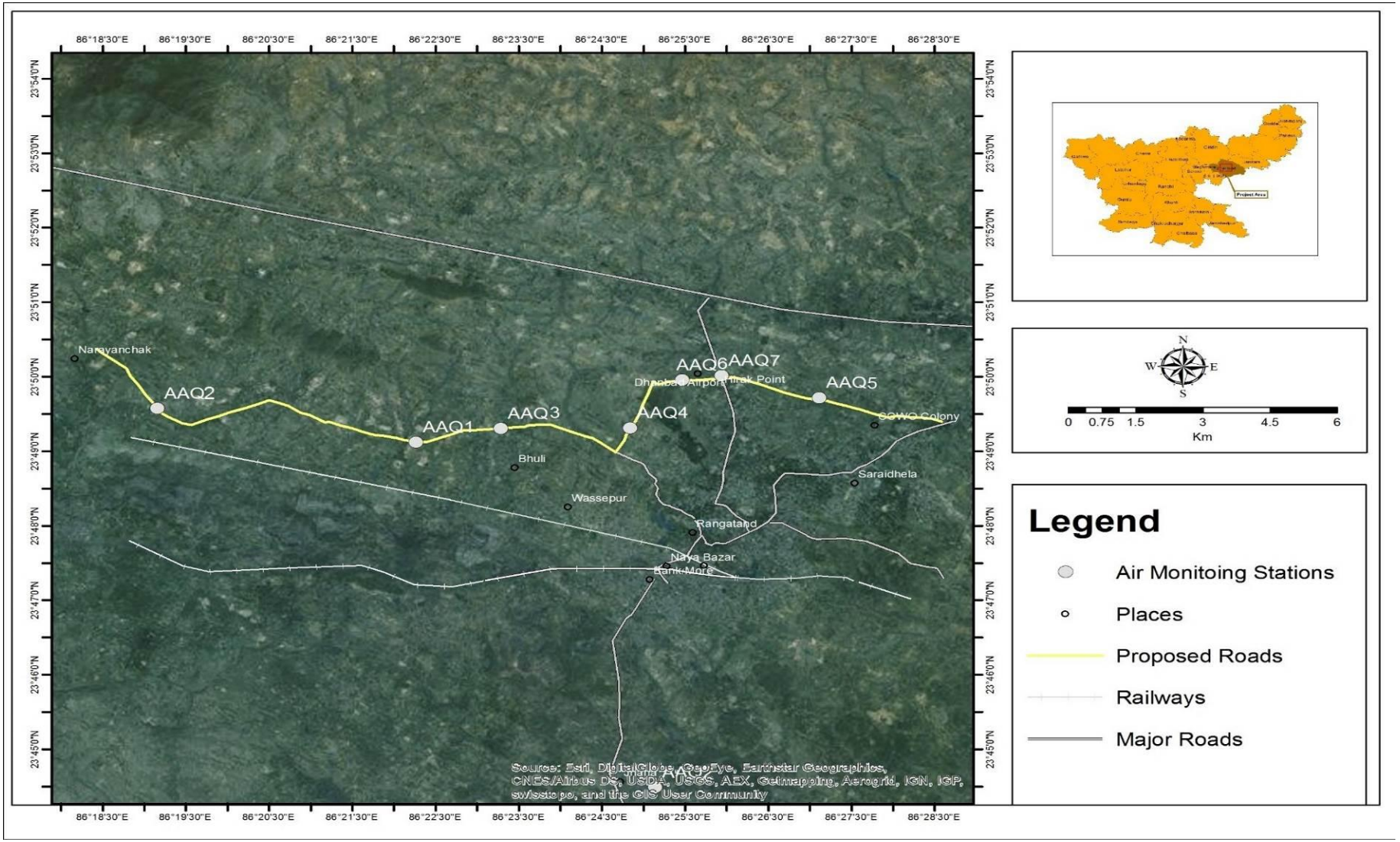
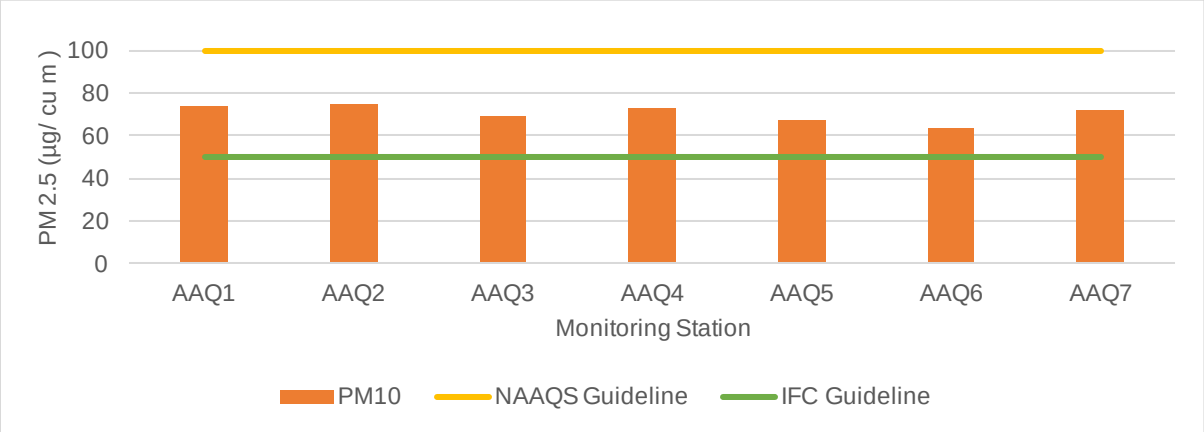


Figure 19: Air Monitoring Locations

Table 33: Ambient Air Quality Monitoring Result(in µ g/cu m.)

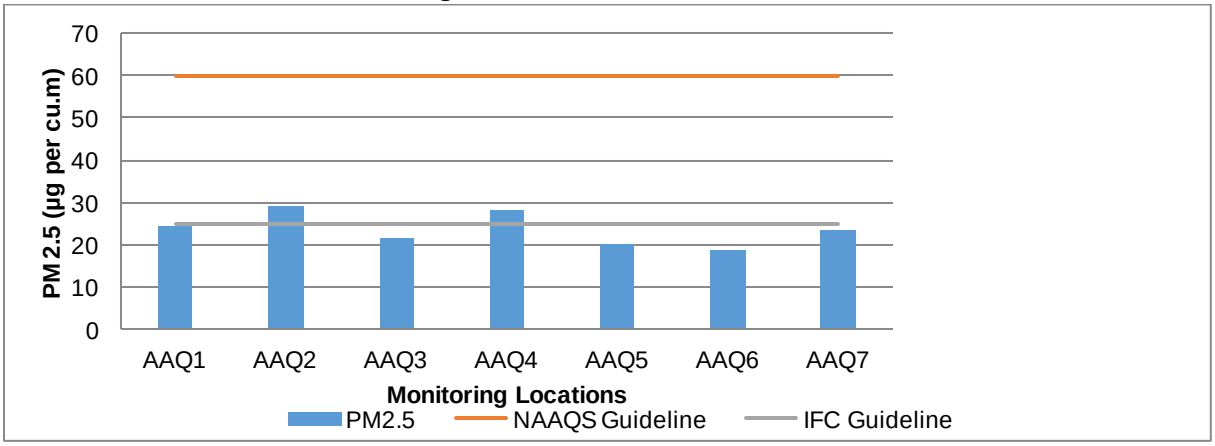
Sl. No	Monitoring Locations	PM_{10}	$PM_{2.5}$	SO_x	NO_x
1	AAQ1	74.31	24.63	13.43	27.53
2	AAQ2	75.39	29.41	17.41	29.15
3	AAQ3	69.75	21.56	15.43	30.23
4	AAQ4	73.35	28.43	17.43	28.54
5	AAQ5	67.32	20.12	11.43	23.63
6	AAQ6	63.41	18.54	11.46	21.43
7	AAQ7	72.13	23.41	12.76	23.41
NAAQS Standard		**100**	**60**	**80**	**80**
IFC Guideline		**50**	**25**	**20**	**200(1 hour)**

Figure 20: PM_{10} observation



120. As observed from Figure 20, PM_{10} was observed to be in range from 63.41(AAQ-6) to 75.39 µg/cu.m (AAQ-2).The higher value observed may be due to clearing, operation of diesel engines, demolition, burning, brick kiln & coke oven industries (present within 2 -3 km radius of the project site)

Figure 21: $PM_{2.5}$ observation



121. $PM_{2.5}$ was observed to be in range of 18.54(AAQ-6) to 29.41(AAQ-2) µg/cu.m. The higher value observed may be due to high traffic movement in congested roads in this location. SO_x was observed to be in range of 11.43(AAQ-5) to 17.43µg/cu.m (AAQ-4). NOx was observed to be in the range from 21.43(AAQ-6) to 30.23 µg/cu.m (AAQ-3).

5.7 Noise Environment

122. To assess the background noise levels in the study area, ambient noise monitoring was conducted. Noise monitoring was carried out at seven locations within the study corridor were in Table 34.

Table 34: Description of Ambient Noise Quality Monitoring Stations

Sl. No.	Station Code	Coordinates		Distance from Centre Line	Location Description	Remarks
		Latitude	Longitude			
1	N-1	23.8189	86.3710	16	Denobili school, nagribua, bhuli	Represents noise level at Residential area in LHS of road no 11
2	N-2	23.8263	86.3193	25	Yogeswar more, chhiradevisarawati vidhyamandir, bhuli	Represents noise level at Residential area in LHS of road no 11
3	N-3	23.8217	86.388	23.8	Abhinov Bharti public school, bhuli	Represents noise level at Residential area in RHS of road no 11
4	N-4	23.8218	86.4138	20	Near Asarfi Hospital, bhuli	Represents noise level at Hospital area in LHS of road no 11
5	N-5	23.831625	86.4243167	55	Missionaries charity, Bhuli	Represents noise level at Residential area in RHS of road no 11
6	N-6	23.8329	86.4325	12	Sri ram Hospital, Bhuli	Represents noise level at Residential area in RHS of road no 11
7	N-7	23.8284	86.4485	30	Near Residential Hirak Road , Hirak road	Residential area in RHS of road no 11

123. The map showing the noise monitoring locations have been presented in Figure 22.

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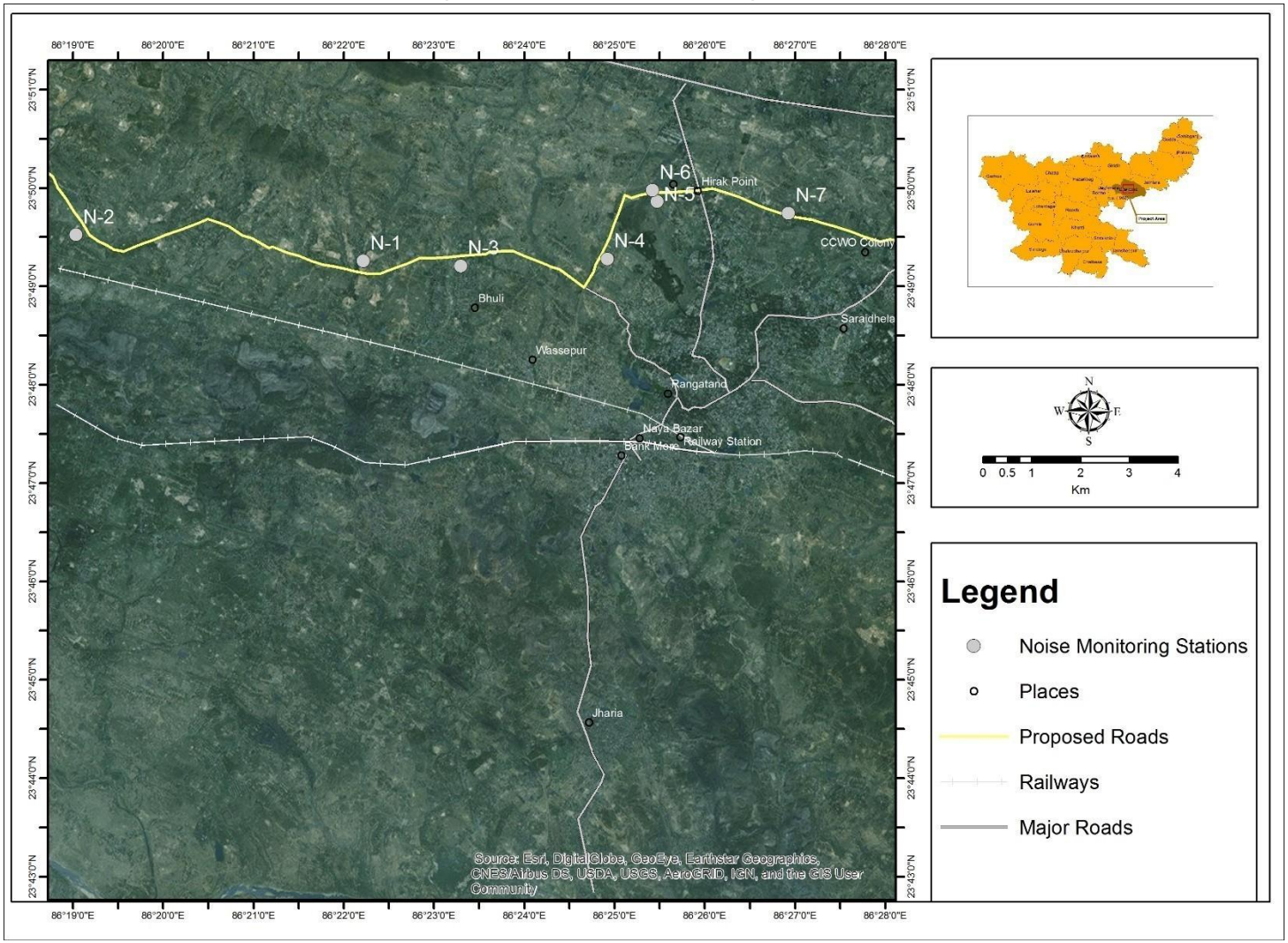
Figure 22: Noise Monitoring Location



124. The summarized noise level data, recorded, is presented in**Table 35**.

Table 35: Summarized noise level data

		Leq (dBA)		Day Time (dBA)		Night Time (dBA)			
Location Code	**Location**	**Day**	**Night**	**Max.**	**Min.**	**Max.**	**Min.**	**Noise Standard –Day Time (IFC & CPCB) db (A)**	**Noise Standard – Night Time (IFC & CPCB) db (A)**
N 1	Denobili school, nagribua, bhuli	66.7	54.9	73.3	58.8	59.6	45.7	**50**	**40**
N 2	Yogeswar more, chhiradevisarawatividhyamandir, bhuli	63.6	55.8	67.9	54.6	58.6	47.5	**55**	**45**
N 3	Near Abhinov Bharti public school, bhuli	70.8	61.9	74.7	68.8	67.3	42.8	**50**	**40**
N 4	Near Asarfi Hospital, bhuli	68.6	52.2	70.3	59.1	55.2	48.4	**50**	**40**
N 5	Missionaries charity, Bhuli	52.5	41.9	63.8	48.9	44.8	37.5	**55**	**45**
N 6	Sri ram Hospital, Bhuli	63.7	52.5	67.8	53.5	56.2	38.6	**50**	**40**
N 7	Near ResidenrtialHirak Road, Hirak road	44.8	42.1	48.3	40.2	43.9	36.8	**55**	**45**

125. The day time equivalent noise level reckoned from 0600 to 2200 hours (Leq day) varied from 44.8 to 70.8 dB(A) while night time equivalent noise level reckoned from 2200 to 0600 hours varied from 42.1 to 61.9 dB(A). The day time equivalent noise levels (Leq Day) and night time equivalent noise levels (Leq Night) monitored were found to be higher than the prescribed norms of CPCB at all locations except at N-7.

5.8 Water Environment

126. Parameters for analysis of water quality were selected based on the utility of the particular source of water as per CPCB guidelines. The quality of groundwater was compared with IS: 10500-2012 for drinking purposes. Grab water samples were collected from locations in 5 litre sampling bottles and 250 ml sterilized clean glass/pet bottles for complete physio-chemical and bacteriological analysis respectively. The samples were analysed as per standard procedure/method given in IS: 3025, IS: 1622 and Standard Method for Examination of Water and Wastewater Ed.20, published jointly by American Public Health Association (APHA) and American Water Works Association (AWWA). Total 6water samples were collected for this sub-project on basis of sensitivity of receptor. The details of the water sampling locations are provided in Table 36.

Table 36: Water Sampling Locations

Id	Location	Code	Latitude (N)	Longitude (E)	Type	Direction from Centre Line	Distance from Centre Line (m)	Remakrs
1	Golbuilding more, Hirak road	GW 1	23.82306	86.47658	Ground Water	RHS	42	Bore well used by residence
2	CCWO colony	SW 1	23.82377	86.46795	Surface – Water-Pond	RHS	86.4	used by local community for washing clothes, bathing, and puja during duringChatt (festive season)

3	Birsamundachowk, Jamuatand	SW 2	23.83131	86.31617	Surface Water-Pond	LHS	114	used by local community for washing clothes, bathing, and puja during duringChatt (festive season)
4	Katri River	SW 3	23.83707	86.30969	Surface Water—Katri River	RHS	50	Flows through the project site
5	Ganduba	SW 4	23.8268	86.34376	Surface Water-Pond	RHS	67	used by local community for washing clothes, bathing, and puja during duringChatt (festive season)
6	Near velatanr	SW 5	23.82823	86.44466	Surface Water-Pond	LHS	140	used by local community for washing clothes, and puja during duringChatt (festive season)

5.8.1 Ground water Quality

127. The ground water quality analysis of the samples in the study area is given in **Table 37**.

Figure 23: Water Monitoring Location

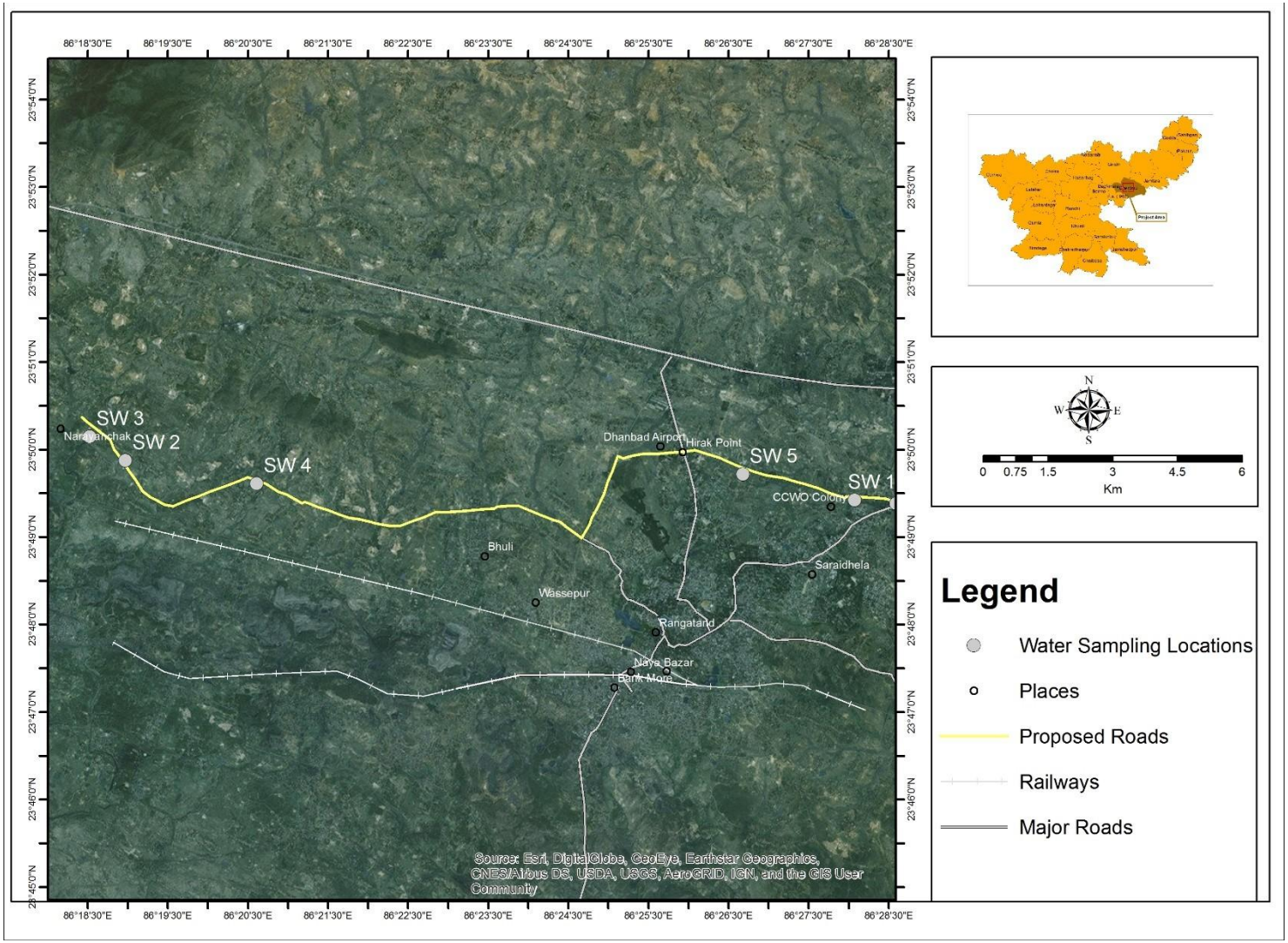


Table 37: Groundwater Analysis Result

Sl. No.	Parameters	Unit	Method	GW 1	IS: 10500, 2012 Acceptable Limit	IS: 10500, 2012, Permissible Limit
1	pH value	--	APHA 4500 H+ B	6.9	6.5-8.5	No relaxation
2	Temperature	0C	APHA 2550 B	24.8		
3	Conductivity	µs/cm	APHA 2510 B	1413		
4	Total Dissolved solid	mg/l	APHA 2540 C	774	500	2000
5	Total suspended solid	mg/l	IS 3025 (P-17)	54.3		
6	Alkalinity	mg/l	IS 3025 (P-23)	254	200	600
7	Hardness	mg/l	IS 3025 (21)	662	200	600
8	DO	mg/l	IS 3025 (38)	1.3		
9	COD	mg/l	IS 3025 (58)	11.4		
10	Calcium	mg/l	IS 3025 (P-40)	246.4	75	200
11	Magnesium	mg/l	APHA 3500 Mg B	11.2	30	100
12	Chloride	mg/l	IS 3025 (P-32)	161.4	250	1000
13	Sulphate	mg/l	IS 3025 (P-24)	18.3	200	400
14	Nitrate	mg/l	APHA 4500 NO3-B	30.2	45	No relaxation
15	Fluoride	mg/l	APHA 4500 F (C)	0.4	1	1.5
16	Copper	mg/l	APHA 3111 B	ND[4]	0.05	1.5
17	Iron	mg/l	APHA 3111 B	0.02	0.3	No relaxation
18	Manganese	mg/l	APHA 3111 B	ND	0.1	0.3
19	Phenols	mg/l	IS 3025 (P-43)	ND	0.001	0.002
20	Mercury	mg/l	APHA 3114 B	ND	0.001	No relaxation
21	Cadmium	mg/l	APHA 3111 B	ND	0.003	No relaxation
22	Selenium	mg/l	APHA 3111 B	ND	0.01	No relaxation
23	Arsenic	mg/l	APHA 3112 B	ND	0.01	0.05
24	Lead	mg/l	APHA 3111 B	ND	0.01	No relaxation
25	Zinc	mg/l	APHA 3111 B	0.15	5	15
26	Total coliform	Cfu/100ml	APHA 9221 B	< 1.8	Shall not be detectable in any 100 ml sample	

[4]Detection Limits- Cu- 0.1 mg/l, Mn- 0.1 mg/l, Phenolic compound-0.001 mg/l, Mercury-0.002 mg/l, Cd-0.01 mg/l,As-0.003 mg/l, Pb-0.01 mg/l

128. The groundwater quality analysis of the sample in the study area is given in Table 37. pHofthe groundwater sample was found within the drinking water limits (6.5 to 8.5). TDS value of the groundwater sample was observed to be higher than the acceptable limit but was within the permissible limit. Both Hardness and Calcium are more than the permissible limit.

5.8.2 Surface water Quality

129. Parameters for analysis of surface water quality were selected based on the utility of the particular source of water as per MoEFCC guidelines. The quality of surface water was compared with IS: 10500-2012 for drinking purposes and against water quality criteria as per CPCB guidelines for aquatic resources Table 38. The surface water quality analysis of the samples in the study area is given below Table 39.

Table 38: Primary Water Quality Criteria for Designated-Best-Use-Classes

Designated-Best-Use	Class	Criteria
Drinking Water Source without conventional treatment but after disinfection	A	▶ Total Coliforms Organism MPN/100ml shall be 50 or less ▶ pH between 6.5 and 8.5 ▶ Dissolved Oxygen 6mg/l or more ▶ Biochemical Oxygen Demand 5 days 20^{o}C 2mg/l or less
Outdoor bathing (Organized)	B	▶ Total Coliforms Organism MPN/100ml shall be 500 or less ▶ pH between 6.5 and 8.5 ▶ Dissolved Oxygen 5mg/l or more ▶ Biochemical Oxygen Demand 5 days 20^{o}C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	▶ Total Coliforms Organism MPN/100ml shall be 5000 or less ▶ pH between 6 to 9 ▶ Dissolved Oxygen 4mg/l or more ▶ Biochemical Oxygen Demand 5 days 20^{o}C 3mg/l or less
Propagation of Wild life and Fisheries	D	▶ pH between 6.5 to 8.5 ▶ Dissolved Oxygen 4mg/l or more ▶ Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	▶ pH between 6.0 to 8.5 ▶ Electrical Conductivity at 25oC micro mhos/cm Max.2250 ▶ Sodium absorption Ratio Max. 26 ▶ Boron Max. 2mg/l
	Below-E	▶ Not Meeting A, B, C, D & E Criteria

Source: Central Pollution Control Board

Table 39: Surface Water Quality Monitoring Result

S. No.	Parameters	Unit	Method	Monitoring Location					IS: 10500, 2012 Acceptable Limit	IS: 10500, 2012, Permissible Limit
				SW 1	SW 2	SW-3	SW-4	SW-5		
1	pH value	-	APHA 4500 H+ B	7.6	6.9	7.9	7.6	6.9	6.5-8.5	No relaxation
2	Temperature	^{0}C	APHA 2550 B	24.6	24.7	26	26	27		
3	Conductivity	µs/cm	APHA 2510 B	656	603	760	1372	1544		
4	Total Suspended solid	mg/l	IS 3025 (P-17)	61	37	74	79	69		
5	Alkalinity	mg/l	IS 3025 (P-23)	172	260	304	294	346	200	600
6	Hardness	mg/l	IS 3025 (21)	224	242	396	402	560	200	600
7	DO	mg/l	IS 3025 (38)	5.6	7.2	4.0	6.0	5.6		
8	BOD	mg/l	IS 3025 (44)	3.9	2.9	2.8	3.2	3.6		
9	COD	mg/l	IS 3025 (58)	41.8	30.4	36	44	56		
10	Nitrate	mg/l	APHA 4500 NO^3-B	2.5	2.1	4.6	4.8	5.4	45	No relaxation
11	Phosphate	mg/l	IS 3025 (P-31)	0.61	0.13	0.64	0.52	0.71		
12	Chloride	mg/l	IS 3025 (P-32)	66.5	233.7	110	178	226.9	250	1000
13	Sulphate	mg/l	IS 3025 (P-24)	6.9	6.2	8.8	7.9	8.4	200	400
14	Sodium	mg/l	APHA 3111 B	51.4	39.5	23	57.5	40.3		
15	Potassium	mg/l	APHA 3111 B	4.15	2.81	2.1	5.6	3.8		
16	Calcium	mg/l	IS 3025 (P-40)	22.3	17.9	80	76	104	75	200
17	Magnesium	mg/l	APHA 3500 Mg B	52.8	67.2	47.6	51.5	72.9	30	100
18	Silica	mg/l	IS 3025 (P-35)	2.9	3.9	3.8	4.0	4.0		
19	Oil & Grease	mg/l	IS 3025 (P-39)	4.9	4.1	5.2	5.2	5.6		
20	Phenolic compound	mg/l	IS 3025 (P-43)	ND[5]	ND	ND	ND	ND	0.01	0.02

[5]Detection Limits- Cu- 0.1 mg/l, Mn- 0.1 mg/l, Phenolic compound-0.001 mg/l, Mercury-0.002 mg/l, Cd-0.01 mg/l,As-0.003 mg/l, Pb-0.01 mg/l,Cr-0.1mg/l

S.	Parameters	Unit	Method	Monitoring Location					IS: 10500,	IS: 10500,
21	Residual Sodium carbonate	meq/l	By calculation	0.13	ND	0.07	0.09	0.1		
22	Lead	mg/l	APHA 3111 B	ND	ND	ND	ND	ND	0.01	No relaxation
23	Boron	mg/l	APHA 3111 B	ND	ND	ND	ND	1.6	0.5	1.0
24	Arsenic	mg/l	APHA 3112 B	ND	ND	ND	ND	ND	0.01	0.05
25	Mercury	mg/l	APHA 3114 B	ND	ND	ND	ND	ND	0.001	No relaxation
26	Cadmium	mg/l	APHA 3111 B	ND	ND	ND	ND	ND	0.003	No relaxation
27	Chromium +6	mg/l	IS 3025 (P-52)	ND	ND	ND	ND	ND		
28	Total Chromium	mg/l	APHA 3111 B	ND	ND	ND	ND	ND		
29	Copper	mg/l	APHA 3111 B	ND	ND	ND	ND	ND	0.05	1.5
30	Zinc	mg/l	APHA 3111 B	0.31	0.17	0.29	0.38	0.42	5	15
31	Iron	mg/l	APHA 3111 B	0.05	0.01	0.08	0.10	0.13	0.3	No relaxation
32	Total coliform	Cfu/100ml	APHA 9221 B	210	1600	350	210	1600		

130. It has been observed pH for all the surface water samples was found within the drinking water limits (6.5 to 8.5) as promulgated by Bureau of Indian Standards (IS: 10500).BOD was observed to be less than 3mg/l in SW2 and less than 4 mg/l in SW-1. DO level was observed more than 6mg/l in SW-2 and less than 6 mg/l in SW-1(5.6 mg/l)

131. Faecal coliform and total coliform was present in all the water samples indicating human or animal faecal contamination in the surface water.

132. Surface water sample collected from SW-2 & SW-3 can be classified as below 'Class B' (Outdoor bathing), SW-4 and SW-5 can be classified as Class- C (Drinking water source after conventional treatment and disinfection) and SW-1 can be classified as Class D (Propagation of Wild life and Fisheries).

5.9 Terrestrial Ecology

133. The details of the flora present which are directly impacted (transplanted/ felling) has been presented in Table 40. Around 8322 trees are directly impacted having variable girth in the project area (this is presented in Annex XIV). The most pre- dominant tree present in the project area is *Acacia spp* (around 1958 nos.) followed by Cassia Spp. (around 1075 nos.) and *Tectona grandis(around 1224 nos.).* There are various types of fruit bearing trees, predominantly*Mangifera indica*and *Artocarpus heterophyllu.* Around 417 nos. of trees are fruit bearing which are present in the direct area of incluence (DAI) within the 45m RoW. A detailed avenue plantation and median plantation scheme has been prepared, where possible, cutting of trees will be minimised and the existing ones will be integrated into the avenue lay-out plan with proper planning.

Table 40:Flora in the Study Area

Scientific Name	Common Name	Kingdom	Family	Genus
Leucaena leucocephala	Subabul	Plantae	Fabaceae	Leucaena
Melia azedarach	Bkain	Plantae	Meliaceae	Melia
Eucalyptus sp	Eucalyptus	Plantae	Myrtaceae	Eucalyptus
Tectona grandis	Teak	Plantae	Lamiaceae	Tectona
Acacia sp	Khair	Plantae	Fabaceae	Acacia
Cassia fistula	Amaltas	Plantae	Fabaceae	Cassia
Terminalia Arjuna	Arjun	Plantae	Combretaceae	Terminalia
Mangifera indica	Mango	Plantae	Anacardiaceae	Mangifera
Emblica officinalis	Amla	Plantae	Phyllanthaceae	Phyllanthus
Tamarindus indica	Emli	Plantae	Fabaceae	Tamarindus
Albizzia lebbek	Siris	Plantae	Fabaceae	Albizia
Syzygium cumini	Jamun	Plantae	Myrtaceae	syzygium
Butea Monosperma	Palash	Plantae	Fabaceae	Butea
Dalbergia sissoo	Shisham	Plantae	Fabaceae	Dalbergia
Neolamarckia cadamba	Kadam	Plantae	Rubiaceae	Neolamarcl
Artocarpus heterophyllus	Kathal	Plantae	Moraceae	Artocarpus
Azardirachta indica	neem	Plantae	Meliaceae	Azadirachta
Aegle marmelos	bael	Plantae	Rutaceae	Aegle
Daibergia latifolia	Satisal	Plantae	Fabaceae	Dalbergia
Albizzia	sirises	Plantae	Fabaceae	Albizia
Zizophus jujube	baer	Plantae	Rhamnaceae	Ziziphus
Bauhinia variegate	Kachnar	Plantae	Fabaceae	Bauhinia
Bauhinia purpuraca	Kaniar	Plantae	Leguminosae	Phanera
Ricinus communis	Arandi	Plantae	Euphorbiaceae	Ricinus
Carissa opaca	Jungli Karonda	Plantae	Apocynaceae	Carissa
Anona squamosal	Sarifa	Plantae	Annonaceae	Annona
Nyctanthes arbor-tristis	Parijat	Plantae	Oleaceae	Nycatanthe
Ziziphus oenoblia	Siyaar ber	Plantae	Rhamnaceae	Ziziphus
Jatropha curacas	Sarpgandha	Plantae	Euphorbiaceae	Jatropha
Ziziphus nummularia	Jhad baer	Plantae	Rhamnaceae	Ziziphus
Tararix dioica	Lal Jhau	Plantae	Tamaricaeae	Tamarix
Cassia siamea	Chakundi	Plantae	Caesalpiniaceae	Cassia
Ocimum sanctum	Tulsi	Plantae	Lamiacae	Ocimum

134. The fauna reported in vicinity of the project area has been presented in the table below.As per forest department records, none of the fauna species falls under endangered/vulnerable or near threatened category by IUCN.*Macacamulatta* (monkey) is the most predominant species reported near the projectarea.The IUCN status of all the species reported near the project site are present in thetable.

Scientific Name	Common Name	Class	Phylum	Class	Order	Family	IUCN Status
Presbytia entellus	GrayLangur	Animalia	Chordata	Mamillia	Primates	Cercopithecidae	Least concern
Macacamulatta	Monkeys	Animalia	Chordata	Mamillia	Primates	Cercopithecidae	Least concern
Hemiechinusauritus	long-eared hedgehog	Animalia	Chordata	Mamillia	Eulipotyphla	Erinaceidae	Least concern
Suncusmurinus	Asian House Screw	Animalia	Chordata	Mamillia	Eulipotyphla	Soricidae	Least concern
Cynopterus sphinx	Short-Nosed Fruit Bat	Animalia	Chordata	Mamillia	Chiroptera	Pteropodidae	Least concern
Pteropusginganteus	Indian Flying fox	Animalia	Chordata	Mamillia	Chiroptera	Pteropodidae	Least concern
Herpestesedwardsi	Indian grey mongoose	Animalia	Chordata	Mamillia	Carnivora	Herpestidae	Least concern
Canisaureus	Golden Jackal	Animalia	Chordata	Mamillia	Carnivora	Canidae	Least concern
Vulpesbengalensis	Indian Fox	Animalia	Chordata	Mamillia	Carnivora	Canidae	Least concern
Funambulus pennant	northern palm squirrel	Animalia	Chordata	Mamillia	Rodentia	Sciuridae	Least concern

Bandicotabengalensis	lesser bandicoot rat	Animalia	Chordata	Mamillia	Rodentia	Muridae	Least concern
Bubulcus obis	Cattle Erget	Animalia	Chordata	Aves	Pelecaniformes	Ardeidae	Least concern
Nettarufina	Red-crested pochard	Animalia	Chordata	Aves	Anseriformes	Anatidae	Least concern
Elanuscaeruleus	black-winged kite	Animalia	Chordata	Aves	Anseriformes	Accipitridae	Least concern
Milvusmigrans	Black Kite	Animalia	Chordata	Aves	Accipitriformes	Accipitridae	Least concern
Bungarusfasciatus	Banded krait	Animalia	Chordata	Reptilia	Squamata	Reptilia	Least concern

5.10 Cultural property

135. A total of 2 statues and 7 religious structures are presentalong the alignment of the road. Table 41presents the list and the details pertaining to the management of physical and cultural resources is presented in Annex XIII

Table 41: List of temples and statues present along the alignment of the road.

S No.	Chainage	Side	Type of Structure	Age (years)	Significance	Location	Distance from Existing Centerexisting Centre Line (Mt)
1	00+000	Left	TilkaMajhiStatue	20	Statue of a freedom fighter	Within RoW	14
2	00+900	Left	Shaheed ManindraNath Mandal Statue	10	Local political leader	Within RoW	9.79
3	00+000	Left	Hanuman Temple	15	Place of community worship	Within RoW	12.33
4	00+700	Left	Kali Temple	12		Within RoW	21.93
5	00+900	Left	Newly built Temple	0.5		Within RoW	9.93
6	02+700	Right	Temple at Ganduba	8		Within RoW	6.17
7	07+100	Right	Hanuman Temple	22		Within RoW	10.93
8	09+500	Left	Hanuman Temple	16		Within RoW	7.68
9	11+000	Right	Hanuman Temple	9		Within RoW	7.32

6 SOCIAL-ECONOMIC PROFILE OF PROJECT IMPACT AREA

This section outlines the social profile of the project impact area in terms of demography, livelihood, health and infrastructure.

6.1 Project Impact Area

136. A socio-economic profile of Dhanbad is based on data from secondary documents such as Census 2011, ULB record and other published reports and studies wity an objective to understand the socio-economic background of the project area.

137. In addition, a Census Survey was undertaken during Jan - March, 2017 with an objective of gathering first-hand information on the following:

- Household characteristics, including social, economic and demographic profile
- Identification of non-titleholders
- Categorization and measurements of potential loss
- Inventory of affected assets
- Physical measurements of the affected assets/structures
- Assessment of potential economic impact, including temporary loss.

138. The census survey covered 100% structures affected within the proposed Right of Way (ROW) as per the Corridor of Impact (CoI) of the DPR and drawings provided.

6.2 Socio-Economic profile

139. Dhanbad District is situated in the state of Jharkhand and lies between 23°37'3" N and 24°4' N latitude and between 86°6'30" E and 86°50' E longitude. Dhanbad district was constituted in 1956 by carving out the old Dhanbad subdivision Chas and Chandankiyari police stations of the Sadar subdivision of the erstwhile Manbhum district. Dhanbad is Police district since 1928. The re-organisation of the districts in the State of Bihar which took place after 1971 did not affect the district of Dhanbad. Dhanbad district is bounded on the west by Giridih and Bokaro on the north by Giridih and Dumka and on the east and south by Purulia district of West Bengal. According to the 2011

census Dhanbad district has a population of 2,682,662. The district has a population density of 1,284 inhabitants per square kilometre (3,330/sq mi).

Total Population and Population Growth Rate

140. As per Census 2011, total population of the Dhanbad district is 26.85 lakh. A population of 11,62,472 (11.63 Lakh) comes within Dhanbad Municipal Corporation. The population growth of Dhanbad district is 11.99% as per Census 2011.

Schedule Caste and Schedule Tribe Population

141. The Schedule Caste (SC) and Schedule Tribe (ST) population of Dhanbad district is considerabley high. The total ST population is 2.33 lakh and SC population is 4.37 lakh. The population coming under Dhanbad Municipal Corporation also has a high percentage of SC population followed by ST. The total SC population in DMC is 1.9 lakh followed by 0.23 lakh population falling in ST category.

Sex Ratio

142. The Sex Ratio of Jharkhand is 948 and of Dhanbad district is only 908. Dhanbad district has seen a slight improvement in sex-ration in the last one decade as the sex ratio has increased from 874 in 2001 to 908 in 2011.

Literacy Rate

143. Dhanbad district has a literacy rate of 74.52% which is higher than the State literacy rate of 66.41%. 83.81% of males and 64.29% of females of Dhanbad district is literate.

Workforce Participate Rate

144. As per Census 2011, the total worker population was around 31.46% while the rest 68.54% comprised non-worker population. In 2011, out of the total population, about 8,44,504 persons were engaged in work or business activities. As per Census of India, worker is defined as person who does business, job, service, and cultivator and labor activity. Of total 8,44,504 working population, 5,46,714 were engaged in Main Work while 2,97,790 of total workers were engaged in Marginal Work in 2011.

Economic Profile of the Study Area

145. Dhanbad is the only district in the state where the non-agricultural population out numbers the agricultural population. Agriculture in the district is mainly rain fed and comprises mono-crop practice which makes economy of district more dependent on coal mining and allied activities. Employment in mining industry, allied enterprises, industrial enterprises of public are the main economic activities in the district. Coal mining activity continues to guide the regional economy. At present, there are 112 coal mines operating in the district which totally produce 26.70 million metric tones of coal annually of a total value nearly Rs. 7,000 million. Therefore, Dhanabd has significant importance in state and national economy. Coal Mining activity directly employs nearly 180,000 workers in the district, which is as much as 25-30% of the total workers in the district.[6]

Basic Infrastructure Service

146. As per Census, 2011, there are 14 hospitals within Dhanbad Municipal Corporation (DMC) with 1270 number of beds. Apart from hospitals, there are 24 Dispensaries, 24 Health centers and 10 Family Welfare Centers.

Education Facilities

147. There are good number of educational institutes within DMC. There are 239 Primary schools, 165 middle schools, 72 Senior schools and 33 Senior secondary school. The number of college is also quite significant (13 colleges). (Source: District Census Handbook, Dhanbad, 2011).

Sanitation and Civic amenities

148. In Jharkhand entire population does not have access to safe drinking water & sanitation. Rural sanitation coverage is very low. About 30% of habitations have partial facility with drinking water. All habitations do not have safe drinking water as source contains Fluoride, Arsenic & Iron.
The programs such as Accelerated Rural Water Supply Programme (ARWSP), Swajaldhara and Total Sanitation Campaign were launched in serving the rural

[6] Official website, Dhanbad district (http://dhanbad.nic.in/undp_DDMP.html)

population with water and sanitation related services all across the State. The sanitation facility in Dhanbad is much higher than the rest of the state.

6.3 Town Management

149. As of 2011 census, it is the second most populous district of Jharkhand (out of 24), after Ranchi. Dhanbad is the administrative headquarters of Dhanbad district and also the headquarters of DMC (Dhanbad Municipal Corporation). The overall administrative supervision and responsibility of the district remain with the Deputy Commissioner of the district.DMC was formed as per the State Government Notification dated 1/02/06 with merger of areas Jharia NAC, Sindri, NAC, Chhatandih NAC, Katras NAC. Dhanbad city elects one Member of Parliament. Also some part of the district comes under Giridih seat of Lok Sabha and there are six Legislative Assembly seat. Dhanbad has District court and Labour Court-Industrial tribunal.

7 PUBLIC CONSULTATION

7.1 Identification of Stakeholders and Methods for Consultation

150. Consultation during project preparation as an integral part of the environment and social assessment process not only minimizes the risks but involves the public as stakeholders in project preparation process, promotes public understanding of the project and leads to timely completion of the project. The ESMP prepared also incorporates the views of the project beneficiaries and Project Affected Persons (PAPs) in the design of the mitigation measures and a management plan.

151. The specific aims of the consultation process were to:

- Provide clear and accurate information about the project to the beneficiary community;
- Obtain the main concerns and perceptions of the public and their representatives regarding the project
- Obtain opinions and suggestions directly from the impacted communities on their preferred mitigation measures; and
- Identify local leaders with whom further dialogue can be continued in subsequent stages of the project.
- Improve project design and, thereby, minimize conflicts and delays in implementation
- Increase long term project sustainability and ownership

152. The primary stakeholders that were identified for the Dhanbad Road project NCB 01 and NCB 02 are the PAPs and the direct beneficiaries. The secondary stakeholders include other individuals and groups, with an interest in the project, viz., the ULBs, other line departments, etc. The stakeholders identified, the social survey methods followed for collecting primary data and also disclosure of the project are depicted in the table below.

Table 42: Stake holders identified and methods used

Category of respondent	Type of respondents	Survey method
Primary		
Citizens	Citizens' consultation in each Ward	Focus Group Discussion (FGD)- gender disaggregated as possible
Government and other Stakeholders	▶ Jharkhand Urban Infrastructure Development Company Ltd (JUIDCO); ▶ Principal Secretary, Urban Development & Housing Department, Government of Jharkhand ▶ Ministry of Railways, Dhanbad Division; ▶ The World Bank ▶ Dhanbad Municipal Corporation ▶ Land Revenue Department ▶ Coal India ▶ Bharat Coking Coal Limited (BCCL) ▶ Tata Steel, Mining Division, Dhanbad. ▶ State Electricity Department, Dhanbad ▶ Health Department. (District Hospital Dhanbad) ▶ PHED, Dhanbad ▶ PWD Roads, Dhanbad ▶ Drinking water and sanitation department, Dhanbad ▶ Sewerage Department, Dhanbad ▶ Forest Department, Dhanbad ▶ Police Department, Dhanbad ▶ Irrigation Department, Dhanbad ▶ Airport Authority, Dhanbad ▶ National Highway Authority of India.(NHAI)	Meetings / FGDs/ Depth Interviews
Private and community Stakeholders	▶ Members of Vendor Committee at GoI Building Chowk. ▶ Educational institutions on the side of the Road in NCB 1. ▶ Local Clubs on the side of the road at NCB 1 and NCB 2. ▶ Other offices ▶ Social Organization	Meetings / FGDs/ Depth Interviews
Secondary		

Category of respondent	Type of respondents	Survey method
All Wards/ both side of the Road within the PIA	Residents and Commercial Entities of the PIA who are not impacted	Socio-economic quantitative (semi structured) questionnaire
Identified Ward/s	Households who would directly affected both physically and economically, due to construction of the road as per the Census of India	Census

Role of Primary Stakeholder

A. PAPs

- Participate in public meetings and identify alternatives to avoid or minimise displacement
- Participate in census survey
- Provide inputs to entitlement provisions, thus assisting in preparation of the resettlement action plan
- Participate in grievance redress as members of grievance redressal cells (GRC)
- Decide on relocation and management of common properties

B. Beneficiaries

- Provide inputs to site selection
- Identify possible conflict areas with PAPs
- Manage the procedure of relocation of common property such as temples, statue etc. and identify site for relocation of the structure, if required.
- Participate in local committees meetings

Role of Secondary Stakeholder

A. JUIDCO

- Establish separate cell for environment and social development
- Design and approve resettlement policy from World Bank and the other appropriate authorities
- Coordinate with line departments such as, JSPCB, Water Resource Board, telephone department , State Electricity Board, and Forest Department for shifting of utilities and cutting of trees]
- Participate in consultations with PAPs and beneficiaries
- Coordinate with local community for identifying land for relocation of common property resources

B. **ULBs:** The responsibilities of ULBs during the preparation and implementation phase are mentioned below:

Preparation Phase

a) Carry out the social outreach and necessary Information, Education and Communication (IEC) activities to ensure adequate social acceptability through citizen participation.
b) Setting up a grievance redressal mechanism
c) Identification of projects and making arrangements for required land
d) Obtain relevant approvals from ULB Board
e) Assistance in obtaining necessary approvals and orders from stakeholder departments for implementation of project

Implementation Phase

a) Obtain feedback from citizens on the services provided and take necessary mitigation actions accordingly
b) Ensure effective implementation of safeguards
c) Monitor day to day activities
d) Take part in the implementation of all community awareness and participation activities
e) Maintain account for R&R activities
f) Submission of progress report to JUIDCO on monthly basis

Process of Consultation

153. **Consultation during the E&S Assessments**: As a part of environmental and social impact assessment, public/stakeholder consultations were organized in Dhanbad project for NCB01 and NCB 02. Furthermore, information pertaining to the sub-project like work schedule, procedures involved, project component, likelyimpacts, entitled grievance redressal mechanisms was disseminated. Feedback on mitigation measures , and grievance redressala mechanism were also collected during initial consultation periodOther stakeholders such as the Land Revenue Department, National Highway Authority of India (NHAI) etc. were also involved in the consultations to the extent possible. The outcomes of the initial consultations held during the January- March 2017 were incorporated, as appropriate, in the designs and mitigation plans.

154. **Consultation on Draft ESIA:** The draft ESIA was presented and explained to local community, stake holders, PAP and ULB members on 6th October 2017.The impacts arising due to the project, the mitigation measures and ESMP were discussed in details.

Levels of Public Consultation

A. State Level

- Secretaries of different Ministries and Departments of Government of Jharkhand
- Labour Commissioner

- Chief Engineer and Engineering Department

B. City /ULB Level

- Mayor/Chairman
- Municipal Commissioner
- Councillors and Representatives of different departments

C. Location/Site Level

- Heads of the households likely to be impacted
- Members of the likely impacted households
- Clusters of PAPs
- Villagers
- Local CBOs/NGOs

7.2 Findings of Public Consultation

Table 43: Findings of Community Consultation

Date / Place	Summary of Discussion	Consensus	Mitigation Measures - Input to technical Design
Place : Dhanbad Kanko Chowk 13/03/2017 10.30 am	A detailed public consultation was organized with the potential project affected persons, people's representatives, shopkeepers, businessmen, and others regarding the project benefits and vis-à-vis estimated loss. During discussion it has been observed that the benefits of the proposed project area were acknowledged by the local people but they stressed that the Executing Agency, need to incorporate proper traffic safety measures to reduce accidents, once the road is operational. The most important topic of discussion was the alignment which passes through the one big temple and a statue , which will be fully impacted due to the project The local residents with their representatives all disagree in demolishing of the temple and the statue, partially or fully. The temple was constructed by Mr.Dilip and Anish Agarwal, owner of the Petrol Pump owner. Simultaneously a focus group discussion with all female participants were undertaken in the same area.	The local people had agreed in the view of the proposed road project which will bring some development of the area but apprehend about the dust pollution. The female participants apprehend about the increase in the number of road accidents and would be dangerous to the children and students who usually not careful using the roads.	The Government officials had agreed to take special care for traffic safety. It has been suggested to make traffic safety awareness campaign at the schools and localities. Mr. Dilip and Anish Agarwal, owner of the Petrol Pump was consulted for relocation of the temple. Though some people were against the demolishing of religious structures, but it was finally decided that if similar structure would be constructed by the implementing agencies only, then they have no objection for relocation. As part of the consultation, the local people had identified a plot for relocation and the verification of Khasra and other details with the NOC from the owner are still under process. The DPR Consultant was advised to incorporate the three legged Junction development plan at the starting point of the proposed road and also have considered the provision to

Date / Place	Summary of Discussion	Consensus	Mitigation Measures - Input to technical Design
			relocate the statue of Tilka Majihi at the island of the Junction.
Place : Shakti Chowk Dhanbad 11/03/2017 6.30 pm	The existing alignment passes through semi urban area. It is also a junction and many goods vehicles passes through this junction. There are both commercial and residential establishments along the alignment. Question were raised on road accident and menace like anti-social activities that may happen due to labour influx. Three schools are in the proposed alignment of the road and the people Requested that adequate safety measures should be incorporated to reduce the risk of accident, As the area is still semi urban there are some places where the cattle cross the road regularly. Provisions for cattle crossing were discussed to reduce any accidents People were of the opinion that 2 temples that would be partially impacted should be avoided.	Combined effort of the local authorities with the JUIDCO officials as well as the other stake holders mainly DMC assured that mitigation measures will be incorporated for the issues raised	The DPR Consultants was advised to incorporate the following provisions in the DPR to mitigate the apprehensions of the local people. 1. 2 People Under Pass (PUP) for NCB01 2. To facilitate crossing the cattle, 3 cattle under pass (CUP) for NCB01 and 2 for NCB 02 have been proposed. 3. To minimize the impact on the Temple study is going on. Road safety awareness campaign will be made at schools. Budget provision for relocation of the temples is kept in the RAP but further Consultations will be required by project proponent to make the people understand the importance of the road. And measures that will be taken to relocate the temple
Place: Vinod Behari Chowk Dhanbad 13/03/2017 1.00 pm	Most of the people impacted were squatters (residential/commercial/ residential cum commercial). DMC has already carried out the survey and are in a process of developing a plan on to relocate them. As per DMC, 14 places have been identified, where the vendors can be	In both the roads the available RoW will be utilized and there will be no land acquisition The Squatter and the Encroachers mainly Hawker, Kiosk and other commercial entities would be provided	The DPR Consultants were asked to include COI and Property Line in their drawings to understand and undertake the Census Survey. Budget allocation for relocation of CPR has been provided in RAP.

Date / Place	Summary of Discussion	Consensus	Mitigation Measures - Input to technical Design
	relocated. To perform the relocation of the vendors the Nagar Nigam, consents were taken from the relevant vendor associations. People raised concern about the impact to nearby ponds due to construction activity	compensation and Temporary Impacts would also be considered for transition allowance	Provision for skill development for PAF have bene considered Mitigation measures to lessen the impacts on the ponds near road side have been suggested in the EMP that will be provided to the contractor
Place: Birsa Munda Park Chowk Dhanbad **12/03/2017** **12.30pm**	The locals welcomed the road strengthening projects. The main point of discussion was to realign the proposed alignment because of the boundary wall of the Airport. Relocation of one small temple was also discussed	The proposed road project is the only feasible option for development as it will help in reducing the movement of trucks within Dhanbad city Local people has agreed to find a land for the relocation of the temple	The people has agreed to cooperate and help for to implement the project Discussion with the DPR Consultant resulted in minimizing the service lane so that the proposed road lie within the available RoW. Budget provision is kept for relocation of the thel temples.
Place : Gol Building Chowk Dhanbad **13/03/2017** **5.30pm**	The city is the Coal City of India as well as a trading hub. Though the town lacks in many infrastructural facilities but the locals are of the opinion that with better communication there would be better economic development their prosperity. People also discussed the mitigation measures that should be incorporated to reduce dust and noise level that may arise during the construction period. People stressed that the period of construction to be reduced to avoid nuisance that can be created due to prolong construction period	The people agreed to the proposal like installing batching plants away from residential areas, and DG sets with proper acoustic enclosures. People stressed that proper mitigation measures should be identified and should be implemented during construction activity to reduce environmental impacts.	The road is expected to complete within 2 years. The EMP have been designed to mitigate environmental impacts due to the construction activity and will be incorporated in the bid document for the contractor to follow.
In addition to the above specific public consultations and FGDs the peoples were also consulted during SES and Census Survey. Further			

Date / Place	Summary of Discussion	Consensus	Mitigation Measures - Input to technical Design
Consultation in respect of all the seven-religious place is undertaken at JUIDCO level, the detail of which is depicted in the Table 44.			

Table 44: **Findings of consultation for impact on religious structures in NCB-01&NCB-02**

SNo.	Location of Temple	Name & Mobile No of Contact Person	Importance & Size of the Temple	Key point discussed	Risk Assessment
1	Temple No-1(Hanuman Mandir) Chainage-11+000 Place-Nawadih(Bhuli Basti) Date- 09.06.2017	Talo Pandit Mob-7050131394	• Small Statue is placed within the ROW. • There is no roof on the statue and only local people worship during the festival time like Ramnavmi, Hanuman Jayanti etc.	• Discussed importance and benefits of road widening project and disclosed to the local people that temple will be impacted as it is in the proposed RoW and have to be relocated before starting of the construction. • Further, the Patron informed that he is aware about the project and agreed to shift the temple on his land behind the current location temple, given that some compensation is provided for construction and relocation of the temple.	As the chief patron of the temple is ready to shift the temple on his personal land allowing for the road widening project, no major risk has been identified pertaining to relocation of temple.
2	Temple-2(Hanuman Mandir) Chainage-9+500 Place-Dhajori (Infront of Gifford Icecream factory) Date- 09.06.2017	Ganesh Chandra Mob no. 7209478386	• Statue is placed within the ROW. • There is no roof on teh statue. Only pillar was erected in past however the temple was not constructed.	• Discussed the proposed alignment and benefits of the project in detail. • The local people were informed about the shifting of temple. The people agreed to cooperate and not create any hurdle in the development project. They	Patron of temple were very much aware about the road widening project and they agreed to relocate the temple, So no major risk identified in relocation of temple.

SNo.	Location of Temple	Name & Mobile No of Contact Person	Importance & Size of the Temple	Key point discussed	Risk Assessment
				also agreed for the relocation of temple. The local people are in the process of identification of land for the temple relocation.	
3	Temple-3 (Hanuman Mandir) Chainage-7+100 Location-Baua kalan Date- 09.06.2017	Bhushan Ravani	• Temple and house of the chief priest is built outside of the ROWbutthe asbestos shed and garden is coming on ROW , hence affected • The temple is small in size and the chief priest, Bhushan Ravani himself looks after the temple and worships in the temple.	He was not available on the site to comment on the relocation.	As per local people, the local community is aware about the proposed project and that available ROW will be utilized. Main Temple structure will not be demolished only encroached part of the garden within the RoW will be affected.
4	Temple-4 Chainage-2+700 Loaction-Ganduba Date- 09.06.2017	Shri. Matukdhari Ravani Mob No-7870621332	• Small size Shiv Mandir built on ROW of road is looked after by Shri Matukdhari Ravani. • The village people of Chhota nagri visit there in the month of Shravan and other festivals to worship.	• Discussed the importance and benefits of the proposed road widening project and informed about the relocation of temple, Villagers were well aware of the proposed road widening project. • Villagers and chief patron of the temple Shri Matukdhari Ravani have agreed for the relocation of temple on the land available with him, provided the proposed project gives appropriate	Villagers and chief patron of the temple agreed to shift the temple on the personal land of the Shri Matukdhari Ravani, so there is minimal risk in relocation of Temple.

SNo.	Location of Temple	Name & Mobile No of Contact Person	Importance & Size of the Temple	Key point discussed	Risk Assessment
				compensation for relocating and building the temple.	
5	Temple-5 Chainage-0+900 Location- khamargoda Date- 09.06.2017	Pravin Mandal Ranjeet Mandal Mob- 7979782725	• This is newly built medium size temple and large number of people worship in the temple. • During the visit of consultants and project proponents, special puja was being held by large number of local people.	Special Puja was going on 09.06.2017. Due to non-availability of local community members, consultations could not be held.	Multiple consultations will be required to convince the local people for relocation of the temple which is falling in the ROW before starting the construction in this section. The risk identified as moderate.
6	Temple-6 (Kali Mandir) Chainage -0+700 Location-Jamuatand Date- 09.06.2017	Public	• Only Bedi (donation box) which is constructed on the opposite side of the temple is coming on the ROW. • However, the temple is not within the proposed ROW and prayers are being offered during holy days.	• Discussed with local people. • The community members informed that the decision will be taken based on the consensus amongst the community members.	As agreed with the people, Bedi may be shifted in front of temple which is out of ROW. No impact on main structure of the temple. So, the risk identified is minimal.
7	Temple-7 Chainage-000 Location-Kanko Chowk Date- 09.06.2017	Dilip Agrawal Mob-9835595480 Anish Agrawal	• Temple is built within the proposed ROW and managed by the Saraswati Petrol Pump's owner Shri Anish and Dllip Agrawal	• The owner is well aware about the construction of road and relocation of temple due to continuous interactions. • Further, he confirmed that all the members of the committee have no objection in relocation of temple. Also, he informed	There is no risk in relocation of temple.

SNo.	Location of Temple	Name & Mobile No of Contact Person	Importance & Size of the Temple	Key point discussed	Risk Assessment
				that land has been identified for relocation of the temple. NOC for the identified land is under process.	

Table 45: Findings of Consultation with Government Officials

Date / Place	Summary of Discussion	Consensus	Mitigation Measures - Input to technical Design
State Level			
Special Secretary, Department of Environment and Forests	▶ Discussion was held on the JMDP and proposed sub-projects in water supply, storm water drainage and road sectors and suggestions were sought on environmental issues to be addressed in Environmental and Social Management Framework. ▶ For road projects, Special Secretary suggested alignment of projects in such a way that tree cutting will be minimized. ▶ Team was informed about the Order No: 3503/2014 passed by Jharkhand High Court that contains guidelines on tree cutting. He informed that application needs to be submitted to High Power Committee headed by Chief Conservator of Forests, Ranchi for tree cutting purpose for linear projects ▶ He told that environmental parameters monitored in municipal areas can be collected from JSPCB ▶ He also stressed on the necessary mitigation measures that needs to be adopted to minimize air emissions from construction sites/ due to transport of construction material	▶ ESMF and ESIA would be shared. ▶ All statutory Guidelines and order to be followed ▶ Environmental parameters in municipal areas were collected. ▶ EMP would be shared with the Department	▶ Minimizing Environmental Impacts by consultation with the DPR Consultant. ▶ EMP would be a part of the Bid Documents

Date / Place	Summary of Discussion	Consensus	Mitigation Measures - Input to technical Design
Sanjay Kumar Suman, IFS, Member Secretary, Jharkhand State Pollution Control Board	Team appraised Member Secretary on JMDP and proposed sub-projects in water supply, storm water drainage and road sectors and sought suggestions on environmental issues to be addressed in Environmental and Social Management Framework.	CTE & CTO is not required for road beautification, but is required for batching plant, hot mix plant and DG set.	EMP to be added in the BOQ.
Smt. Himani Pandey, IAS, Secretary, Welfwere Department	Meeting team appraised Secretary on Jharkhand Municipal Development Project (JMDP) and proposed sub-projects in water supply, storm water drainage and road sectors and sought her suggestions on environmental and social issues to be addressed in Environmental and Social Management Framework. For road projects , she suggested to validate the ROW and stressed that the vendor compensation should be carried out as per the national /state laws	ESMF and ESIA would be shared. The RAP and EMP would be displayed in the Welfare Office Notice Board. The GRC committee Contact Details would be displayed.	DPR Consultant was asked to review the RoW details. Initiation for formation of GRC.
Praveen Kumar Toppo, Labor Commissioner & Prabhat Kumar, Labor Commissioner, Dhanbad,	The meeting team appraised Labor Commissioner and Joint Labour Commissioner on Jharkhand Municipal Development Project (JMDP) and proposed sub-projects in water supply, storm water drainage and road sectors. The team sought the suggestions on environmental issues. The team was informed about the licenses that are required and the facilities to be provided to the workers.	ESMF and ESIA would be shared. The EMP would be available in public domain.	EMP to be added in the BOQ. All the Labour Rules would also be part of the BOQ. Guidelines for labour camps to be incorporated in ESIA and the contractor must provide facilities as provided in the guideline
Amarinder Pratap Singh, IAS, Principal Secretary, Ministry of Drinking Water and Sanitation	The meeting team appraised Principal Secretary on Jharkhand Municipal Development Project (JMDP) and proposed sub-projects in water supply, storm water drainage and road sectors and sought their suggestions on environmental issues to be addressed in Environmental and	ESMF and ESIA would be shared. The EMP would be available in public domain.	Necessary permits for water withdrawal to be obtained for construction purpose.

Date / Place	Summary of Discussion	Consensus	Mitigation Measures - Input to technical Design
	Social Management Framework. Related to road project he discussed issues related to water pollution due to construction activity. He also recommended the facilities to be provided to the labours in labour camps and also stressed that proper drinking water facility and toilet facilities should be made available in the labour camps. Also, he stressed that proper mitigation measures should be incorporated to avoid water pollution during the construction phase.		
Ashok Kumar / Yogender Sharma, Chief Engineer / Member, Monitoring Cell - Water Resources Department	The meeting team appraised Chief Engineer and hwas team on Jharkhand Municipal Development Project (JMDP) and proposed sub-projects in water supply, storm water drainage and road sectors and sought their suggestions on environmental issues to be addressed in Environmental and Social Management Framework. Regarding the road project, chief engineer stressed that as Dhanbad is a water stress location, proper measures should be implemented to mitigate any high impacts on water availability due to the project	ESMF and ESIA would be shared. The EMP would be available in public domain.	Mitigation measures to reduce impacts on water availability will be provided in EMP and the contractor has to implement the same.
CITY Level			
RRDA Building, Dhanbad, **Various department of Dhanbad municipality Councillors, Ward Councillors** **Date: 31.01.2017** **Place: Dhanbad**	Provisions of toilets/ urinals should be kept at labour camps during the construction activity Trees should be planted as per national and international rule & guidelines. Survey for trees to be felled should be undertaken Parking facilities should be provided where roads were being widened. For dust reduction sprinkler system, should be installed DPR should consider 6 lanes road instead of 4 lanes Foot-over bridges or junctions should be constructed at	As per provision of EMP Trees should be planted. All CPRs, Waiting Sheds, Public Toilets would be provided. No scope of Land Acquisition and the construction will be within the available RoW. Safety measures would	EMP was to review to accommodate all aspects of Environment and Safety. The DPR Consultants were asked to include COI in their drawings.

Date / Place	Summary of Discussion	Consensus	Mitigation Measures - Input to technical Design
	specific positions for pedestrian to cross. Proper identification of people directly affected by the project should be undertaken and stressed on proper compensation for the PAP.	be a part of EMP and BOQ. Temporary Impacts will be a part of RAP which would be disclosed in websites and other media.	

Table 46: Findings of ULB Level meeting based on Draft ESIA

Date / Place / No. of Participants	Summary of Discussion	Consensus
6th October 2017, Mayor, Municipal Commissioner, ULB members, RCD, PAP, Professors of Engineering Colleges, Trade Union, Women Self Help Group, Hawkers Association	▶ The draft ESIA was presented to the Participants ▶ The environmental impacts and its mitigation measures were explained in detail ▶ Social impacts arising due to the project and its mitigations were discussed with the participants ▶ The participants stressed that majority of the labours to be employed during the construction and operation phase should be locals ▶ Entitlement matrix and compensation to be provided to non-titleholders were discussed in details. ▶ Mitigation measures to be implemented for air pollution was discussed in details ▶ Steps to be taken to control deterioration of surface water present near the road ▶ The participants suggested that the during project construction stage, discussion should be undertaken with Bharat Coking Coal Limited (BCCL) to assess if construction waste can be used for backfilling of open caste mines. ▶ Discussion on institutional arrangement and component to be overseen by ULB was discussed ▶ Reports to be prepared by CSQC and PIU were also discussed.	▶ During construction, discussion with BCCL authority to assess if non-hazardous construction waste can be used for back filling of nearby open caste mines.

Disclosure of Project Information

The impacts of the project, both positive and negative, were disclosed to the local people who will be affected. During public consultation sessions, the local people accepted that they were aware of the project as it was disclosed from time to time through local newspaper. It was made known to the people that a resettlement information leaflet containing information on compensation, entitlement and resettlement management adopted for the project will be made available in the local language (Hindi) before mobilization of the contractor. The detailed information would also be available on the website of JUIDCO and the World Bank after approval of the World Bank.

Grievance Redressal Mechanism

The Grievance Redressal Committee (GRC) at the state level has already been constituted. Consultation for the formation of GRC for this project at district/city level is being undertaken. Before the start of the process of civil contractor appointment, the GRC at project level will be formed in consultation with the PAPs and beneficiaries so that the grievances are resolved at the project site itself.

Provision of further Consultations at Implementation Stage

The effectiveness of the implementation of an Environmental and Social Management Plan (ESMP) is directly related to the degree of continuing involvement of the people affected by the sub-project. Several additional rounds of consultation with the PAPs and local community will be undertaken during the sub-project implementation. A NGO responsible for RAP implementation is entrusted with the task of conducting these consultations during implementation phase. This could involve agreements on assistance options, entitlement package and income restoration measures, accessibility and padestraian movement for the sub-project and inconvenience to the local community with respect to dust, noise safety, labour etc.. The consultation will continue throughout the sub-project implementation stage. The following set of activities will be undertaken for effective implementation of the plan:

- During Implmentation an active feedback loop for citizen complaints on air, noise, dust pollution, and safety issues will be maintained and adequately addressed by the contractor and PIU.
- In case of any changes to implmentation/ work schedules, closure of roads, interruption in utilities, the PIU and ULB will inform the affected people prior.

- Together with the NGO, the Project Implementation Unit (PIU) will conduct information dissemination sessions in the project area and will invite feedback from the PAPs in order to strengthen the Environmental and Social Management Plan implementation.
- During the implementation of RAP, the NGO will organize public meetings and will inform the communities about the progress of the implementation of sub-project works, including awareness regarding health and sanitation issues related to water supply.
- Consultation and focus group discussions will be conducted with vulnerable groups like women, SCs, STs, and people living below poverty line to understand their specific needs that should be incorporated in ESMP/RAP.
- Women will be specially consulted during implementation stage.

8 ENVIRONMENTAL IMPACT ASSESSMENT

8.1 Construction Phase Impact

8.1.1 Impact on Land Use

155. **Change in land use along RoW**: For NCB-01&02 package, road development work will be carried out in the existing RoW section itself and no new land acquisition will be undertaken for it. As this is not a new road, and mainly encompasses widening of existing 2 lane road it will not take agricultural land.

156. Theland use along the 500m lateral distance of the roadside is characterized by mixed land use with predominatly agriculture land, and small portion ofresidential, commercial land. Clearance of vegetation, levelling, and borrow areaswill have temporary changes in current land use and the same will be restored eventually. Road 11 has small temples of local significance in the ROW, which would need to be relocated outside the RoW in agreement with the local community under the RAP.

157. **Change in land use at construction cum labour camp site**: The labour campsare proposed at Gargaria village located at 3.0 Km from KakoChaukand Velatanvillage which are about 3.3 km away from the sub-project sitei.e.Memcogol building Chawk. The construction cum labour camps will be set up on an area of approximately 2 acres each. The current land use at both these sites isbaren land. The land for the labour camp and its associated access roads will not include forest or sensitsive natural habitats, nor will it affect natural water courses and cultural properties.

158. **Change in land use within the RoW**: The approximate 80 percent compensatory plantation will be carried out inthe existing RoW of 19.9 Km road length and remaning 20 percent will beundertaken in community areas like school, Panchayat Ghar etc.

159. **Change in land use at borrow/quarry sites**: The borrow land used for material extraction (stone quarry sites and borrow pits) will also result in temporary change in land use.

Quarry sites for stone: Govt approved quarry site shall be used for road material.

Borrow sites for soil: The borrow sites identified for the sub-project are located at Village Kanko bharwadi, RathTand and Dhangiand the current land use at the borrow sites is wasteland. The estimated quantity of borrow material is 656500 cu.m.and this will require about 328250sq. m. of land dug to a depth of 2.0 m.

160. **Disposal sites for waste**: All solid waste generated through the project will be disposed at Dhanbad designed landfill at Sijua. The disposal of construction debrus and spoil material will have an impact on economic and aesthetic value of public and/or private land within and

around the disposal site. Construction waste shall be disposed in designated area or reused during construction activitites.The proposed sub-project will have direct impact and the duration of impacts range from short to medium term.

Significance of Impacts

The impact severity is anticipated to be high. The overall impact on change in land use has been assessed to be moderate.

Mitigation Measures

161. Any cleared topsoil will be stockpiled to be used in re-vegetation scheme. Wherever possible mature trees will be retained. Cut and fills sections will be designed so as to minimize net materials import. Borrow pits will be reinstated and blended to fit the surrounding landscape environment. The contractor will avoid excessive borrow pitting as it will be difficult to rehabilitate. The topsoil will be utilized for the borrow pit also top soiling areas between road prism and the ROW to enable re-vegetation to take place. Guidelines for environment management measures for borrow areas have been provided in Annexure –II. JUIDCO will provide its contractor the site for disposal of debris identified through the ULB and approved by the JSPCB Guidelines for Waste Management have been presented in Annexure V.
162. **Use of Fly- ash**as per prevailing guidelines (Ministry of Environment, forests & climate change notification) in the country, fly-ash shall be used for concrete works fly-ash can be used as per current specifications of MORTH when fly-ash is available in adequate quantity (within 100km of any power plant). Therefore, the use of fly-ash in concrete works will be mandated through the Civil Works
contract.
163. **Quarrying** will be carried out at approved and licensed quarries only. Copy of licenses will be submitted to the JUIDCO PMU and CSQC. Three registered quarry areas have been identified for the construction of project road Gobindpur, Palani, Baliapur Quarry & Crusher.
164. **Borrow Areas:** Three locations have been identified as suitable borrow areas. The number of borrow pits that will be established/used by the contractor according to the specifications in the Borrow area management plan. No borrow pit will be opened without the permission of JUIDCO PIU/ CSQC. Before opening additional borrow pits, operating pits will be closed per IRC specification.
165. **Agriculture Top Soil:** All areas of cutting and all areas will be permanently covered will be stripped to a depth of 15 cm and stored in stockpile**.** Top soil will be safeguarded from erosion and will be reused in agricultural fields and to cover up and restore borrow areas acquired temporarily.
166. **Labour cum construction site:** Labour camps and construction site at both the locations (Gargaria village and Velatanr village) are not located close to habitations, schools, hospitals,

religious places and other community places. No habitations, sensitive locations like temple, school & hospitals, forest areas and other eco-sensitive zones is present within 500m from the labour camp cum construction site. No major surface water body is located within 200m from the construction site. On the basis of the above reasoning, the overall impact of change in land use of NCB 01 and NCB 02 has been assessed as minor.

8.1.2 Land Contamination

167. **Construction and Demolition Waste**: General construction and demolition waste generated onsite during construction phase of NCB-01&02.The inventory and type of waste to be generated and its disposal arrangement is mentioned below.

Table 47: Waste Generated during Construction Period

S. No.	Item	Unit	NCB 01	NCB 02	Disposal Arrangement
1	Clearing and Grubbing	Hec	44	32	Reuse in avenue plantation and may also be utilize in filling the mines (unused mines).
		Cum	66035	48488	
2	Trees Stems and Roots	No.	924	655	To be disposed by Forest Department. (Designated Depot)
3	Stone Masonry	Cum	3335	1820	To be reused in leveling and filling for temporary structure.
4	Lime/Cement Concrete	Cum	304	36	To be reused in leveling and filling for temporary structure.
5	RCC	Cum	2922	73	To be reused in leveling and filling for temporary structure.
6	Hume pipe	Rm	12	16	To be reused in temporary structures.
7	Dismantling of Existing Bituminous Pavement	Cum	4585	3091	To be reused in construction camps, haul roads etc and disposed in construction debris site.
8	Dismantling of Existing Granular Pavement	Cum	25010	16862	To be reused in filling borrow pits/unused mines.

168. **Domestic Waste**: Domestic wastes consisting of food waste, plastic, glass, and paper waste will also be generated by the construction workforce at any canteen facility/ rest area which

shall be constructed for them and also at labour camp site. Domestic sewage will be generated from labour camp. It is estimated that about 100_kg/day of domestic waste will be generated from the labour camp of NCB-1 and75_kg/day will be generated from the labour camp of NCB-2.

169. **Hazardous waste**: A small proportion of waste generated during construction phase of NCB-01&02 will be hazardous and may include used oil, hydraulic fluids, waste fuel, grease and waste oil containing rags. If improperly managed, solid waste and wastewater both hazardous and non-hazardous (domestic) in nature can lead to adverse impacts on land causing soil and groundwater contamination. It is estimated that about 4-6 tons of hazardous waste will be generated in NCB-01 and 3-4 tons will be generated per annum in NCB-2.

170. **Construction Demolition/ Debris**Debris due to excavation of foundation, dismantling of existing cross drainage structure will be removed from the water course immediately. All construction debris will be taken to the designated disposal site as agreed with JUIDCo and ULB.

171. Government of IndiaGuidelines of "Hazardous waste (Management, Handling and Tran boundary Movement) Rules, 2008 will be enforced.

172. Soil contamination during the construction phase may result from leaks and spills of oil, lubricants, or fuel from heavy equipment, improper handling of chemical/fuel storage and wastewater. Such spills will have an impact on soil quality, but are expected to be localised in nature. Storm water run-off from the contaminated area will pollute downstream soil and water quality of first order seasonal streams and water bodies within/close to the sub-project site.

Embedded/in-built control

i. Construction contractor will ensure daily collection, segregation, proper storage on site, and, periodic (monthly) disposal of construction and demolition waste generated at the disposal sites identified by the ULB and approved by the JSPCB. All waste management will be carried out as per the Waste Management Plan in Annex V.
ii. Septic tanks connected to soak pits will be provided for sewage/wastewater management at the labour camps to enable wastewater to be treated and disposed safely.
iii. The domestic waste from the labour camps will be collected and segregated at site, and, disposed at the municipal landfill in Sijua.
iv. Spill control measures such as the storage and handling of chemicals and fuel in impervious areas with secondary containment will be implemented to minimize impacts in the event of a spill.

v. Unauthorised dumping of used oil and other hazardous wastes will be prohibited.
vi. JUIDCO will provide its contractor the site for disposal of debris identified through the ULB and approved by the JSPCB Guidelines for Waste Management have been presented in Annexure V.
vii. Oil interceptors will be installed at construction site.

Significance of Impacts

173. The proposed projects (NCB-01& 02) will have direct impact and the duration of impacts will be short term restricted to construction phase.
174. The geographical extent of impact is expected to be local, mainly confined to the areas of waste and wastewater generation and their storages. The impact severity of both the packages is anticipated to be low as most of the wastes generated are anticipated to be non-hazardous, mostly reusable or recyclable and the inventorization and sites of disposal will be identified prior to start of construction. Based on the above the significance of impacts for both package NCB-01 & NCB-02 have been assessed as Minor.

Additional Mitigation Measures

i. Littering and burning of waste will be strictly prohibited and the labour will be oriented towards the same;
ii. Domestic waste generated at site and at the labour campwill be segregated onsite, collected and disposed by the ULB. Recyclables will be sold to vendors/ scrap dealers;
iii. Routine disposal of hazardous waste will be ensured through CPCB approved vendors and records will be properly documented with required manifests;
iv. Spill control kits will be used to contain and clean small spills and leaks;
v. Transport vehicles and equipment will undergo regular maintenance at designated areas (equipped with proper drainage) to avoid any oil leakages; and
vi. Unloading and loading protocols will be prepared for diesel, oil and used oil respectively and workers will be trained to prevent/contain spills and leaks.

8.1.3 Soil Erosion and Surface Hydrology

175. Due to excavation and allied construction activities in package NCB-01 & 02, the upper stabilized portion of the construction corridor in both the packages will become loose and hence susceptible to erosion. Soil erosion may occur during the rains and heavy winds. The project site and study area mostly has soil of sandy loam texture. The site does not have very fertile soil. The area experiences annual average rainfall of about 1484.6 mm spreading over 76.2 days with June-September having maximum rainfall.

176. The loose soil will cause fugitive dust emissions with and impact on ambient air quality and eroded soil could potentially flow into adjacent waterways, water bodies, thus polluting them. The waterways and bodies that could be impacted are pond near ganduba, Near Mount Litera Zee School, NearBhuli, River Katri. Also, removal of top soil at some patches of land will lead to disturbance in the soil nutrient cycle and imbalances in soil microbial population.
177. The Road widening will increase impervious surface area, which serves to increase net run-off.

Embedded/in-built control

i. Existing roads will only be used to access the site to the extent possible;
ii. Construction activities will be planned accordingly to take advantage of non-rainy season and major excavation work will be completed during dry season itself;
iii. Stripping of topsoil/ top layer will not be conducted earlier than required i.e. vegetation cover will be maintained for as long as possible in order to prevent the erosion (wind and water) of soil. Topsoil, found to be fertile will be used for landscaping purpose
iv. Open Construction sites will be barricaded to prevent locals and cattle from entering construction site.

Significance of Impact

178. The anticipated nature of impact type will be direct during the construction phase which involves activities like excavation, storage of construction material on land etc. The geographical extent of impacts will be local and restricted to project footprint. The severity of impact during the construction phase is expected to be low. Based on the above the overall impact significance of the soil erosion has been assessed as Minor.

Additional Mitigation Measures

i. Areas for top soil utilization will be identified before start of construction activities and top soil will be utilized for plantations in the median after road development
ii. The disturbed areas and soil stock piles will be kept moist to avoid wind erosion of soil.
iii. Small bunds will be created in case of any activities near the water body or drainage areas within the site to prevent washing of the soil into these waterways;
iv. Silt/sediment trap will be provided in areas susceptible to high erosion.
v. The contractor will plan the activities so that no bare/ loose earth surface is left out before the onset of monsoon, for minimizing the soil erosion following preventive measures to be taken such asslopes will be covered, soon after completion
vi. Top soil from borrow area, debris disposal sites; borrow area, construction site will be protected/covered for soil erosion.

vii. Roadside drains will ensure that all run off is channelled into the drains, so there is no issue with flash flooding conditions unless mitigation measures for such rare events are incorporated in project design.

viii. Debris due to excavation, dismantling of existing cross drainage structure will be removed from the water course immediately.

ix. Diversions for bridges will be removed from the watercourse before the onset of monsoon.

8.1.4 Soil Compaction

179. During construction activities, there will be compaction of soil in the project foot print and surroundings, due to movement of vehicles/ construction machinery and work force. The soil compaction will lead to impact on the soil physical properties such as reduction in pore spaces, water infiltration rate and soil strength etc.

Significance of Impact

180. The project will have direct impacts and geographical extent of impacts will be local, within the project site. The duration of impact is assessed to be short-term and will be restricted to the construction phase of the project.

181. The impact severity is assessed to be low as the various activities will have soil compaction only at certain areas in the construction foot print. The significance of impact has been assessed to be minor.

Mitigation Measures

- The routes for movement of heavy machinery will be designated to the corror of impact to avoid the soil compaction in other areas
- All service roads, haul roads will be redeveloped.
- Construction material will be stored in designated area only

8.1.5 Impact on Water Quality

182. The impact on water quality is expected to be:

- **Waste water from on-site sanitation facilities**: The major source of wastewater (domestic sewage) will be from the usage of sanitation facilities at the construction site and at the labour camps where about 70 individuals (NCB-I) are expected to work and 40 individuals (NCB-II) are expected to reside respectively. The quantity of waste water generated would be in the range of 4.3to 7.5 kilolitres/day. There is a chance for contamination of surface and groundwater resources resulting from improper management of sewage at the sub-project site and labour camps.

- **Waste water from construction site**: There is a chance for contamination of surface and groundwater resources resulting from accidental spills/leaks at the storage areas.
- **Runoff from excavation**: The surface runoff carrying the excavated stored loose top soil at project foot print area will lead to increased sedimentation in the receiving water bodies.

Impact Significance

183. There is only four surface water body located just near to approximately 100 m Road Number 11. Septic tank and soak pits will be provided (as per specifications given in IS 2470 1985 Part I and Part II) at labour camp site for treatment and disposal of sewage, thereby minimizing the impacts of wastewater discharge.
184. There will be no direct discharge of wastewater in the ground water aquifer, however groundwater levels as reported by CGWB varies in the range of 4-6 m below ground level in monsoon and therefore chances of contamination from project activities of NCB-01 & 02 is present.

Significance of Impact

185. The duration of the impact is assessed to be short-term with low impact severity as the wastewater discharge will be limited and controlled through septic tanks at labour camp. The geographical extent of impact is assessed to be local. The project during construction phase does not anticipate affecting groundwater of the area though there may be some impact on surface drainage quality during rains due to construction activities which will be mitigated through silt-traps. Based on the above the overall impact significance is assessed as Minor.

Mitigation Measures

i. Toilets, soak pits and septic tanks, waste collection areas, storage areas will be located at least 200m away from natural drainage channels and water bodies;
ii. Spill/leakage clearance plan will be adopted for immediate cleaning of spills and leakages.
iii. Labourers will be given training towards proactive use of designated areas/bins for waste disposal and encouraged for use of toilets. Open defecation and random disposal of sewage will be strictly prohibited.
iv. Silt traps will be installed
v. Septic tank and soak pits will be provided (as per specifications given in IS 2470 1995 Part I and Part II) onsite and at labour camp for treatment and disposal of sullage, thereby minimizing the adverse impacts of wastewater discharge;
vi. Proper cover and stacking of loose construction material will be ensured during construction of outfall structures at construction site to prevent surface runoff and contamination of receiving water body;

vii. Licensed contractors will be used for management and disposal of hazardous waste
viii. Construction labours will be restricted from polluting the water or misusing the water
ix. Construction work close to water bodies will be avoided during monsoon.
x. Equipment and vehicle washing/workshops near water bodies will be avoided.

8.1.6 Impact on Terrestrial Ecology

186. As indicated in the baseline section, natural vegetation found in the area, mostly consists of trees, grasses, shrubs. About 1579number of trees of greater than 14-inchgirth on road number 11 will be felled due to project activity and around 6753trees along road number 11 will be transplanted near to the RoW.
187. Topchachi sanctuary is located approximately 20 km north-west of the Kanko Chowk (chainage 0.000 km) which is beyond the influence area (10 km). As indicated in the baseline section, flora and fauna found in the area are mostly mammals found in habitats as house shrew, house rat, and Indian grey mongoose and, stripped squirrel, reptiles as snakes, lizards and birds. No threatened, vulnerable or endangered species will be affected due to the proposed project

Significance of Impact

188. The loss of vegetation will result in disturbance for many birds, reptiles and mammals during the construction phase. Including, rise in air, dust pollution and ambient noise levelswill lead to minor disturbances (temporary and localized) of fauna presentnear the active construction sites.
189. The loss of 1579 mature trees will have an impact on local drainage and soil property. Compensatory plantation of 17000 trees would require good maintainence to ensure a good survival rate.
190. Since compensatory plantation will be carried out in the new alignment the impact on terrestrial fauna and bird will be reduced.
191. Based on the above the impact on ecology has been accessed as Moderate.

Mitigation Measures

i. Permission for proposed Tree Cutting and transplantation needs to be ontained by the Divisional Forest Officer, Dhanbad.
ii. Transplantation and compensatory planting will be undertaken as per guideline presented in Annexure VIII to ensure survival of trees.
iii. A separate budget should be allocated for Maintaince of the saplings, young trees and transplanted trees to ensure a good survival rate.

iv. Apart from all transplanted trees, approximately 80 percent compensatory plantation is proposed along the expanded road of 19.9 Km road lenth (within the avenues of service lane and carriage lane).Theremaning 20 % shall be in the Dhanbad block at various schools and public areas. If required, additional compensatory afforestation will be undertaken as specified by the DFO incase survival rate of the young plants is low. This is to ensure that all vegetation (17000 trees)proposed for compensationis in place.

v. Only local native species will be used for compensatory planting as per Annex VIII. These species are also specied as per the NHAI Green Highways Manual as species suitable for plantation in the RoW, and will not have any impacts on local biodiversity or on road safety.

vi. All active construction sites will be barricaded effectively so that no terrestrial fauna will trespass, or be impacted by construction hazards, electrocution etc.

vii. The footprint of the activities will be kept to the minimum to reduce disturbance to flora and fauna.

8.1.7 Impact on Air Quality

192. The potential sources of air pollution during the construction period include:

- Fugitive dust emissions from excavation work, digging and stacking of soils, filling, handling of construction material, transportation of material, movement of tyres, plying of heavy construction machinery, loading, unloading of trucksetc.
- Emissions from construction plants/machinery such as batching plant, hot mix plant, etc.
- Emissions from operation of diesel generators to meet power requirements.
- Vehicular traffic can generate great quantities of emissions including sulfur dioxides, nitrogen oxides, carbon monoxide and, where lead fuel is in use, lead. However, the project is intended to relieve congestion and improve traffic flow, the impact may be a net local decrease in emissions generated.

Impact Significance

193. **Fugitive dust emissions**: The fugitive emissions from construction material loading and unloading are likely to remain highly localised and confined to the sub-project area, but require adequate mitigation measures to prevent their spread outside the sub-project footprint.

194. The impact of emissions from vehicles bringing construction material will be minimised by proper upkeep of maintenance of PUC certify vehicles, sprinkling of water on unpaved roads at the construction site and planned movement of such vehicles provided with proper cover.

195. **Emissions from DG sets:** The emissions from diesel generators (meant for emergency power during construction) will be be controlled to minimise adverse impacts by using DG sets that comply with CPCB standards, by optimizing usage and depending moreon electricity supply for construction, by proper onsite orientation onsite and adequate stack height for wider dispersion of gaseous emissions.
196. The geographical extent of potential for impact on air quality without mitigations in place is expected to be local and the impact significance on air quality due to project activity has been assessed asmoderate.

Mitigation Measures

197. The impacts on air quality will be minimized through mitigation measures to be included in the construction contract, requiring contractors to strictly implement them. The mitigation measures include the following:
    i. Asphalt mixing plants will be sited over 1000 m (refer CPCB/SPCB,) from any communities. Mixing equipment will be well sealed, and be equipped with a dust-removal device, and Operators will wear dust masks, ear protection and hard hats.
    ii. Suppression of fugitive dust emissions will be undertaken by spraying water, wetting of the stockpile, proper location of material stockpiles, especially sand and soil downwind from the habitations, or by providing wind breaks for stockpiles, covering of trucks with tarpaulin sheets during transportation of soil and material;
    iii. The emissions from diesel generators (meant for emergency power requirement) will be controlled to minimise impacts of air emissions by optimised operations, orientation at the site and providing stack height of 6 m (calculated as per stack height criteria of Central Pollution Control Board) from ground level for wider dispersion of gaseous emissions;
    iv. Proper maintenance of engines and use of vehicles with 'Pollution Under Control' Certificate will be ensured;
    v. Proper location of material stockpiles, especially sand and soil will be undertaken. All such construction loose material will be provided with temporary bunds and screens (or providing wind breaks) near schools and hospitals to prevent erosion and generation of fugitive dust. When not in use, all stockpiles of the loose construction material will be covered with tarpaulin sheets;
    vi. Suitable and adequate dust control system such as dry and wet scrubber for the dryer and mixer will be provided for hot mix plant
    vii. Adequate stack height (atleast 6 meter) for the discharge of its scrubbed flue gases

viii. Wind breaking wall will be provided at predominant wind direction

ix. Vehicles and machinery will be maintained so that emissions conform to National Ambient air quality standards (2009).

x. All vehicles and machineries should obtain Pollution Under Control Certificates

xi. Water to be sprayed during the construction phase, at mixing sites, approach roads & temporary roadsto prevent dust generation.

xii. Any slopes will be covered with turfing/ stone pitching immediately after completion

xiii. All Construction plant and equipment will meet recognized nations standards for emissions and will be maintained and operated in a manner that ensures that relevant air, noise and discharge regulations are met.

8.1.8 Impact on Noise Environment

198. The potential sources of increase in ambient noise levels during the road development phase of the sub-project will mainly arise from the equipment, machinery and transportation used for the construction activities. The heavy equipment used for excavation will be the major sources of noise. There is expected to be a slight increase in traffic and thereby in traffic noise impacts to receptors near the existing tracks in and around the project site from the transportation of materials and workers.

199. Road development of works are expected to vary from 2-5 months at different sites and development activities will be limited to daytime only. Tentative noise generation from construction equipment and machinery has been presented in Table 33. Specific information about types, quantities, and operating schedules of the construction equipment was not available at the time of assessment, assumptions have made regarding the type, number and Sound Power Levels (SPLs) of construction equipment, based on similar projects and publicly available data.

Table 48: Maximum Sound Power Levels of Major Additional Equipment and their Deployment

.	Machineries	Sound Level(dB)	Operation time
	Power Shovel	88	Daytime Operation Only
	Rubber Tired Crane	84	Daytime Operation Only
	Bulldozer ca 150 kW	114	Daytime Operation Only
	Asphalt Road Roller	95	Daytime Operation Only
	Light Duty Grader	89	Daytime Operation Only
	Bulldozer ca 150 kW	114	Daytime Operation Only
	Wheel Loader	94	Daytime Operation Only
	Light Duty Bulldozer	96	Daytime Operation Only
	Vibrating Road Roller	97	Daytime Operation Only
	Heavy Duty Buldozer	99	Daytime Operation Only
	Rubber Tired Crane	84	Daytime Operation Only

	Grader	85	Daytime Operation Only
	Concrete mixer truck	79	Daytime Operation Only

Significance of Impact

200. Road development activities will be limited within 50mfrom the road development footprint, which will be developed. Road development of works are expected to vary from 2-5 months at different sites and will be limited to daytime only and the within the designated area. The impact significance due to construction activity on noise quality has been assessed to be moderate

Mitigation Measures

201. The following mitigation measures will be implemented to minimise potential noise impacts during the road development phase in all periods:

i. Hammering and vibration compaction will be minimized when near cultural properties, structures, buildings or property boundary where applicable, residential class mufflers and engine shrouds (acoustic lining) will be used on all equipment.

ii. Only well-maintained equipment will be operated on-site

iii. Regular maintenance of equipment such as lubricating moving parts, tightening loose parts and replacing worn out components will be conducted;Equipment noise will be maintained at 85 dB(A) at 1 m from the source in line with WB EHS guidelines.

iv. Noise standard at processing sites, e.g. aggregate crushing plants, batching plant, hot mix plant will be strictly monitored to prevent exceeding of CPCB noise standards.

Workers near strong noise will wear protectors and their working time will be limited as a safety measure. Construction sites within 150 m of sensitive receptors construction to be stopped from 22:00 to 06:00

v. Machinery and equipment that may be in intermittent use will be shut down or throttled down during non-work periods;

vi. Low noise equipment will be used as far as practicable;

vii. The number of equipment operating simultaneously will be reduced as far as practicable;

viii. Equipment known to emit noise strongly in one direction will be orientated so that the noise is directed away from nearby NSRs as far as practicable;

ix. DG sets if any used will be provided with acoustic enclosures;

x. Minimal use of vehicle horns in the sub-project area will be encouraged; and

8.1.9 Socio Cultural Impacts

The environmental and social surveys have identified all cultural properties; in total 9 Cultural Property Resources, will be affected due to the project activities. Out of 9 CPRs, 7 are temples and 2 are statues. (Four temples and two statues that are within the RoW, and will be fully impacted and would need relocation, three temples that will be partially affected by the road widening and would require modifications in the temple area to accommodate the road width. There are no graves, burial grounds, sacred treesin the ROW. In addition, these are all structures of local significance, and there is no tourism/pilgrimage activity associated with them.

Significance of Impact

202. The impact significance due to construction activity on CPRs has been assessed to be moderate given that these are small structures of local importance that can be easily relocated with standard mitigation measures.

Mitigation Measures

i. All Temples will be relocated per the provisions in the RAP by RAP implmentation agency.Public consultation will be organized after completion of construction to access the people opinion/grievances from the the relocation activity conducted.

ii. All mitigation measures and environmental monitoring has been included as part of the PCR plan in Annex XIII. Remedial measures to mitigate the impact due to project intervention will be incorporated in the operation phase.

iii. A clause for 'Chance finds' would be added to the ESMP and subsequently the bidding documents for the works contract which explains the steps to follow whenever new archaeological remains, antiquity or any other object of cultural or archaeological importance are encountered during construction phase.

8.1.10 Occupational Health & Safety Risks for Workers

203. The workers and site personnel will be exposed to various physical, chemical hazards due to construction activities and handling of equipment such as hot work, electrical work, tree cutting, operation of JCB, hydra crane, working at height, electrical work etc.

204. All activities during construction of Road Number 11 causing air pollution and increasing noise levels have the potential to directly impact the construction workers and site personnel.

205. Various emergencies, such as fire, equipment overturn and natural hazards such as earthquake and cyclones could occur during construction, endangering lives of the construction workers.

206. Working at night time presents a highened risk to worker health and safety aspects.

Impact Significance

207. Duration of the impact will be short-term occurring only during the construction phase. Extent of the Impact will be local or national depending on origin of construction workers. Likelihood of the impact occurring is high considering the usually low level of safety at construction sites. Significance of this impact is therefore predicted to be major.

Mitigation Measures

208. The contractor will follow the OHS plan in Annex VI, and emergency response plan in Annex VI with clear assignment of responsibilities which should among others address the following:

- Follow reccomendations for night time work in Annex VI Recommendations for night time work
- All workers will be provided with requisite personal protective equipment (see**Table 49**)
- 'No smoking' signs will be placed in office, communal places construction camps as well as high-risk areas prone to fire hazards e.g. near fuel tanks.
- Adequate fire safety, fire exists and fire assembly points will be provided at the labour camp.
- Signage reminding use of PPE at appropriate locations will be provided in the project areas including ancillary work sites.
- Develop code of conduct for construction labour and staff.
- Sub-project supervising engineers, safety officer will inspect contractors 'compliance with safety precautions during construction/project activities.
- Adequate illumination should be provided at site during evening and night time till the work is being carried out
- Rest area should be provided at site in which workers can rest after the lunch hours
- Workers should wear the personal protective equipment like helmet, gum boots, safety shoes, safety jackets, ear plugs, gloves etc. while working
- Noise level in the work zone should be maintained and followed as per OSHAS norms
- Contractors should adopt and maintain safe working practices. SOPs should be prepared for each and every activity and all activities should be undertaken as per SOPs under supervision of site engineer
- Training should be given to workers to handle the heavy equipment so as to prevent accidents
- Training should be given to workers to handle emergency situation like fire, earth quake and flood
- Complete medical check-up should be done for workers prior to joining and after six months of joining

- First aid facilities, first aid room, first aid trained personnel and ambulance should be provided at the site 24 X 7. Also, tie-ups with local hospital should be done to handle emergency case, if any
- List of emergency nos., hospital contacts, ambulance contacts and doctors contacts should be displayed in first aid room, rest area and at all required location
- Working hours of labour should not exceed than standard norms as per state factory law
- Labour camps should be located at neat and clean location with no water logging issues and should be well ventilated with adequate illumination, kitchen and safe drinking water facility
- Construction labour camps and site should be properly cleaned and hygiene should be maintained
- Proper sanitation facility like toilet and bathing facility should be provided at site and labour camps. Wastewater generated from these facilities should be disposed off through septic tanks and soak pit
- LPG should be provided as fuel for cooking to workers and open burning of fuel should not be allowed
- Wastewater from construction site should not be allowed to accumulate at site as standing water may lead to breeding of mosquitoes. Septic tanks/soak pits should be provided for its disposal
- Temporary storm water drainage system should also be provided at camp site and construction site so as to drain the storm water and prevent accumulation of storm water at site and thus breeding of mosquitoes/flies
- Safety officers should be appointed at site so as to ensure all safety measures are taken at the site
- All construction workers should be provided with personal protective equipments like helmet, gloves, gumboots, safety jackets etc. and fines should be imposed if found not wearing
- Job rotation should be carried out for workers exposed to high noise and dust areas
- Activity like smoking and consuming liquor should be prohibited at the site
- Awareness on AIDS should be spread among the workers
- Traffic manager should be present at the site all the time to manage incoming and outgoing traffic to prevent accidents
- Regular inspection for hygiene and safety in labour camps should be done
- Provision of cautionary and guiding signage in local and English language indicating the hazard associated with the site & activities. Usage of fluorescent signage, in local language at the construction sites

- Speed limit of vehicles should be restricted at site to prevent any accidents and fines should be imposed on vehicles if same is not maintained. All construction vehicles should follow the designated routes & timings only.
- Construction vehicle movement should be restricted to non-peak hours, i.e. late evening (7-12:00 pm) only. Villagers should also be given intimation of these timings.
- Noise level in the work zone should be maintained and followed as per OSHA norm
- Employment should be provided preferable to local & affected people
- Dustbins should be provided at labour camps for collection of waste and waste should be regularly disposed off through the concerned agency
- Arrangement of fire-fighting should be made at site and workers should be trained to use the system in case of fire
- Site should be barricaded and should have entry guarded by security guard. Resister should be maintained for entry of outsiders. No unauthorized person should be allowed to enter the site especially village children
- A board should be displayed at entrance of site displaying name of project, area and hazards associated with the site on entrance and activities prohibited within and near site area in local language
- All construction vehicles should be regularly serviced and maintained and carry pollution under control certificate
- All proposed environmental pollution measures should be taken during construction of phase of terminal to minimize the harm to existing environmental quality of the area, which is being enjoyed by the residents of that area
- Maintenance and repair of the village road should be carried out both before and end of construction by contractor.
- Sprinkling of water should be carried out in village road also, so as to minimize dust generation due to movement of construction vehicles.

Table 49: PPE to be used

Objective	Hazard	PPE Required
Eye and face protection	Flying particles	Safety glasses
Head protection	Falling objects, inadequate height clearance, and overhead power cords	Plastic hard hats with top and Side impact protection
Foot protection	Falling or rolling objects, pointed objects	Safety shoes and boots
Hearing protection	Noise	Ear plugs or muffs
Hand protection	Hazardous materials, cuts	Gloves made of rubber or synthetic materials
Respiratory	Dust	Facemasks filters for dust

Objective	Hazard	PPE Required
protection		removal
Body/leg protection	Hazardous materials, biological agents, cuttings	Overalls /coveralls

8.1.11 Impacts on Community Health and Safety

209. During construction, approximately 20percent of the labour would be migrantlabour.(Refer Section 2.5.6 for labour requirement) Arriving migrant workers will require housing, food supply, merchandize, transport, health care, entertainment, social interaction, etc.If not managed appropriately this influx of workers can cause e lead to pressure on existing resources
210. All activities during construction causing air pollution and increasing noise levels have the potential to indirectly affect the health of the local community and pedetrians.
211. Delays in utility shifting can cause disturbance to the communities that depend on them.

Impact Significance

212. The impact will be restricted to immediate vicinity of the project area and to the construction period.Thus, the impact can be classified as 'Moderate'

Mitigation Measures

213. Mitigation measures are listed below:
    i. Necessary directives will be given to Contractor for hiring the local work force.However, in case of unavailability of required labor force and associated goods and services locally for the construction of civil works, because of a number of reasons such as worker unavailability and lack of technical skills and capacity, the labor force (total or partial) may be brought in from outside the project area from nearby municipal towns and villages and sometimes from outside the state
    ii. Contractor to hire external/migrant workers through recruitment offices and avoid hiring "at the gate" to discourage spontaneous influx of job seekers. All labour will be registered and issued ID cards.
    iii. Labour camp will be set up and monitored as per the provisions in Annex IV. Responsibilities for managing these impacts will be reflected as a contractual obligation, with appropriate mechanisms for addressing non-compliance.
    iv. Vaccinating and educating workers against common and locally prevalent diseases.
    v. Mandatory and regular training for workers on required code of conduct (JUIDCO will issue the directives to Contractor and Contractor will accordingly prepare code of conduct)

vi. Details of project, complaint handling mechanism and GRM will be displayed at prominent places such as ULB's office and Deputy Commissioner's office and project sites.

vii. Access to labour camp sites will be restricted to only authorised persons with ID card. Caution boards, barricades, etc., will be used to warn the public about unauthorized access and danger.

viii. Install lighting devices and safety signal devices in the temporary access areas and construction sites.

ix. A transportation plan of materials will be prepared by the contractor, approved by the ULB, and implemented to avoid their delivery at peak traffic hours.

x. Legible warning signs, barriers and signals shall be placed at strategic locations in sufficient number and spacing for allprominent access ways to the sites. Warning signs and otherprotective barriers shall be erected to prevent accidents tocitizens due to open ditches, heavy machinery and constructionvehicles etc.

xi. No equipment/heavy machinery will be parked on the roadside at night, and will be taken to the necessary parking bay.

xii. Security guards will be deployed at critical areas such as labour camps, all active hazardous construction sites, material and fuel storage areas at night time. In addition, the CSQC safety officer will conduct a risk assessment regarding the security arrangements prior to deploying of security guards and necessary risk control measures like additional security, barricading, illumination, will be implemented along the road alignment and construction sites and labour camps.

214. The construction of the proposed road may necessitate the re-routing of some vehicular and pedestrian traffic and introducing traffic delays thereby increasing in travel time. The contractor will follow all necessary arrangements for traffic safety in the OHS plan.

215. The utility shifting activity will be undertaken before the start of construction period byrespective agencies.as presented in.Table 50. If there is a delay in utility shifting, connecting households to new water supply lines, electric lines that may impact the service delivery communities will be notified, and the necessary mitigation actions will be put in place like supply of tanker water.

The GRM and complaint handling mechanism will be made widely available to the public at the ULB office, and signboards on the project site.

Table 50: Utility shifting agencies and timeline

Sl. No.	Utility	Shifting agencies	Tentative Time Line for completion of activity	Mititgation measures

1	Water Supply	DWSD	Five months (new pipeline will be laid and then connected to the distribution system before dismantling of old pipeline)	Old water supply line will not be disconnected until the new line is operational and all households connected to the old system are accounted for reconnection
2	Electrical Line	JBVNL	Five month(new line will be laid before dismantling of old lines)	Electrical lines will as far as possible not be disconnected in summer months. Prior intimation should be given to affected persons
3	Telecommunication	BSNL	Five month(new line will be laid before dismantling of old lines)	

8.1.12 Impacts on Community Structures

Community Structures such as shelters, handpumps will be impacted during the road widening activities, and will be relocated outside the RoW.

Impact Significance

The impact is assessed to be minor, as these will be suitably reclocated and there will be no permanent loss in community sturtcures.

Mitigation Measure

i. Precautions will be taken during construction, for accidental loss/ damage of any communal property and the damage will be repaired immediately up to the satisfaction of community at Contractor's own cost.

ii. In addition, the contractor will consider the following enhancements for the benefit of the community

- Solid waste management: waste collection bin at every bus bay/shelter
- Provision of solar lights: Solar lighting can be considered at critical locations – bridges, bay shelters, crossings.
- Soak pits for hand pumps: For handpumps that need to be relocated, the project can consider soak pit of 1.5m diameter and 1.0m deep made of brick masonry/concrete rings, filled with brick bats and pebbles.

8.1.13 Road Safety

Construction work on the road in the absence of adequate mittigations and occupational health and safety precautions could, lead to unsafe conditions for workers and all road users, including vehicle drivers, pedestrians and cyclists

Injuries and fatalities can arise when there is contact with construction vehicles and equipment. Workers operating construction equipment are most likely to be injured by collisions or overturning equipment. Issues can arise from constricted work sites, bad weather, low light/reduced visibility and vehicle congestion

Impact Significance

The impact is rated as moderate.

Mitigation Measure

To ensure adoption of good construction-related safety practices and appropriate traffic management practices to ensure road safety during the construction phase.

i. For delivery of hazardous substances, three certificates issued by transportation department are required permit license, driving license and guarding license.
ii. Compliance with “Rules” as defined in Environmental (Protection) Act, 1986
iii. Vehicles delivering hazardous substances will be printed with standard signs.
iv. Public security, transportation and fire fighting departments will designate a special route for these vehicles.
v. These vehicles can only be parked at designated parking lots.
vi. In case of spill of hazardous materials, relevant departments will be informed at once & dealt with it in accordance with ERP.
vii. Follow guidelines in OHS plan to ensure safety in storage, handling, use and emergency response for hazardous substances.

8.2 Operation Phase Impacts

8.2.1 Impact on Land

216. No significant impact is predicted during the operation other than those resulting from neglected mitigation measures in disposing of spoiled materials, prevention, tree planting

along the road alignment. It is, therefore, necessary to undertake regular monitoring to ensure that all require mitigation measures are implemented.

Impact Significance

The significance of impact is assessed to be negligible.

Mitigation Measure

i. Borrow area redevelopment will be completed as per Annex III
ii. All temporay haul roads for transportation of material etc. will be redeveloped to the satisfaction of the ULB
iii. Accidental spills probability is quite low as one of the objectives of this project is to enhance road safety.
iv. Affected productive area will be poured with top soil as per Top soil management guidelines

8.2.2 Impact on Air Quality

217. Air pollution will be necessarily prevailing during the operation life of the road due to vehicular emissions of particulates and fumes into air or atmosphere. However, the effect on air quality of the increased traffic flow is significant if no maintenance programme will be installed. As observed in Table 28, current ambient air quality levels are higher than CPCB prescribed norms in some of the locations near the proposed roads.
218. Particulate matter/ Dust raised by passing vehicles will be reduced due to increased/widened paved surface.
219. With the reduction in journey time, idle engine runningtime and air pollution will reduce.

Impact Significance

220. The significance of impact without proper mitigation measures due to vehicular emission is assessed to be moderate.

Mitigation Measures

i. Enforce Pollution Under Control (PUC) Programs. The public will be informed about the regulations on air pollution of vehicles
ii. ULB can consider using street sweeper/vacuum trucks
iii. Avenue plantation to be maintained by ULB along the roadside will reduce dust dispersion.
iv. All Major junctions have been proposed for l plantation and landscaping.
v. Various national initiatives are being taken to reduce vehicle emissions. Fuel-related air pollution abatement measures include vehicle inspection programs, better fuel formulation, availability of unleaded and low sulphur fuels, and promotion/use of

alternate fuels such as compressed natural gas (CNG), liquid natural gas (LNG), and liquid petroleum gas (LPG). These measures, if implemented as proposed, will reduce toxic and greenhouse gas emissions.

vi. Training and measuring equipment need to be provided to traffic police to enable them to enforce to pollution norms

8.2.3 Impact on Ground and Surface Water Quality

221. **Impact on ground water**: The impact on trafficwhich might be expected to show through the presence of oil and grease, including lead—appears minor. Comparative measurements of water quality between bore wells adjacent to the existing road and away from the road in the new alignment suggest that traffic effects are minimal.

222. **Impact on surface water**: Drainage is an important part of road maintenance. Unless road drainage is maintained properly, drains and culverts can block, causing localized flooding and damage to the road itself.

Impact Significance

223. Thesignificance of impact on ground and surface water quality without proper mitigation measures due to the project is assessed to be minor

Mitigation Measure

i. Provision of oil and grease traps with silt filters has been considered to further reduce the risk of contamination.

ii. Regular monitoring and maintenance of drains in roads of NCB-01 and 2 will be a requirement under the Project as per the project O&M EHS povisons in Annex XVI.

iii. Road side drains should be cleaned before the monsoon, and will be maintained to accommodate storm water flow

iv. Solid waste dumping in the culvert areas will be prohibited.

v. Accidental spills are potentially disastrous, but its probability is quite low as one of the objectives of this project is to enhance road safety

vi. The public will be informed about the regulations on water pollution and local people will be discouraged from establishing workshops and car wash near public drinking water source.

8.2.4 Ambient Noise Quality

224. During operation, passing vehicles and trucks will generate noise. As observed in Table 30 current noise levels are higher than CPCB prescribed norms in the proposed roads. This is due to the current configuration of the roads which leads to traffic congestion and increase in noise level.

225. After the development of the proposed road, the noise and vibration impacts will be reduced due to improved road surface, less congestion and free movement of vehicles. In addition, since the vehicular density is expected to be relatively higher, the perceived traffic noise effects will likely be moderate.

Impact Significance

226. The significance of impact on ambient noise quality without proper mitigation measures due to the project is assessed to be moderate

Mitigation Measure

i. At the operation phase, noise and vibration will be reduced through speed control by applying bumps - this is effective since the lowest sound emissions arise from vehicles moving smoothly at low speed.
ii. Vibration will be mitigated by maintaining road surface.
iii. Additionally, adequate avenue plantation across the proposed road will also act as a noise barrier and will reduce the noise impact to minor.
iv. HORN PROHIBITED sign post will be enforced at sensitive receptors.
v. In addition, the ULB and Road Construction Department should invest in long term plan of:
    a. Discouraging local people from establishing sensitive receptor near the road.
    b. The public will be informed about the regulations on noise pollution.
    c. Monitoring of noise pollution will be done by ULB/ RCD as per frequency and location mentioned under the ESMP

8.2.5 Impact on Road Safety

227. The main causes for accidents due to lack of maintenance, reckless driving, defective vehicles, drunkenness, poor road facilities for the pedestrians and cyclists, and, unqualified drivers. The improvement of the proposed road might lead to an increase in accidents due to increase in traffic volume and speed, unless precautionary measures are taken. The problem of road accidents will be more pronounced near residential areas and located in proximity to the road.It was observed that in many settlements along the sub-project road, people have the habit of crossing the road at different points..
228. There is a risk of collision with cattlein the day time with road improvements for the same reason unless provision for cattle crossings are provided.

Impact Significance

229. The significance of impact on road safety without proper mitigation measures due to the project is assessed to be moderate.

Mitigation Measure

i. The ULB and RCD will follow the EHS provisions for O&M phase as indicated in Annex XVI. The road will be provided with adequate cat's eyes, delineators, hazard markers, safety barriers at hazardous locations, pedestrian guardrails, high mast lighting, traffic signals at junction.

ii. Foot over bridges will be provided near De- Nobili school at Ch Km 7.5; and another foot over bridge at Ch Km 9.3. The sidewalks have been proposed in the built-up sections, on both sides, by barrier type (nonmountable) kerb of height 200 mm above the adjacent road surface.

iii. At-Grade Pedestrian Crossing (Pedestrian Crosswalk) at all important intersections and such other locations where substantial conflict exists between vehicular and pedestrian movements (like bus bays, schools and settlement areas etc.) will be provided.

iv. Designated pedestrian crossings with good illumination and road safety barriers will provide for safe movement of people so that habit of crossing the road at different points will also be curtailed.

v. Designated areas for cattle crossing been defined, with road signages to ensure there is no traffic collision, and Go Slow signages.

vi. Service Roads are proposed on Road 11 to provide access to abutting properties and to ensure that the vehicles entering the project road from other village roads shall not enter directly on the main carriageway. This also takes care of the accident blackspot identified by DPR consultants during site investigations.

8.2.6 Induced impacts

The level if risk with induced impacts with the road development is expected to be moderate. The city is expected to expand in the direction of road 11. It is likely that property value within proximity within Road 11 will appreciate, and agricultural land will slowly be convereted to residential areas. The improvement of Road 11 will overall improve acess into the city and consequently and commercial development to new residents will also follow.

9 SOCIAL IMPACT ASSESSMENT

9.1 Introduction

2. The project thus involves an integrated approach towards planning and design, incorporating close cooperation of the engineering, environment and social sector teams. The social assessment for impact analysis of the project was carried out through a series of complementary processes. Data for SIA was collected through various primary and secondary sources.

9.2 Findings of Social Impact Assessment

9.2.1 Scope of land acquisition and Social Impact

The existing ROW of the projects road varies from 45 mtrs to 52 mtrs. The sub-project roads has such been designed that all the improvement activities will be carried out within the existing ROW and thus no land acquisition is involved in the sub-project. The existing ROW is encroached and thus to analyse the level of impacts on the structures and the livelihood of the families doing business within the existing ROW, a census survey of the affected families was conducted along with photography and videography of potential Project affected persons. Based on the census survey it is estimated that:

- In total, 258 private structures will be affected due to the road improvement
- All the affected families are non-titleholders i.e. either encroachers or squatter. About91 percent of the properties affected are under commercialuse.
- About 83 percentof the affected structures are either temporary or semi-permanent structure.
- In this project, 103 households will be physically displaced and 116 will be economically displaced.

9.2.2 Loss of Community Property Resources (CPR)

230. There are altogether 19 CPR in the NCB-01 and NCB -02 project area. The detail of number of community properties, which may face relocation, has been mentioned in table below:

Table 51: Loss of Community Property Resources

Sl. No.	Type of Properties	Number
1	Religious Structures	07
2	Waiting Sheds	10
3	Statues	02
Total		19

Source: Census Survey, March, 2017

- 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.

9.4 Social Impact Mitigating measures

3. The Resettlement Policy framework has been formulated to lay down the principles and procedures for management of resettlement impacts caused by the JMDP project and entitlements matrix for the project affected eligible Persons. This Resettlement Policy framework shall apply to all sub-project roads under JMDP, including Dhanbad Road NCB-01 &02, whether partly or fully funded by World Bank during the entire period of loan assistance. Hence, this Resettlement Action Plan is prepared. The census survey date 02.03.2017 of potential PAPs will serve as the cut-off date for establishing eligibility for entitlements. The RAP will be implemented over a period of 24 months.

4. As a part of its disclosure requirement, this draft RAP shall be made available to the public in accordance with relevant provisions of the RTI Act. The draft RAP after approval of World Bank can be accessed at the website of JUIDCO www.juidco.jharkhand.gov.in as well as in the website of Dhanbad Municipal Corporation(www.dmcdhanbad.gov.in) for feedback and comments from stakeholders. The revised RAP shall be disclosed again after incorporation of comments, if any.

R&R budget has been worked out for the sub-project based on impacts identified during the census survey. Since the subproject do not involve land acquisition, the R&R cost includes cost of structures and R&R assistance as per the entitlement matrix. Contingency provisions have also made to take into account any variations from estimated R&R cost. The total R&R Budget for NCB-01 and NCB-02 is Rs. 4.53 crore and Rs. 2.75 crore respectively.

9.3 Gender issues and Action Plan

5. 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. The details have been discussed in table below:

Table 52: Gender Data of Jharkhand and India

Items	Jharkhand	India
Gender Related Development Index (GDI)	0.558	0.590
GDI rank (out of 35)	29	122
Gender Empowerment Measure (GEM)	0.435	0.497
GEM rank (out of 35)	26	Not Applicable

Source: Jharkhand Factsheet

The main gender issues in the project is inequality in accessibility to urban infrastructure and services, safety and security of the women, inequality in participation of women workforce and awareness of women about their rights.

The project will ensure easy accessibility to improved urban infrastructure and services through better roads. Proper street lighting will increase the safety and security of women. There will also be a provision for the contractor to employ local people, preferably women. The RAP implementing consultant/NGO would increase the awareness among the women regarding their rights and opportunities available from the project.

The monitoring indicators shall include number of women employed and their wages through the contractors progress report and monthly status of the grievance disaggregated by gender (GRM).

Gender Action Plan

Actions	Indicators	Responsibility	Timeframe
Output 2. Capacity of JUIDCO, ULBs andconsumers community in project town			
2.1 Prepare and implement gender-sensitive behavior change communication (BCC) plan for project towns	► A gender-sensitive BCC plan will be developed and implemented in all project towns focusing on road safety awareness. Minimum 50% women participants will be ensured.	PMU/PIU/ULBs (support from PMC/PMU)	Pre-Construction Stage
2.2 Conduct awareness generation programs in project towns	► Awarenessgenerationprograms on road safety will be conducted in each project town, ensuring, 50% womenparticipants.	ULBs (support from PMC/ PMU)	Construction to operation
2.3 Constitute Grievance Redressal Committees (GRCs)in each sub-project	► GRC will be constituted for Dhanbad with at least one women member.	PIU/ULBs (support from PMC/PMU)	
2.4 Designate a gender focal point in JUIDCO.	► Designated social expert will function as Gender Focal Point for all women related grievances.	JUIDCO/PMU	Pre Construction stage to operation
2.5 Develop gender-sensitive training/learning material for ULBs	► Training/learning material will be prepared for ULBs staff on gender sensitive O&M services andurban servicemanagement ► Learning material on community based participatory planning,monitoring and evaluation	PMU (support from PMC)	Pre Construction stage to operation

Actions to be Taken

6. The Vishakha Guidelines are a set of procedural guidelines for use in India in cases of sexual harassment. They are promulgated by the HYPERLINK "https://en.wikipedia.org/wiki/Supreme_Court_of_India" \o "Supreme Court of India" Indian Supreme Court in 1997 and was superseded in 2013 by ' HYPERLINK "https://en.wikipedia.org/wiki/The_Sexual_Harassment_of_Women_at_Workplace_(Prevention,_Prohibition_and_Redressal)_Act,_2013" \o "The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013" The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013'. The Jharkhand High Court in the Writ Petion (PIL) 5497 of 2011 had ordered the State of Jharkhand to strictly enforce the directions of the Honourable Supreme Court and also advised to enact legislation in tune Tamil Nadu Prohibition of Eve Teasing Act, 1998 and Delhi Prohibition of Eve Teasing Act, 1998.

7. As per the information of Jharkhand State Commission for Women (JSCW), around 10 Government organisations have confirmed the functioning of Anti sexual harassment cells till the December of 2016. The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act 2013 under Vishaka Guidelines mentions an employer to set up an Internal Complaints Committee (ICC) at each office or branch with more than 10 employees of any gender. Inability to form such a cell can charge a sum of Rs 50,000 from the employer. JSCW had written letter to the chief secretary for prompt formation and functioning of such cells in all private as well as government departments for the sake of women employees. Involvement of an NGO member and a woman employee is mandatory in the cell also referred as ICC. But the formation of such cells in all the government and private offices is in process.

9.4 Labour Influx Management and Child Labour

8. The construction of civil works for which the required labor force and associated goods and services cannot be fully supplied locally for a number of reasons such as worker unavailability and lack of technical skills and capacity. In such cases, the labor force (total or partial) would need to be brought in from outside the project area from nearby municipal towns and villages and sometimes outside the state. This rapid migration of labor to the project area may affect the project area negatively in the terms of additional burden on public infrastructure such as local social and health services, utilities such as water and electricity,

housing and social dynamics and thus impact on local communities. Other related issues could be increased risk of spread of communicable diseases, and increased rates of illicit behavior and crime. Some of the adverse environmental impacts are illegal waste disposal sites, inappropriate Wasterwater discharges, camp related noise, access roads and land use issues. Such adverse impacts may get amplified by local-level low capacity to manage and absorb the incoming labor force, and specifically when civil works are carried out in, or near, vulnerable communities and in other high-risk situations.

9. For the construction of the road project, the expected required number of skilled labours and unskilled labours for NCB-1 are 61 and 298 respectively. About 20% (70 nos.) of skilled labours and unskilled labours may come from outside the Dhanbad city. The labour camp for 70 nos. of labour shall be expected, the remaining number of labours shall be employed from nearby villages/areas. Out of 61 nos. of skilled labours, it is expected that about 15-20% shall get the rented accommodation by the contractor.

10. The expected required number of skilled labours and unskilled labours for NCB-II are 36 and 164 respectively. About 20% (40 nos.) of skilled labours and unskilled labours may come from outside the Dhanbad. The labour camp for 40 nos. of labour is expected, the remaining number of labours shall be employed from nearby villages/areas. It is expected that about 15% of skilled labours shall get the rented accommodation by the contractor.

11. Thus about, 20% labour/technicians will come from outside; therefore, chances of conflict between immigrant labour force and local community are rare. In this regard, directives will be issued to the contractor to manage the migrant labour. In addition to the above, there may be issues relating to child labour andsafety and security of women. A committee will be set up in each sub project district to look after the issues pertaining to child labour and ensure that children below 14 years are not employed in any of the sub-projects.While the sub project ESIAs would require to assess such potential issues linked to temporary project induced labour influx, the specific impacts can only be assessed once the contractor is appointed and decides to outsource labour.

12. Some of the risk factors identified are (i) weak institutional capacity of the implementing agency; (ii) many contractors without strong worker management and health and safety policies; (iv) pre-existing social conflicts or tensions; (v) weak local law enforcement, and (vi) prevalence of gender-based violence and social norms towards it in the community (vii) local prevalence of child and forced labor. (Viii) perception of insecurity by the local community due to illicit behavior or crimes including theft, physical assaults, substance abuse, human

trafficking etc and (ix) limited availability of affordable accommodation and rents within Municipal area.

13. There are multiple and comprehensive Acts and Rules at both state and national level (Chapter 3) that set out the provisions for appropriate working conditions and for good labour management. However, multiplicity of laws and rules sometimes cause confusion in its applicability in a specific context. Further in case of contracted workers and Primary labor suppliers the enforcement weakens.

14. Hence, the contractor would require to develop sub project specific labour management procedures and mitigation measures in the C-ESMP before the start of works and monitor and update the labour management Plan as necessary during the course of the project. JUIDCO would develop a separate training module with the help of technical partner to build the capacity of JUIDCO, Supervision Consultants and Contractors in preparation and execution of this labour management Plan.

15. This Labor Management Plan would address specific activities that will be undertaken to minimize the impact on the local community, including elements such as

- Communication and awareness plan on national labour and women harassment laws and its penal implications, leave provisions and other allowances for workers benefit,
- Worker codes of conduct with respect to manual scavenging, engagement with local residents, child labor, nondiscrimination, harassment of coworkers including women and those belonging to SC and STs and other minority social groups.
- Training programs on HIV/AIDS and other communicable diseases, etc.
- Workers' Camp Management Plan addressing specific aspects of the establishment and operation of workers' camps provided the ULB is unable to cater to the demand for affordable housing for this additional workforce in terms of rentals, hostels, apartments etc.
- Compliant handling Mechanism at the sub project level

16. The responsibilities for managing these adverse impacts is being clearly reflected as a contractual obligations of the Civil Works Contractor and Supervision Consultant, with appropriate mechanisms for addressing non-compliance.

10 ENVIRONMENT AND SOCIAL MANAGEMENT PLAN

231. This section describes the environmental and social measures to be implemented in NCB-01 & 02 packages to mitigate the impacts that are anticipated as a result of the project activities proposed at project site NCB-01 &02. These measures will be implemented to mitigate the adverse impacts of the project and enhance its positive impacts, by avoiding impacts where possible, and by reducing, remedying or compensating for impacts where they cannot be avoided. The Environment and Social Management Plan (ESMP) for the project represents a consolidated list of mitigation measures and aims to:

- Set out the arrangements that will be put in place by the project to manage the environmental and social performance of the project during construction phase
- Describe the monitoring programmes required to assess accuracy of predicted impacts and adequacy of mitigation strategies; and
- Provide a comprehensive listing of the various mitigation and monitoring measures that are to be implemented to avoid or reduce negative impacts and enhance postive impacts.
- Ensure compliance with the applicable National, and State Environment and Social laws and regulations as well as the World Bank's safeguard policies.
- Institutional arrangements that are and will be put in place by JMDP for the environmental and social compliance.
- Detail the plan for periodic monitoring of the effectiveness of the mitigation measures and residual impacts.
- Outline the capacity building plan for enhancing the capacities of the key stakeholders on environmental and social management.
- Detail the budget requirements for implementation of the ESMP
- Provides a framework for compliance auditing and inspection of the project that will give the regulators and external stakeholders the assurance that the project's commitments to environmental and social mitigation and its aims with respect to environmental and social performance are being met.

232. The primary objectives will be to comply with:

- All applicable Indian legislation as identified in Chapter 3
- World Bank Safeguard Policies, where these vary the most stringent standard will apply, as identified in Chapter 3
- And local state level policies, as identified in Chapter 3

- Ensure all E&S permits and clearences applicable to the project have been provided.

10.1 Institutional Arrangement for ESMP Implementation

233. The key institutional arrangements and capacity for the nimplementation of the ESMP, their roles and responsibilites are outlined in this section.

Table 53: Key institutions for EMP implementation

Level	Implementing institutions	External institutions servicing the sub-project	
State	JUIDCO – Project Management Unit (PMU)(already in place) - Environmental Specialist - Social Specialist	JUIDCO's Project Management Consultant (PMC) - Environmental Specialist - Social Specialist	
Dhanbad ULB level	JUIDCO – Project Implemetation Unit (PIU) - Environmental Specialist - Social Specialist	Contractor - Environmental Health and Safety Specialist - Social Specialist	JUIDCO's Construction Supervision and Quality Control Consultant (CSQC Consultant) - Environmental Health and Safety Specialist - Construction Safety officer

234. **JUIDCO-PMU**: JUIDCO is the primary implementing agency for the JMDP under which the Dhanbad-Road sub-project is being implemented. JUIDCO has established a Project Management Unit (PMU) for JMDP, which has a dedicated environment and spcial specialist. The JUIDCO-PMU will have ultimate responsibility and obligation to ensure for implementing the provisions of the ESMP. This role will include on-going identification and management of environmental impacts, monitoring social and environmental performance, ensuring availability of committed human resources and budget for ESMP implementation, periodic monitoring and reporting on ESMP performance. JUIDCO PMU will also carry out regular training on EHS aspects especially for construction stage, orientation and experience sharing programs to enhance the knowledge and capacity of the project staff. JUIDCO-PMU will coordinate with Project Implementing Unit (PIU) and Project Management Consultant (PMC) for effective monitoring of the ESMP. The JUIDCO PMU will draw support from safeguards specilists from the project management consultant's team if needed.

235. The PMU will also put in place training programmesas per the ESMF for contractors staff on environment and social impacts in construction stage which include OHS management,

maintainence of labour camp code of conduct and hygene, use of PPE, HIV prevention, gender, and maintaining hazard free work spaces JUIDCO-PMU will coordinate with Project Implementing Unit (PIU) and Project Management Consultant (PMC) for effective monitoring of the ESMP. The JUIDCO PMU will draw support from safeguards specilists from the project management consultant's team if needed.

236. **JUIDCO-PIU:** The PIU located at the ULB level, this will be established and have a dedicated environment and social specialist to supervise and monitor the contractor's performance in implementing the ESMP. The PIU will assume direct responsibility for day-to-day project management, coordination and implementation of the sub project. The PIU will also supervise implementation of ESMP, and submit monthly progress reports to the PMU; and, will monitor the financial and physical progress of ESMP, adequacy of public consultation and compliant handling, and grievance redressal. It will also facilitate smooth coordination between the contractor, CSQC and the relevant government departments (ultilities, forest, traffic management etc.) for ESMP implementation. The PIU will also form the formal link between he ULB and JUIDCo, obtaining various clearances and approvals required and essential for project implementation, and reporting ESMP non-compliance to the PMU.

237. **CSQC Consultant:** The CSQC Consultant will have a full-time Environment, Social, Health ans Safety specialists to undertake day to day supervision of the implementation of the ESMP, labour management, OHS and waste management provisions, including all mitigation, management and monitoring measures by the Contractor, will provide required on-site guidance for safeguards compliance, and and non-compliance, will report on safeguards compliance to the PIU. The CSQC consultant firm will also have a full-time construction safety officer on board, specifically dedicated towards monitoring site, safety, accident prevention and hazardous work sites. The scope of work for the CSQC ESHS specialist is attached in Annex XII

238. **Contractor:** The contractor will be responsible for implementation and adherence to all the mitigation measures, monitoring and inspection arrangements outlined in this ESMP associated with their respective activities. The contractor will be required to comply with the mitigation provisions, specifications, drawings of the ESMP and with any related codes of conduct required by JUIDCO.The contractor selection process will include consideration of the capacities of the entities to ensure compliance to legal environmental and social requirements as well as adherence to the ESMP. The contract conditions will emphasize the obligations of the contractor on both these aspects. The contractor will put in place experienced specialist in the roles of Environmental Health and Safety; and Social as a part of the implementation team.

239. **State Pollution Control Board** The state pollution control board (JSPCB) will provide CTO and CTE for all plants and machinery.

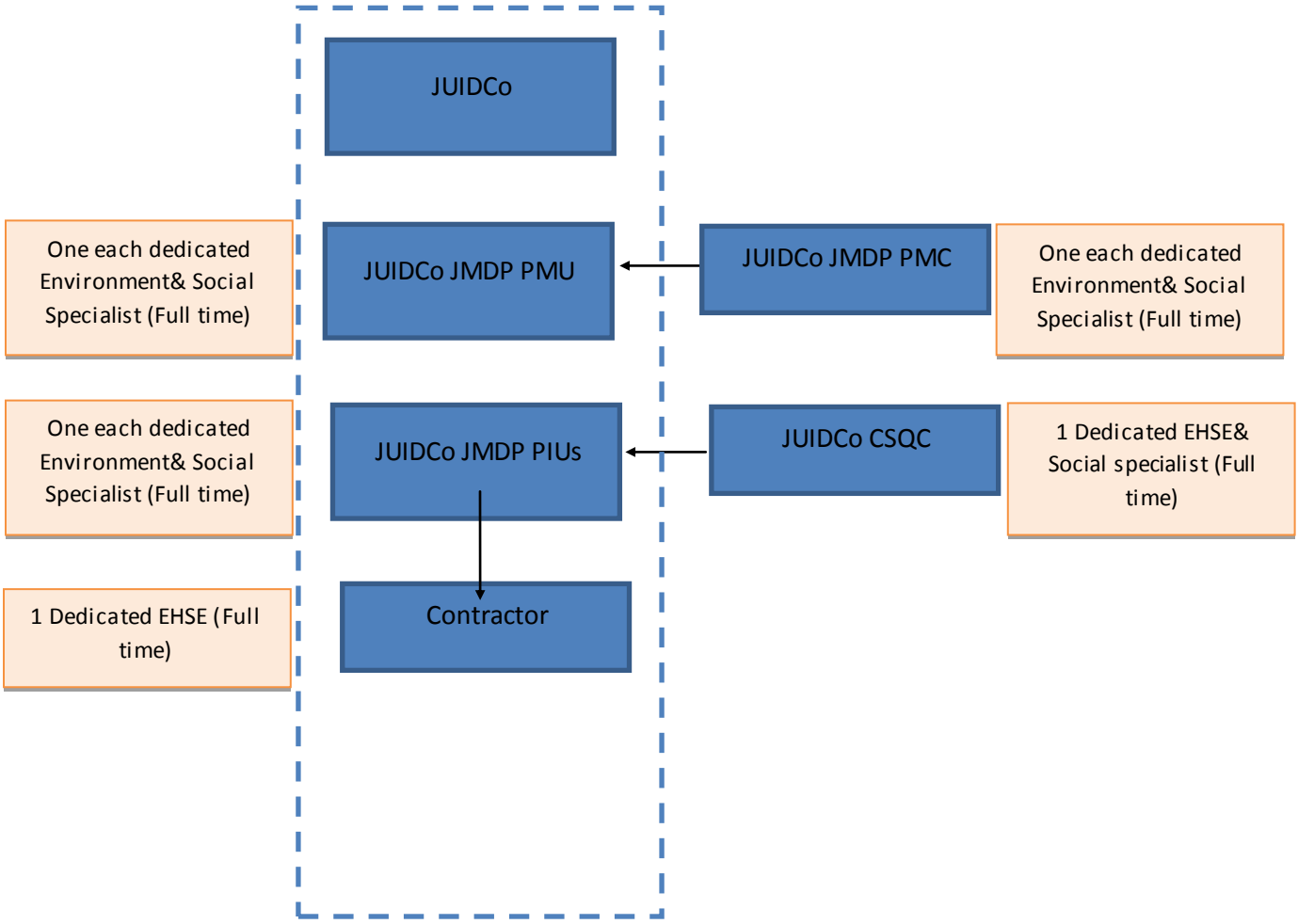
240. **Dhanbad Municipal Corporation:** The ULB officers, engineers will form an integral part of the PIU. However, the ULB will also support the sub project implmentation in conducting information education and communication activities, addressing compliants, assistance in obtaining necessary government approvals for waste management, water withdrawal, and raw material requirements.

241. **Road Construction Department:** As the RCD is the owner of the road, all O&M will be carried by the RCD including maintainence of landscoaping and compensatory plantation.

242. **Forest Department:** The Forest Department, Divisional Forest officer will supervise the tree cutting and transplantation activities and ensure that all activities are conducted as per the reccomednaton of the HPCC in Annex XV.

243. The organogram of the project is presented below:

Figure 24: Organogram of JMDP



244. The human resources in each of these institutions for EMP implementation will be as follows:

Level	tution	an Resources
State	CO PMU	ime dedicated Environment& Social Specialist
State + Regional	JUIDCO PMC	Full time dedicated Environment& Social Specialist
Regional/ ULB	JUIDCO PIU	1 dedicated Environment Engineer& Social Specialist
Regional/ ULB	CSQC Consultant	Full time Environment Social Health and Safety Engineer& Social Specialist
Project Site	Contractor	Full time Environment Health and Safety Engineer

10.2 Structure of the ESMP

245. The ESMP discusses the aspect/potential impacts and specific action to be taken for its management. It refers to the responsible person ensuring commitment for implementation and means of verifying whether the same has been implemented. The timing and frequency of monitoring along with the supervision responsibility and reporting requirements are also provided.

10.2.1 Project Commitments

246. As a part of the EMP, JUIDCO will commit to recognizing the environmental issues, social and livelihood impacts of the local communities and stakeholders at the individual project site. Overall, JUIDCO/PMC/the Contractor will not restrict or curtail the rights of local communities around project to be developed during the developments of the project other than for interventions that are necessitated from the perspective of community health and safety.

10.2.2 Contractor Management

247. The CSQCwill be responsible for the performance of all contractors with the overall accountability resting with the JUIDCO-PMU. This will include regular training, monitoring and ensuring that all EMP commitments and policy requirements are translated into ‘contractors' requirements and that these requirements are implemented to their full intent and extent.

248. Contractors will be responsible for implementation of and adherence to all the mitigation measures outlined in this ESMP associated with their respective activities. All contractors will be required to comply with the provisions of the ESMP

Revisions to the ESMP

249. In case of any future changes in the sub-project design the ESMP will need to be updated to reflect the new scope of the activities. The environmental specialist in CSQC firm, and JUIDCO- PIU will identify any safeguard issues relating to the new design elements, and mitigation measures for the same. In case of substantial revisions, this will be finalised in consultation with the PMU.

10.2.3 Safeguards Audit.

250. There will also be an annual safeguard audit carried out for the JMDP projects, by an independent consultant. ESMP and all its provisions will be sudited, and where required the consultant firm will make reccomendations for improvement. The contractor would need to take corrective action, supervised and verified by the JMDP PIU.

10.2.4 Environmental Management Plan

251. The proposed project would influence the environment during the construction phase which would be temporary and short-medium term.Before the start of construction work, theProject Engineer, contractor's team will carry out joint field verification of the EMP. The efficacy of the mitigation measures suggested in the EMP will be checked and if required, the Engineer will modify the EMP and BoQs associated with the mitigation measures.Adittionaly JUIDCO shall organize orientation sessions for all contractor staff of and field level implementation staff of Contractor and all consultants on environment and social management for management of construction phase impacts

252. A checklist of potential Environmental and social impacts of NCB-01 is presented Table 54 and for NCB-02 is presented in Table 55 below along with proposed mitigation and monitoring measures.

Table 54: Environmental Management Plan for NCB-01

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
Pre- construction Phase					
1.1	Joint Field verification of ESMP (no impact)	► The Project Engineer, Contractors Team will carry out joint field verification with CSQC team of the ESMP. The efficacy of the mitigation measures suggested in the EMP will be checked. If required, the Engineer will modify the BoQs associated with the mitigation measures.	A field verification survey report will be prepared by the contractor and verified by CSQC	Implementation: Contractor Supervision: CSQC and PIU	Pre- construction- one time survey
1.2	Information Dissemination and Communicatio n Activities (no impact)	► Prior to construction activity, information dissemination will be undertaken by JUIDCO and the ULB at the project site and at the city level. The wider dissemination of information to public will be undertaken by JUIDCo through the	JUIDCo PIU and CSQC will ensure all information signages at all key locations has been displayed.	Implementation: Contractor Supervision: CSQC and PIU	Pre- construction

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		disclosure of ESIA / ESMP reports in the website of the ULB and JUIDCo. ► At the project site, i.e. the direct impact zone, information boards will be displayed to disseminate the project details including at cultural and common property resource sites. Such information boards will display project name, concerned official's name in the engineer's office with his designation and contact no., name and contact details of an authorized official in local JUIDCo PIU office. These information boards will be approximately of size 5' x 5' and will be designed and put up in such a way that public can easily read it from a distance. ► boards will also be setup at the sites of construction camps and labor camps and other project facilities like borrow area and debris disposal site. These information boards will also mention the availability of a complaint register with ESHS officer of the CSQC consultant.			
1.3	ESHS Training to Contractors team and project staff (no impact)	JUIDCO shall organize training sessions for all contractor staff, PIU, CSQC and field level implementation staff of Contractor and all consultants on environment and social management in construction stage, use of	Training of all project staff and contractors team should be undertaken in mobilisation phase	JUIDCo PMU	Pre-construction

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		PPE, Contractors code of conduct, HIV prevention and gender aspects.	before construction activity commences.		
1.4	Siting Common property management (refer to impacts associated with cultural and community properties relocation)	All affected common amenities such as community hand pumps, cultural properties, etc., will be relocated with consent of the using community. All relocaton activities will be undertaken as part of the RAP. The relocation site identification will be in accordance with the choice of the community and completed before construction starts. stakeholder meetings with the community will be held to discuss the relocation aspects, the structures, and accessibility to the structures.	All environmental management and mitigation measures in the PCR Plan in Annex XIII will be followed by the contractor's team. RAP implementing agency will submit a completion report, once relocation activities have been satisfactorily completed.	Implementation: Contractor Supervision: CSQC and PIU	Pre-construction
1.5	Loss of handpumps /borewells (refer to impacts associate with community properties/ resources relocation)	Water sources (16 tube wells, 14 handpumps) to be replaced by the contractor at a location suitable to the community.	JUIDCO PIU environment and social specialist will supervise the activity and ensure all water sources are relocated prior to road construction.	Implementation: Contractor Supervision: CSQC and PIU	Continous throughout relocation activity.

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
1.6	Utility shifting (refer to impacts associate with community properties/ resources relocation)	i. Prior permission will be taken from regional offices of Electricity, Telecommunications, OFC, Water works etc. ii. Any CPR, if removed shall be relocated at the earliest with consent of the villagers and the Gram Panchayat to suitable location in consent with the villagers iii. All utilities and common property resources impacted (permanently) due to the project will be relocated with prior approval of JUIDCo before construction starts. (Shifting of electrical poles, telephone poles, optical fibre cables and water mains in the RoW, by the respective State agencies. iv. Utility/ CPR shall be relocated at the earliest	JUIDCo PIU will supervise the utility shifting activity and ensure that there are no delays or inconveninces caused to the dependent communities. JUIDCo will ensure the ESMP provisions apply to all executing agencies conducting the utility shifting activities.	Implementation: Government Departments of Water Supply (DWSD), Electrical Line (JBVNL), Telecommunicati on (BSNL) Supervision: CSQC and PIU	Continous reporting in ESMP progress report over 5-month time taken by departments.
1.7	Tree Cutting and Transplantatio n Actvities (refer to impact on terrestrial ecology)	A total of about 1553 trees fall within formation width which needs to be felled (Refer Annexure VIII). Tree cutting to be undertaken by Contractor. JUIDCo will obtaining tree felling permission from DFO, Dhanbad. Contractor will follow the mittigaton and provisions in Tree Cutting and Transplantation Annex VIII All OHS managtement provisions for tree cutting activities will be followed as per Annex VI	Permission for tree cutting and transplantation works to be obtained by JUIDCo All provisions of Annex VIII will be monitored.	Implementation: Contractor Supervision: JUIDCo PIU, CSQC and DFO Dhanbad.	Continuous throughout tree cutting, transplantation activities.

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
1.8	Storage of construction materials	JUIDCO PIU, Contractor consultation with ULB shall identify the site for temporary use of land for construction sites /storage of construction materials including pipes etc. These sites shall not cause an inconvenience to local population / traffic movement. These locations shall be approved bythe engineer in charge.	Approved areas will be demarcated, the necessary barricading and security arrnagments will be provided by the contractor	Implementation: Contractor Supervision: CSQC and JUIDCo PIU	Pre- Construction
1.9	Setting up of Labour Camp	Labour camp site will be identified and set up over area of 2 acres as per the provisions in Annex IV. Approximately 50-60 labour will be housed in the camp site. Labour camp sites should be located close to the project area.	JUIDCo PIU and CSQC will assess that the labour camp has been set up in accordance with the provisions/specifications in Annex IV. A Labour camp inspecition checklist will be furnished in monthly ESMP report.	Implementation: Contractor Supervision: CSQC and JUIDCo PIU	Pre- Construction
1.10	Sites for Debris disposal	The contractor will follow the provisions of the waste management plan in Annex V. Based on the sites provided by ULB and JUIDCo for construction debris disposal, will update the plan.	JUIDCo PIU and CSQC will verify sites and ULB consent.	Implementation: Contractor Supervision: CSQC and JUIDCo PIU	Pre- Construction
1.11	Siting of Hot mixplants,	Asphalt mixing plants will be sited over 1000 m (refer CPCB/SPCB,) from any community,	CSQC will verify locations	Implementation: Contractor	Pre- Construction

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		water bodies All maintenance facilities, hot mix plant and concrete mixing plant shall be established with prior consent to establish to be obtained from SPCB. All such equipment/plant shall be fitted with air pollution control system and shall comply with condition of consent to establish. Periodic monitoring shall be carried as per consent conditions.		Supervision: CSQC and JUIDCo PIU	
1.12	Clearances, Approvals and Permits	List of clearances/ permits and licenses required prior to start of construction activity is provided in E& S permissions required Provide a copy of all necessary clearances to the PIU	JUIDCo PIU to check all records of licenses, permits, and clearences	Implementation: Contractor Supervision: CSQC and JUIDCo PIU	Before Construction Activity begins. PIU will ensure the contractor will adhere to all clearance terms and conditions
1.13	Raw Material Sourcing	i. Use of Fly ash in concrete works – Fly ash should be utilized from the nearest power station. ii. Borrow pits to be identified given the shortlisted areas by JUIDCo, and confirm to Borrow Area Management Plan in Annex II iii. Quarrying will be carried out at approved and licensed quarries only. Three registered quarry areas have	JUIDCO PIU and CSQC to verify licences and permits for raw materials.	Implementation: Contractor Supervision: CSQC and JUIDCo PIU	Before Construction Activity begins

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		been identified for the construction of project road Gobindpur, Palani, Baliapur Quarry & Crusher. iv. No excavation from the bund of the water bodies. v. Prior written permission from authorities for use of water/ tanker water for construction activity will be submitted to the PIU			
2	Construction phase				
2.1	Community common property resources (impact- minor)	i. Precautions will be taken during construction, for accidental loss/ damage of any communal property and the damage will be repaired immediately up to the satisfaction of community at Contractor's own cost. ii. In addition, the contractor will consider the following enhancements for the benefit of the community • Waste collection bin at every bus bay/shelter • Solar lighting can be considered at critical locations – bridges, bay shelters, crossings. • For handpumps that need to be relocated, the project can consider	Visual Site Inspection	Implementation: Contractor Supervision: CSQC and JUIDCo PIU	Daily monitoring by CSQC & PIU will submit Monthly ESMP implmentation compliance report to PMU

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		soak pit of 1.5m diameter and 1.0m deep made of brick masonry/concrete rings, filled with brick bats and pebbles.			
2.2	Land Contamination (impact- minor)	▶ The construction contractors will have control over the amount and types of waste (hazardous and non- hazardous) generated at the site and should have an estimated inventory prior to start of construction ▶ Construction contractor will ensure daily collection at a designated storage area and periodic (monthly) disposal of construction waste generated debris, concrete, metal cuttings wastes, waste/used oil etc. ▶ Septic tank and soak pit will be provided at labour camps for sewage/wastewater management during construction phase ▶ The municipal waste from the labour camp will only be routed through proper collection and handover to local municipal landfill for disposal ▶ Unauthorised dumping of used oil and other hazardous wastes will be prohibited ▶ Excess excavation spoil will be dumped in areas designated by the Municipal Corporation ▶ Spill control measures such as the storage	▶ Record of waste (Hazardous & Non-Hazardous waste) generated, collected, segregated and disposed or recycle. ▶ Memorandum of Understanding with approved recycler of JSPCB for disposal of Hazardous waste if generated. ▶ Location of site for disposal of construction waste /debris	Implementation: Contractor Supervision: CSQC and JUIDCo PIU	Daily monitoring by CSQC & PIU will submit Monthly ESMP implmentation compliance report to PMU

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		and handling of chemicals and fuel in impervious areas with secondary containment will be implemented to minimize impacts in the event of a spill ► Obtain prior authorization for collection, storage and disposal of construction phase related hazardous wastes; ► Contractor will follow all provisions of the Waste Management Plan in Annex V ► JUIDCO will finalize road design and alignment to minimize waste generation through balancing of cut and fill operations and minimizing excess cuts requiring disposal ► JUIDCO will provide its contractor site for disposal of debris. Contractor should obtain all clearance requirements if required from regulatory agencies ► Slope stabilization techniques and erosion control measures will be planned such as increasing vegetation, sausage walls/ gabions (IRC: SP: 48 – 1998), bally benching (IRC: SP: 48- 1998)			
2.3	Soil Erosion and drainage (impact- minor)	► Contractor will follow the provisions of the borrow area management plan Annex II, and Top Soil Management in Annex III ► The disturbed areas and soil stock piles will	► On site observation/inspection ► Existence of soil	Implmentation: Contractor Supervision:	Daily monitoring by CSQC &PIU will submit Monthly ESMP implmentation

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		be kept moist to avoid wind erosion of soil. ► Small bunds will be created in case of any activities near the water body or drainage areas within the site to prevent washing of the soil into these waterways; ► Silt/sediment trap will be provided in areas susceptible to high erosion. ► The contractor will plan the activities so that no bare/ loose earth surface is left out before the onset of monsoon, for minimizing the soil erosion following preventive measures to be taken such as slopes will be covered, soon after completion ► Top soil from borrow area, debris disposal sites; borrow area, construction site will be protected/covered for soil erosion. ► Debris due to excavation, dismantling of existing cross drainage structure will be removed from the water course immediately. ► Diversions for bridges will be removed from the watercourse before the onset of monsoon. ► Construction activities will be planned accordingly to take advantage of non-rainy season and major excavation work will be	erosion sites ► Number of soil erosion sites/ occurrences of soil erosion	CSQC and JUDCo PIU	compliance report to PMU

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		completed during dry season itself; ► Stripping of topsoil/ top layer will not be conducted earlier than required i.e. vegetation cover will be maintained for as long as possible in order to prevent the erosion (wind and water) of soil. Topsoil, found to be fertile will be used for landscaping purpose ► Diversions will be constructed during dry season, with adequate drainage facility, and will be completely removed before the onset of monsoon. ► Road Side drains are provided on both sides of the road, obstruction if any to be removed immediately. ► Increased runoff due to increased impervious surface is countered through increased pervious surface area through soak pits.			
2.4	Traffic Management and Road Safety (impact-moderate)	► Idenitfy black spots and mark them ► Contractor will follow Traffic Management Provisions in OHS plan in Annex VI ► Traffic Management/ diversions will be prepared in consultation with Dhanbad Traffic police department. ► Install proper Signange, flags, barricading ► For delivery of hazardous substances,	On site visual inspection Inspection of signages, barricading Compliance with Traffic Management Provisions in OHS plan in Annex VI	Contractor (primary responsibility) JUIDCO – PMC/PIU/ PMU (verification)	Daily monitoring by CSQC & PIU will submit Monthly ESMP implmentation compliance report to PMU

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		three certificates issued by transportation department are required permit license, driving license and guarding license. ► Compliance with "Rules" as defined in Environmental (Protection) Act, 1986 ► Vehicles delivering hazardous substances will be printed with standard signs. Public security, transportation and fire fighting departments will designate a special route for these vehicles. ► Construction vehicles can only be parked at designated parking lots. ► In case of spill of hazardous materials, relevant departments will be informed at once & dealt with it in accordance with ERP.			
2.5	Soil Compaction due to vehicular movement (impact- minor)	► The movement of heavy machinery/ vehicles willbe designated in the corridor of impact to avoid soil compaction in other areas ► Construction material will be stored in designated area only ► Restoration of compacted area as soon as possible ► All service roads, haul roads will be redeveloped.	On site observation / visual inspection	Implementation: Contractor Supervision: CSQC and PIU	Daily monitoring by CSQC & PIU will submit Monthly ESMP implmentation compliance report to PMU

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		▶ Construction material will be stored in designated area only			
2.6	Impact on Water Quality (impact- minor)	▶ Septic tank and soak pits will be provided (as per specifications given in IS 2470 1995 Part I and Part II) o at labour camp for treatment and disposal of sewage, thereby minimizing the adverse impacts of wastewater discharge ▶ Proper cover and stacking of loose construction material will be ensured during construction of outfall structures at construction site to prevent surface runoff and contamination of receiving water body ▶ Use of licensed contractors for management and disposal of waste will be encouraged ▶ Toilets, soak pits and septic tanks, waste collection areas, storage areas will be located at least 200m away from natural drainage channels and water bodies; ▶ Emergency Response Plan in Annex VII will be adopted for immediate cleaning of spills and leakages. ▶ Labourers will be given training towards proactive use of designated areas/bins for waste disposal and encouraged for use of	On site observation / visual inspection Ensure all wastewater streams are properly treated No turbidity of surface water bodies in the indirect area of influence. Records of Presence/ absence of water logging along the road and service roads.	Implementation: Contractor Supervision: CSQC and PIU	Daily monitoring by CSQC&PIU will submit Monthly ESMP implmentation compliance report to PMU

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		toilets. Open defecation and random disposal of sewage will be strictly prohibited. ► Proper cover and stacking of loose construction material will be ensured during construction of outfall structures at construction site to prevent surface runoff and contamination of receiving water body; ► Licensed contractors will be used for management and disposal of hazardous waste ► Construction labour will be restricted from polluting the water or misusing the water ► Equipment and vehicle washing/workshops near water bodies will be avoided.			
2.7	Increase in air pollution (impact-moderate)	► Suppression of fugitive dust emissions will be undertaken by spraying water, wetting of the stockpile, proper location of material stockpiles, especially sand and soil downwind from the habitations, or by providing wind breaks for stockpiles, covering of trucks with tarpaulin sheets during transportation of soil and material; ► The emissions from diesel generators (meant for emergency power requirement) will be controlled to minimise impacts of air	Review of status of implementation of suggested mitigation measures. Ambient air quality (PM10, CO, SO2 NOx) Monitoring by NABEL/MoEFCC accredited Laboratory as per monitoring plan.	Implementation: Contractor Supervision: CSQC and PIU	Daily monitoring by PIU & PMC and Monthly monitoring by PMU. Monthly statement of Ambient Air Quality Monitoring to be submitted to JUIDCO

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		emissions by optimised operations, orientation at the site and providing stack height of 6 m (calculated as per stack height criteria of Central Pollution Control Board) from ground level for wider dispersion of gaseous emissions; ► Proper maintenance of engines and use of vehicles with "Pollution Under Control Certificate will be ensured ► Covering of trucks with tarpaulin sheets during transportation of soil and material will be ensured ; ► Suitable and adequate dust control system such as dry and wet scrubber for the Dryer and mixer will be provided for hot mix plant ► Adequate water scrubbing mechanism to control the dust coming out of the dryer from hot mix plant will be provided ► Regular air quality monitoring should be conducted at construction site as provided in Table 56 and mitigation measures as indicative above should be ensured so that the ambient air quality does not exceed the NAAQS levels. (Refer to Annexure –X for applicable environmental standards to be followed for the project). ► Asphalt mixing plants will be sited over			

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		1000 m (refer CPCB/SPCB,) from any communities. Mixing equipment will be well sealed, and be equipped with a dust-removal device, and Operators will wear dust masks, ear protection and hard hats. ► Suppression of fugitive dust emissions will be undertaken by spraying water, wetting of the stockpile, proper location of material stockpiles, especially sand and soil downwind from the habitations, or by providing wind breaks for stockpiles, covering of trucks with tarpaulin sheets during transportation of soil and material; ► The emissions from diesel generators (meant for emergency power requirement) will be controlled to minimise impacts of air emissions by optimised operations, orientation at the site and providing stack height of 6 m (calculated as per stack height criteria of Central Pollution Control Board) from ground level for wider dispersion of gaseous emissions; ► Proper maintenance of engines and use of vehicles with 'Pollution Under Control' Certificate will be ensured; ► Proper location of material stockpiles, especially sand and soil will be undertaken.			

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		All such construction loose material will be provided with temporary bunds and screens (or providing wind breaks) near schools and hospitals to prevent erosion and generation of fugitive dust. When not in use, all stockpiles of the loose construction material will be covered with tarpaulin sheets; ▶ Suitable and adequate dust control system such as dry and wet scrubber for the dryer and mixer will be provided for hot mix plant ▶ Adequate stack height (atleast 6 meter) for the discharge of its scrubbed flue gases ▶ Vehicles and machinery will be maintained so that emissions conform to National Ambient air quality standards (2009). ▶ All vehicles and machineries should obtain Pollution Under Control Certificates ▶ Water to be sprayed during the construction phase, at mixing sites, approach roads & temporary roads to prevent dust generation. ▶ Any slopes will be covered with turfing/ stone pitching immediately after completion ▶ All Construction plant and equipment will meet recognized nations standards for emissions and will be maintained and			

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		operated in a manner that ensures that relevant air, noise and discharge regulations are met. ▶			
2.8	Increase in noise pollution (impact-moderate)	▶ Minimise hammering and vibration compaction when in close proximity to structures, buildings or property boundary where applicable, residential class mufflers and engine shrouds (acoustic lining) will be used on all equipment ▶ Contractor should ensure that the ambient noise level near the project site is within the day time noise standard. (refer Annexure X for standard to be followed) ▶ Only well-maintained equipment will be operated on-site ▶ Regular maintenance of equipment such as lubricating moving parts, tightening loose parts and replacing worn out components should be conducted ▶ Machinery and equipment that may be in intermittent use shall be shut down or throttled down during non-work periods ▶ Low noise equipment shall be used as far as practicable ▶ The number of equipment operating	Review of status of implementation. of suggested mitigation measures. Noise levels at the site and access road Noise monitoring as per the monitoring plan	Implementation: Contractor Supervision: CSQC and PIU	Daily monitoring by PIU & PMC and Monthly monitoring by PMU. Monthly statement of Ambient Noise Monitoring to be submitted to JUIDCO

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		simultaneously shall be reduced as far as practicable ▶ Equipment known to emit noise strongly in one direction should be orientated so that the noise is directed away from nearby NSRs as far as practicable ▶ Hammering and vibration compaction will be minimized when near cultural properties, structures, buildings or property boundary where applicable, residential class mufflers and engine shrouds (acoustic lining) will be used on all equipment. ▶ Only well-maintained equipment will be operated on-site ▶ Regular maintenance of equipment such as lubricating moving parts, tightening loose parts and replacing worn out components will be conducted; Equipment noise will be maintained at 85 dB(A) at 1 m from the source in line with WB EHS guidelines. ▶ Noise standard at processing sites, e.g. aggregate crushing plants, batching plant, hot mix plant will be strictly monitored to prevent exceeding of CPCB noise standards. ▶ Workers near strong noise will wear			

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		protectors and their working time will be limited as a safety measure. Construction sites within 150 m of sensitive receptors construction to be stopped from 22:00 to 06:00 ► DG sets if any used, must be provided with acoustic enclosures and should meet the CPCB guidelines ► Minimal use of vehicle horns in the Project area shall be encouraged ► Equipment noise should be 85 dB(A) at 1 m from the source in line with WB EHS guidelines			
2.9	Worker Health& Safety (impact- major)	► Contractor wll follow all provisions in the Occupational Health ans Safety Plan Annex VI and Emergency Response Plan in Annex VII ► All workers will be provided with requisite personal protective equipment (see**Table 49**) ► Onsite toilet and drinking water will be provided for workers. ► 'No smoking' signs will be placed in office, communal places construction camps as well as high-risk areas prone to fire hazards e.g. near fuel tanks.	► Review of status of implementation of suggested mitigation measures. ► Noise levels at the site and access roads ► Training to all onsite workers on Safety. ► Status of Emergency response plan ► Number of accidents ► Conditions and	Implementation: Contractor Supervision: CSQC and PIU	Daily monitoring by PIU & PMC and Monthly monitoring by PMU. Monthly statement of HSE Incidents to be submitted to JUIDCO-PMU

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		Follow recommendations for night time work in Annex VI Recommendations for night time work ► Adequate fire safety, fire exists and fire assembly points will be provided at camp. ► Signage reminding use of PPE at appropriate locations will be provided in the project areas including ancillary work sites. ► Project supervising engineers/ Construction Safety Officer will inspect contractors 'compliance with safety precautions during construction/project activities.	existence of safety signs, rumble strips etc. on the road ► Fatal and non-fatal accident rate is reduced after improvement		
2.10	Increase in Community Risk (impact-moderate)	► Necessary directives will be given to Contractor for hiring the local work force so they are aeasily assimilated in the project area. However, in case of unavailability of required labor force and associated goods and services locally for the construction of civil works, because of a number of reasons such as worker unavailability and lack of technical skills and capacity, the labor force (total or partial) may be brought in from outside the project area from nearby municipal towns and villages and	► Visual inspecition of all barricading around camp site and security arrnagements ► Training to all onsite workers on Safety Implementation of Health and Safety plan ► Record of worker medical tests	Implementation: Contractor Supervision: CSQC and PIU	Daily monitoring by PIU & PMC and Monthly monitoring by PMU. Monthly statement of Community HSE Incidents to be submitted to JUIDCO-PMU

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		sometimes from outside the state ► Contractor to hire external/migrant workers through recruitment offices and avoid hiring "at the gate" to discourage spontaneous influx of job seekers. All labour will be registered and issued ID cards. ► Labour camp will be set up and monitored as per the provisions in Annex IV. Responsibilities for managing these impacts will be reflected as a contractual obligation, with appropriate mechanisms for addressing non-compliance. ► Vaccinating and educating workers against common and locally prevalent diseases. ► Mandatory and regular training for workers on required code of conduct (JUIDCO will issue the directives to Contractor and Contractor will accordingly prepare code of conduct) ► Details of project, complaint handling mechanism and GRM will be displayed at prominent places such as ULB's office and Deputy Commissioner's office and project sites. ► Access to labour camp sites will be restricted to only authorised persons with ID card. Caution boards, barricades, etc.,	► Review Labour licenses ► Status of emergency response system		

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		will be used to warn the public about unauthorized access and danger. ▶ Install lighting devices and safety signal devices in the temporary access areas and construction sites. ▶ A transportation plan of materials will be prepared by the contractor, approved by the ULB, and implemented to avoid their delivery at peak traffic hours. ▶ Legible warning signs, barriers and signals shall be placed at strategic locations in sufficient number and spacing for all prominent access ways to the sites. Warning signs and otherprotective barriers shall be erected to prevent accidents to citizens due to open ditches, heavy machinery and construction vehicles etc. ▶ No equipment/heavy machinery will be parked on the roadside at night, and will be taken to the necessary parking bay. ▶ Security guards will be deployed at critical areas such as labour camps, all active hazardous construction sites, material and fuel storage areas at night time. In addition, the CSQC safety officer will conduct a risk assessment regarding the security arrangements prior to deploying of security			

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		guards and necessary risk control measures like additional security, barricading, illumination, will be implemented along the road alignment and construction sites and labour camps. ► The construction of the proposed road may necessitate the re-routing of some vehicular and pedestrian traffic and introducing traffic delays thereby increasing in travel time. The contractor will follow all necessary arrangements for traffic safety in the OHS plan. ► If there is a delay in utility shifting, connecting households to new water supply lines, electric lines that may impact the service delivery communities will be notified, and the necessary mitigation actions will be put in place like supply of tanker water. ► The GRM and complaint handling mechanism will be made widely available to the public at the ULB office, and signboards on the project site. ► Warning signs and other protective barriers shall be erected to prevent accidents to citizens due to open ditches, heavy machinery and construction vehicles			

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		etcsures suggested for impact on air, water, soil and noise environment to be implemented. ► Asphalt mixing plants will be sited over 1000 m from any communities. Mixing equipment will be well sealed, and be equipped with a dust-removal device. ► Install lighting devices and safety signal devices in the temporary access during construction to ensure safe construction. ► Enforce rigorous traffic rules and regulations in these temporary accesses ► Adopt effective safety measures during construction			
2.11	Traffic congestion (impact-moderate)	► Appropriate diversion of traffic to ensure smooth traffic flow, minimize accidents during construction, design of diversionary signage. ► Arrange delivery of materials at off-peak traffic hours ► Prepare a transportation plan of materials to avoid delivery of them at peak hours, especially on existing roads ► Efforts shall be made to move construction material early morning and late evening period. ► Traffic regulators (Guard) shall be posted in	► Accident records ► Visual Inspection of all signage, barriers and lighting. ► Any record of spill of hazardous waste	Implementation: Contractor Supervision: CSQC and PIU	Daily monitoring by PIU & PMC and Monthly monitoring by PMU. Monthly statement of any traffic accident incident near to construction site/labour camp due to project activity to be submitted to JUIDCO-PMU

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		habitat area and at key junction areas to avoid congestion ► No construction, material, equipment or vehicle shall be stored or parked at any road or the non-project area ► Transportation vehicle shall strictly adhere to the designated routes and timings and shall avoid the peak traffic hours ► Parking space for dumpers shall be provided within the site so as to prevent parking of vehicles on road and other area and thus preventing traffic jams			
2.12	Cultural Properties (impact-moderate)	► All Temples will be relocated per the provisions in the RAP by RAP impmentation agency. Public consultation will be organized after completion of construction to access the people opinion/grievances from the the relocation activity conducted. ► All mitigation measures and environmental monitoring has been included as part of the PCR plan in Annex XIII. Remedial measures to mitigate the impact due to project intervention will be incorporated in the operation phase. ► Contractor will follow 'Chance finds' steps	► Visual Inspection ► Community consultations	Implementation: Contractor Supervision: CSQC and PIU	Daily monitoring by CSQC & PIU will submit Monthly ESMP implmentation compliance report to PMU RAP supervision and reporting will be followed.

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		and prcedures if any artefact/relic is uncovered during construction.			
2.13	Impact on Terrestrial Ecology& Loss of Trees (impact-moderate)	i. Permission for proposed Tree Cutting and transplantation needs to be ontained by the Divisional Forest Officer, Dhanbad. ii. All Transplantation and compensatory planting will be undertaken as per guideline presented in Annexure VIII to ensure survival of trees. And in accordance with the reccomendations of the Jharkhand High Court HPCC meeting in Annex XV iii. A separate budget should be allocated for Maintaince of the saplings, young trees and transplanted trees to ensure a good survival rate. iv. Apart from all transplanted trees, approximately 80 percent compensatory plantation is proposed along the expanded road of 19.9 Km road lenth (within the avenues of service lane and carriage lane). The remaning 20 % shall be in the Dhanbad block at various schools and public areas. If required, additional compensatory afforestation will be	► Review of status of implementation of suggested mitigation measures. ► Record of trees felled and planted. ► Tree/plants survival rate	Implementation: Contractor Supervision: CSQC and PIU and Forest Department	Daily monitoring by PIU & PMC and Monthly monitoring by PMU. Monthly statement of Ambient Air Quality Monitoring to be submitted to JUIDCO

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		undertaken as specified by the DFO incase survival rate of the young plants is low. This is to ensure that all vegetation (17000 trees) proposed for compensationis in place. v. Only local native species will be used for compensatory planting as per Annex VIII. These species are also specied as per the NHAI Green Highways Manual as species suitable for plantation in the RoW, and will not have any impacts on local biodiversity or on road safety. vi. All active construction sites will be barricaded effectively so that no terrestrial fauna will trespass, or be impacted by construction hazards, electrocution etc. vii. The footprint of the activities will be kept to the minimum to reduce disturbance to flora and fauna. Construction workers will protect natural resources & wild animals. viii. Hunting is prohibited. ix. All the major junctions are to be enhanced with landscaping x. Contractor needs to ensure that no trees/branches to be felled by laborer			

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		for fuel, warmth during winter. Enough provision of fuel to be ensured			
2.14	Impacts due to demobilisation of construction material, improper site restoration, temporary sheds etc. (Site Restoration impact- minor)	► To prepare site restoration prior to demobilization. On completion of the works, all temporary structures will be cleared away, all rubbish burnt, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy. ► Remove all construction equipment, material storage containers, tanks from construction site swith due care on health, safety and environment; ► Remove all demobilisation waste from the construction site and dispose of non-hazardous civil waste as per the Waste Management Plan in Annex V, while any hazardous waste is to be disposed as the requirement of JSPCB; ► Re-vegetate bare area as per the landscape development plan. road	Review of status of implementation of suggested mitigation measures Visual inspection	Implementation: Contractor Supervision: CSQC and PIU	Daily monitoring by PIU & PMC and Monthly monitoring by PMU. Daily inspection by PMC and Audit at start and end of demobilization of construction equipment by JUIDCO
3.0	Operation Phase				
3.1	EHS Provisions	All EHS issues in the operational phase of the subproject should be addressed as per Annex IX.	RCD will undertake routine monitoring and inspection	RCD	Half yearly Audit by JUIDCO
3.2	Impacts on	i. Borrow area redevelopment will be	Contractor will sibmit	Contractor	Half yearly Audit by

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
	land and site restoration activities (impact category-Minor)	completed as per Annex III ii. All temporay haul roads for transportation of material etc. will be redeveloped to the satisfaction of the ULB iii. Affected productive area will be poured with top soil as per Top soil management guidelines	photographs of the sites as before and after with compliance with the borrow area restoration/redevelopment. ULB and JUIDCo PIU will inspect restored borrow areas and haul roads and ensure these have been sucessfulyl respotred to the satisfaction of the community.		JUIDCO
3.3	Community Health & Safety concern increases due to the runoff during monsoon will lead to silting of the drain resulting in increase in water borne disease.	Regular visual checks and cleaning of drains along the alignment to ensure flow of water maintained through cross drains and other channels streams.	Regular visual check	RCD	Half yearly Audit by JUIDCO

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
3.4	Air Quality- Increase in fugitive dust and gaseous emission (impact category- Minor)	i. Enforce Pollution Under Control (PUC) Programs. The public will be informed about the regulations on air pollution of vehicles ii. ULB can consider using street sweeper/vacuum trucks iii. Avenue plantation and landscaping to be maintained by ULB along the roadside will reduce dust dispersion. iv. Fuel-related air pollution abatement measures include vehicle inspection programs, better fuel formulation, availability of unleaded and low sulphur fuels, and promotion/use of alternate fuels such as compressed natural gas (CNG), liquid natural gas (LNG), and liquid petroleum gas (LPG). These measures, if implemented as proposed, will reduce toxic and greenhouse gas emissions. v. Training and measuring equipment need to be provided to traffic police to enable them to enforce to pollution norms	PUC certificate of vehicles Regular inspection	RCD	Half yearly Audit by JUIDCO
3.5	Impact on ground and surface water quality due to	i. Provision of oil and grease traps in roadside drains has been considered to further reduce the risk of contamination to surface water bodies	Ground and Surface Water monitoring Regular inspection by ULB	RCD	Half yearly Audit by JUIDCO

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
	blockage of drains and culverts localized flooding and damage to the road (impact category- Minor)	ii. Regular monitoring and maintenance of drains in roads of NCB-01 and 2 will be a requirement under the Project as per the project O&M EHS povisons in Annex XVI. iii. Road side drains should be cleaned before the monsoon, and will be maintained to accommodate storm water flow iv. Solid waste dumping in the culvert areas will be prohibited. v. The public will be informed about the regulations on water pollution and local people will be discouraged from establishing workshops and car wash near public drinking water source.			
3.6	Ambient Noise (impact category- Moderate)	i. HORN PROHIBITED sign post will be enforced at sensitive receptors. ii. Monitoring of noise pollution will be done by ULB as per frequency and location mentioned under the ESMP	Ambient noise monitoring	RCD	Half yearly Audit by JUIDCO
3.7	Maintainence of plantation	iii. Proper maintenance of new saplings planted to ensure a good survival rate shall be undertaken by ULB. A cost of 4 CR has been designated as part of the DPR iv. Maintainence care for transplanted trees will also be undertaken by ULB after the	DFO will monitor survival rates (The expected Survival rate for plantation is expected to be 75%-80%, and the survival	RCD will undertake the necessary Maintaince and care	Survival rate will be recorded by JUIDCo in the quarterly project safeguards reports.

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		contractor demobilizes. v. If required incase of lower survival rate, additional plantation will be undertaken at sites identified by ULB and DFO.	rate of transplanted trees is expected to be 40%-50%).and provide necessary technical inputs to ensure the reccomendations of the HPCC are met.		

Table 55: Environmental Management Plan for NCB – 02

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
Pre- construction Phase					
1.1	Joint Field verification of ESMP (no impact)	▶ The Project Engineer, Contractors Team will carry out joint field verification with CSQC team of the ESMP. The efficacy of the mitigation measures suggested in the EMP will be checked. If required, the Engineer will modify the BoQs associated with the mitigation measures.	A field verification survey report will be prepared by the contractor and verified by CSQC	Implementation: Contractor Supervision: CSQC and PIU	Pre- construction- one time survey
1.2	Information Dissemination and Communication Activities (no impact)	▶ Prior to construction activity, information dissemination will be undertaken by JUIDCO and the ULB at the project site and at the city level. The wider dissemination of information to public will be undertaken by JUIDCo through the disclosure of ESIA / ESMP reports in the	JUIDCo PIU and CSQC will ensure all information signages at all key locations has been displayed.	Implementation: Contractor Supervision: CSQC and PIU	Pre- construction

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		website of the ULB and JUIDCo. ► At the project site, i.e. the direct impact zone, information boards will be displayed to disseminate the project details including at cultural and common property resource sites. Such information boards will display project name, concerned official's name in the engineer's office with his designation and contact no., name and contact details of an authorized official in local JUIDCo PIU office. These information boards will be approximately of size 5' x 5' and will be designed and put up in such a way that public can easily read it from a distance. ► boards will also be setup at the sites of construction camps and labor camps and other project facilities like borrow area and debris disposal site. These information boards will also mention the availability of a complaint register with ESHS officer of the CSQC consultant.			
1.3	ESHS Training to Contractors team and project staff (no impact)	JUIDCO shall organize training sessions for all contractor staff, PIU, CSQC and field level implementation staff of Contractor and all consultants on environment and social management in construction stage, use of PPE, Contractors code of conduct, HIV	Training of all project staff and contractors team should be undertaken in mobilisation phase before construction	JUIDCo PMU	Pre-construction

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		prevention and gender aspects.	activity commences.		
1.4	Siting Common property management (refer to impacts associated with cultural and community properties relocation)	All affected common amenities such as community hand pumps, cultural properties, etc., will be relocated with consent of the using community. All relocaton activities will be undertaken as part of the RAP. The relocation site identification will be in accordance with the choice of the community and completed before construction starts. stakeholder meetings with the community will be held to discuss the relocation aspects, the structures, and accessibility to the structures.	All environmental management and mitigation measures in the PCR Plan in Annex XIII will be followed by the contractor's team. RAP implementing agency will submit a completion report, once relocation activities have been satisfactorily completed.	Implementation: Contractor Supervision: CSQC and PIU	Pre-construction
1.5	Loss of handpumps /borewells (refer to impacts associated with cultural and community properties	Water sources (16 tube wells, 14 handpumps) to be replaced by the contractor at a location suitable to the community.	JUIDCO PIU environment and social specialist will supervise the activity and ensure all water sources are relocated prior to road construction.	Implementation: Contractor Supervision: CSQC and PIU	Continous throughout relocation activity.

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
	relocation)				
1.6	Utility shifting (refer to impacts associated with culturalproperties relocation)	v. Prior permission will be taken from regional offices of Electricity, Telecommunications, OFC, Water works etc. vi. Any CPR, if removed shall be relocated at the earliest with consent of the villagers and the Gram Panchayat to suitable location in consent with the villagers vii. All utilities and common property resources impacted (permanently) due to the project will be relocated with prior approval of JUIDCo before construction starts. (Shifting of electrical poles, telephone poles, optical fibre cables and water mains in the RoW, by the respective State agencies. viii. Utility/ CPR shall be relocated at the earliest	JUIDCo PIU will supervise the utility shifting activity and ensure that there are no delays or inconveninces caused to the dependent communities. JUIDCo will ensure the ESMP provisions apply to all executing agencies conducting the utility shifting activities.	Implementation: Government Departments of Water Supply (DWSD), Electrical Line (JBVNL), Telecommunication (BSNL) Supervision: CSQC and PIU	Continous reporting in ESMP progress report over 5-month time taken by departments.
1.7	Tree Cutting and Transplantation Actvities (refer to impact on terrestrial	A total of about 1553 trees fall within formation width which needs to be felled (Refer Annexure VIII). Tree cutting to be undertaken by Contractor. JUIDCo will obtaining tree felling permission from DFO, Dhanbad. Contractor will follow the mittigaton and provisions in Tree Cutting and Transplantation	Permission for tree cutting and transplantation works to be obtained by JUIDCo All provisions of Annex VIII will be monitored.	Implementation: Contractor Supervision: JUIDCo PIU, CSQC and DFO Dhanbad.	Continuous throughout tree cutting, transplantation activities.

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
	ecology)	Annex VIII All OHS managtement provisions for tree cutting activities will be followed as per Annex VI			
1.8	Storage of construction materials	JUIDCO PIU, Contractor consultation with ULB shall identify the site for temporary use of land for construction sites /storage of construction materials including pipes etc. These sites shall not cause an inconvenience to local population / traffic movement. These locations shall be approved bythe engineer in charge.	Approved areas will be demarcated, the necessary barricading and security arrnagments will be provided by the contractor	Implementation: Contractor Supervision: CSQC and JUIDCo PIU	Pre- Construction
1.9	Setting up of Labour Camp	Labour camp site will be identified and set up over area of 2 acres as per the provisions in Annex IV. Approximately 50-60 labour will be housed in the camp site. Labour camp sites should be located close to the project area.	JUIDCo PIU and CSQC will assess that the labour camp has been set up in accordance with the provisions/specifications in Annex IV. A Labour camp inspecition checklist will be furnished in monthly ESMP report.	Implementation: Contractor Supervision: CSQC and JUIDCo PIU	Pre- Construction
1.10	Sites for Debris disposal	The contractor will follow the provisions of the waste management plan in Annex V. Based on the sites provided by ULB and JUIDCo for construction debris disposal, will update the	JUIDCo PIU and CSQC will verify sites and ULB consent.	Implementation: Contractor Supervision:	Pre- Construction

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		plan.		CSQC and JUIDCo PIU	
1.11	Siting of Hot mix plants,	Asphalt mixing plants will be sited over 1000 m (refer CPCB/SPCB,) from any community, water bodies All maintenance facilities, hot mix plant and concrete mixing plant shall be established with prior consent to establish to be obtained from SPCB. All such equipment/plant shall be fitted with air pollution control system and shall comply with condition of consent to establish. Periodic monitoring shall be carried as per consent conditions.	CSQC will verify locations	Implementation: Contractor Supervision: CSQC and JUIDCo PIU	Pre- Construction
1.12	Clearances, Approvals and Permits	List of clearances/ permits and licenses required prior to start of construction activity is provided in E& S permissions required Provide a copy of all necessary clearances to the PIU	JUIDCo PIU to check all records of licenses, permits, and clearences	Implementation: Contractor Supervision: CSQC and JUIDCo PIU	Before Construction Activity begins. PIU will ensure the contractor will adhere to all clearance terms and conditions
1.13	Raw Material Sourcing	vi. Use of Fly ash in concrete works – Fly ash should be utilized from the nearest power station. vii. Borrow pits to be identified given the shortlisted areas by JUIDCo, and confirm to Borrow Area Management	JUIDCO PIU and CSQC to verify licences and permits for raw materials.	Implementation: Contractor Supervision: CSQC and JUIDCo PIU	Before Construction Activity begins

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		Plan in Annex II viii. Quarrying will be carried out at approved and licensed quarries only. Three registered quarry areas have been identified for the construction of project road Gobindpur, Palani, Baliapur Quarry & Crusher. ix. No excavation from the bund of the water bodies. x. Prior written permission from authorities for use of water/ tanker water for construction activity will be submitted to the PIU			
2	Construction phase				
2.1	Community common property resources (impact- minor)	i. Precautions will be taken during construction, for accidental loss/ damage of any communal property and the damage will be repaired immediately up to the satisfaction of community at Contractor's own cost. ii. In addition, the contractor will consider the following enhancements for the benefit of the community • Waste collection bin at every bus bay/shelter • Solar lighting can be considered at	Visual Site Inspection	Implementation: Contractor Supervision: CSQC and JUIDCo PIU	Daily monitoring by CSQC & PIU will submit Monthly ESMP implmentation compliance report to PMU

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		critical locations – bridges, bay shelters, crossings. • For handpumps that need to be relocated, the project can consider soak pit of 1.5m diameter and 1.0m deep made of brick masonry/concrete rings, filled with brick bats and pebbles.			
2.2	Land Contamination (impact- minor)	► The construction contractors will have control over the amount and types of waste (hazardous and non- hazardous) generated at the site and should have an estimated inventory prior to start of construction ► Construction contractor will ensure daily collection at a designated storage area and periodic (monthly) disposal of construction waste generated debris, concrete, metal cuttings wastes, waste/used oil etc. ► Septic tank and soak pit will be provided at labour camps for sewage/wastewater management during construction phase ► The municipal waste from the labour camp will only be routed through proper collection and handover to local municipal landfill for disposal ► Unauthorised dumping of used oil and other hazardous wastes will be prohibited	► Record of waste (Hazardous & Non-Hazardous waste) generated, collected, segregated and disposed or recycle. ► Memorandum of Understanding with approved recycler of JSPCB for disposal of Hazardous waste if generated. ► Location of site for disposal of construction waste /debris	Implementation: Contractor Supervision: CSQC and JUIDCo PIU	Daily monitoring by CSQC & PIU will submit Monthly ESMP implmentation compliance report to PMU

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		▶ Excess excavation spoil will be dumped in areas designated by the Municipal Corporation ▶ Spill control measures such as the storage and handling of chemicals and fuel in impervious areas with secondary containment will be implemented to minimize impacts in the event of a spill ▶ Obtain prior authorization for collection, storage and disposal of construction phase related hazardous wastes; ▶ Contractor will follow all provisions of the Waste Management Plan in Annex V ▶ JUIDCO will finalize road design and alignment to minimize waste generation through balancing of cut and fill operations and minimizing excess cuts requiring disposal ▶ JUIDCO will provide its contractor site for disposal of debris. Contractor should obtain all clearance requirements if required from regulatory agencies ▶ Slope stabilization techniques and erosion control measures will be planned such as increasing vegetation, sausage walls/ gabions (IRC: SP: 48 – 1998), bally benching (IRC: SP: 48- 1998)			

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
2.3	Soil Erosion and drainage (impact- minor)	▶ Contractor will follow the provisions of the borrow area management plan Annex II, and Top Soil Management in Annex III ▶ The disturbed areas and soil stock piles will be kept moist to avoid wind erosion of soil. ▶ Small bunds will be created in case of any activities near the water body or drainage areas within the site to prevent washing of the soil into these waterways; ▶ Silt/sediment trap will be provided in areas susceptible to high erosion. ▶ The contractor will plan the activities so that no bare/ loose earth surface is left out before the onset of monsoon, for minimizing the soil erosion following preventive measures to be taken such as slopes will be covered, soon after completion ▶ Top soil from borrow area, debris disposal sites; borrow area, construction site will be protected/covered for soil erosion. ▶ Debris due to excavation, dismantling of existing cross drainage structure will be removed from the water course immediately. ▶ Diversions for bridges will be removed from the watercourse before the onset of	▶ On site observation/inspection ▶ Existence of soil erosion sites ▶ Number of soil erosion sites/ occurrences of soil erosion	Implmentation: Contractor Supervision: CSQC and JUDCo PIU	Daily monitoring by CSQC & PIU will submit Monthly ESMP implmentation compliance report to PMU

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		monsoon. ► Construction activities will be planned accordingly to take advantage of non-rainy season and major excavation work will be completed during dry season itself; ► Stripping of topsoil/ top layer will not be conducted earlier than required i.e. vegetation cover will be maintained for as long as possible in order to prevent the erosion (wind and water) of soil. Topsoil, found to be fertile will be used for landscaping purpose ► Diversions will be constructed during dry season, with adequate drainage facility, and will be completely removed before the onset of monsoon. ► Road Side drains are provided on both sides of the road, obstruction if any to be removed immediately. ► Increased runoff due to increased impervious surface is countered through increased pervious surface area through soak pits.			
2.4	Traffic Management and Road Safety	► Idenitfy black spots and mark them ► Contractor will follow Traffic Management Provisions in OHS plan in Annex VI ► Traffic Management/ diversions will be	On site visual inspection Inspection of signages, barricading Compliance with Traffic	Contractor (primary responsibility) JUIDCO –	Daily monitoring by CSQC & PIU will submit Monthly ESMP implmentation

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
	(impact- moderate)	prepared in consultation with Dhanbad Traffic police department. ► Install proper Signange, flags, barricading ► For delivery of hazardous substances, three certificates issued by transportation department are required permit license, driving license and guarding license. ► Compliance with "Rules" as defined in Environmental (Protection) Act, 1986 ► Vehicles delivering hazardous substances will be printed with standard signs. Public security, transportation and fire fighting departments will designate a special route for these vehicles. ► Construction vehicles can only be parked at designated parking lots. ► In case of spill of hazardous materials, relevant departments will be informed at once & dealt with it in accordance with ERP.	Management Provisions in OHS plan in Annex VI	PMC/PIU/ PMU (verification)	compliance report to PMU
2.5	Soil Compaction due to vehicular movement (impact- minor)	► The movement of heavy machinery/ vehicles will be designated in the corridor of impact to avoid soil compaction in other areas ► Construction material will be stored in designated area only	On site observation / visual inspection	Implementation: Contractor Supervision: CSQC and PIU	Daily monitoring by CSQC & PIU will submit Monthly ESMP implmentation compliance report to PMU

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		▶ Restoration of compacted area as soon as possible ▶ All service roads, haul roads will be redeveloped. ▶ Construction material will be stored in designated area only			
2.6	Impact on Water Quality (impact- minor)	▶ Septic tank and soak pits will be provided (as per specifications given in IS 2470 1995 Part I and Part II) o at labour camp for treatment and disposal of sewage, thereby minimizing the adverse impacts of wastewater discharge ▶ Proper cover and stacking of loose construction material will be ensured during construction of outfall structures at construction site to prevent surface runoff and contamination of receiving water body ▶ Use of licensed contractors for management and disposal of waste will be encouraged ▶ Toilets, soak pits and septic tanks, waste collection areas, storage areas will be located at least 200m away from natural drainage channels and water bodies; ▶ Emergency Response Plan in Annex VII will be adopted for immediate cleaning of	On site observation / visual inspection Ensure all wastewater streams are properly treated No turbidity of surface water bodies in the indirect area of influence. Records of Presence/ absence of water logging along the road and service roads.	Implementation: Contractor Supervision: CSQC and PIU	Daily monitoring by CSQC & PIU will submit Monthly ESMP implmentation compliance report to PMU

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		spills and leakages. ► Labourers will be given training towards proactive use of designated areas/bins for waste disposal and encouraged for use of toilets. Open defecation and random disposal of sewage will be strictly prohibited. ► Proper cover and stacking of loose construction material will be ensured during construction of outfall structures at construction site to prevent surface runoff and contamination of receiving water body; ► Licensed contractors will be used for management and disposal of hazardous waste ► Construction labour will be restricted from polluting the water or misusing the water ► Equipment and vehicle washing/workshops near water bodies will be avoided.			
2.7	Increase in air pollution (impact-moderate)	► Suppression of fugitive dust emissions will be undertaken by spraying water, wetting of the stockpile, proper location of material stockpiles, especially sand and soil downwind from the habitations, or by providing wind breaks for stockpiles, covering of trucks with tarpaulin sheets	Review of status of implementation of suggested mitigation measures. Ambient air quality (PM10, CO, SO2 NOx)	Implementation: Contractor Supervision: CSQC and PIU	Daily monitoring by PIU & PMC and Monthly monitoring by PMU. Monthly statement of Ambient Air Quality

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		during transportation of soil and material; ▶ The emissions from diesel generators (meant for emergency power requirement) will be controlled to minimise impacts of air emissions by optimised operations, orientation at the site and providing stack height of 6 m (calculated as per stack height criteria of Central Pollution Control Board) from ground level for wider dispersion of gaseous emissions; ▶ Proper maintenance of engines and use of vehicles with "Pollution Under Control Certificate will be ensured ▶ Covering of trucks with tarpaulin sheets during transportation of soil and material will be ensured ; ▶ Suitable and adequate dust control system such as dry and wet scrubber for the Dryer and mixer will be provided for hot mix plant ▶ Adequate water scrubbing mechanism to control the dust coming out of the dryer from hot mix plant will be provided ▶ Regular air quality monitoring should be conducted at construction site as provided in Table 56 and mitigation measures as indicative above should be ensured so that the ambient air quality does not exceed the	Monitoring by NABEL/MoEFCC accredited Laboratory as per monitoring plan.		Monitoring to be submitted to JUIDCO

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		NAAQS levels. (Refer to Annexure –X for applicable environmental standards to be followed for the project). ▶ Asphalt mixing plants will be sited over 1000 m (refer CPCB/SPCB,) from any communities. Mixing equipment will be well sealed, and be equipped with a dust-removal device, and Operators will wear dust masks, ear protection and hard hats. ▶ Suppression of fugitive dust emissions will be undertaken by spraying water, wetting of the stockpile, proper location of material stockpiles, especially sand and soil downwind from the habitations, or by providing wind breaks for stockpiles, covering of trucks with tarpaulin sheets during transportation of soil and material; ▶ The emissions from diesel generators (meant for emergency power requirement) will be controlled to minimise impacts of air emissions by optimised operations, orientation at the site and providing stack height of 6 m (calculated as per stack height criteria of Central Pollution Control Board) from ground level for wider dispersion of gaseous emissions; ▶ Proper maintenance of engines and use of			

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		vehicles with 'Pollution Under Control' Certificate will be ensured; ► Proper location of material stockpiles, especially sand and soil will be undertaken. All such construction loose material will be provided with temporary bunds and screens (or providing wind breaks) near schools and hospitals to prevent erosion and generation of fugitive dust. When not in use, all stockpiles of the loose construction material will be covered with tarpaulin sheets; ► Suitable and adequate dust control system such as dry and wet scrubber for the dryer and mixer will be provided for hot mix plant ► Adequate stack height (atleast 6 meter) for the discharge of its scrubbed flue gases ► Vehicles and machinery will be maintained so that emissions conform to National Ambient air quality standards (2009). ► All vehicles and machineries should obtain Pollution Under Control Certificates ► Water to be sprayed during the construction phase, at mixing sites, approach roads & temporary roads to prevent dust generation. ► Any slopes will be covered with turfing/			

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		stone pitching immediately after completion ▶ All Construction plant and equipment will meet recognized nations standards for emissions and will be maintained and operated in a manner that ensures that relevant air, noise and discharge regulations are met. ▶			
2.8	Increase in noise pollution (impact-moderate)	▶ Minimise hammering and vibration compaction when in close proximity to structures, buildings or property boundary where applicable, residential class mufflers and engine shrouds (acoustic lining) will be used on all equipment ▶ Contractor should ensure that the ambient noise level near the project site is within the day time noise standard. (refer Annexure X for standard to be followed) ▶ Only well-maintained equipment will be operated on-site ▶ Regular maintenance of equipment such as lubricating moving parts, tightening loose parts and replacing worn out components should be conducted ▶ Machinery and equipment that may be in intermittent use shall be shut down or	Review of status of implementation. of suggested mitigation measures. Noise levels at the site and access road Noise monitoring as per the monitoring plan	Implementation: Contractor Supervision: CSQC and PIU	Daily monitoring by PIU & PMC and Monthly monitoring by PMU. Monthly statement of Ambient Noise Monitoring to be submitted to JUIDCO

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		throttled down during non-work periods ► Low noise equipment shall be used as far as practicable ► The number of equipment operating simultaneously shall be reduced as far as practicable ► Equipment known to emit noise strongly in one direction should be orientated so that the noise is directed away from nearby NSRs as far as practicable ► Hammering and vibration compaction will be minimized when near cultural properties, structures, buildings or property boundary where applicable, residential class mufflers and engine shrouds (acoustic lining) will be used on all equipment. ► Only well-maintained equipment will be operated on-site ► Regular maintenance of equipment such as lubricating moving parts, tightening loose parts and replacing worn out components will be conducted; Equipment noise will be maintained at 85 dB(A) at 1 m from the source in line with WB EHS guidelines. ► Noise standard at processing sites, e.g. aggregate crushing plants, batching plant,			

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		hot mix plant will be strictly monitored to prevent exceeding of CPCB noise standards. ▶ Workers near strong noise will wear protectors and their working time will be limited as a safety measure. Construction sites within 150 m of sensitive receptors construction to be stopped from 22:00 to 06:00 ▶ DG sets if any used, must be provided with acoustic enclosures and should meet the CPCB guidelines ▶ Minimal use of vehicle horns in the Project area shall be encouraged ▶ Equipment noise should be 85 dB(A) at 1 m from the source in line with WB EHS guidelines			
2.9	Worker Health & Safety (impact- major)	▶ Contractor wll follow all provisions in the Occupational Health ans Safety Plan Annex VI and Emergency Response Plan in Annex VII ▶ All workers will be provided with requisite personal protective equipment (see**Table 49**) ▶ Onsite toilet and drinking water will be provided for workers. ▶ 'No smoking' signs will be placed in	▶ Review of status of implementation of suggested mitigation measures. ▶ Noise levels at the site and access roads ▶ Training to all onsite workers on Safety. ▶ Status of	Implementation: Contractor Supervision: CSQC and PIU	Daily monitoring by PIU & PMC and Monthly monitoring by PMU. Monthly statement of HSE Incidents to be submitted to JUIDCO-PMU

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		office, communal places construction camps as well as high-risk areas prone to fire hazards e.g. near fuel tanks. Follow recommendations for night time work in Annex VI Recommendations for night time work ► Adequate fire safety, fire exists and fire assembly points will be provided at camp. ► Signage reminding use of PPE at appropriate locations will be provided in the project areas including ancillary work sites. ► Project supervising engineers/ Construction Safety Officer will inspect contractors 'compliance with safety precautions during construction/project activities.	Emergency response plan ► Number of accidents ► Conditions and existence of safety signs, rumble strips etc. on the road ► Fatal and non-fatal accident rate is reduced after improvement		
2.10	Increase in Community Risk (impact-moderate)	► Necessary directives will be given to Contractor for hiring the local work force so they are aeasily assimilated in the project area. However, in case of unavailability of required labor force and associated goods and services locally for the construction of civil works, because of a number of reasons such as worker unavailability and	► Visual inspecition of all barricading around camp site and security arrnagements ► Training to all onsite workers on Safety Implementation of	Implementation: Contractor Supervision: CSQC and PIU	Daily monitoring by PIU & PMC and Monthly monitoring by PMU. Monthly statement of Community HSE Incidents to be submitted to JUIDCO-

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		lack of technical skills and capacity, the labor force (total or partial) may be brought in from outside the project area from nearby municipal towns and villages and sometimes from outside the state ▶ Contractor to hire external/migrant workers through recruitment offices and avoid hiring "at the gate" to discourage spontaneous influx of job seekers. All labour will be registered and issued ID cards. ▶ Labour camp will be set up and monitored as per the provisions in Annex IV. Responsibilities for managing these impacts will be reflected as a contractual obligation, with appropriate mechanisms for addressing non-compliance. ▶ Vaccinating and educating workers against common and locally prevalent diseases. ▶ Mandatory and regular training for workers on required code of conduct (JUIDCO will issue the directives to Contractor and Contractor will accordingly prepare code of conduct) ▶ Details of project, complaint handling mechanism and GRM will be displayed at prominent places such as ULB's office and Deputy Commissioner's office and project	Health and Safety plan ▶ Record of worker medical tests ▶ Review Labour licenses ▶ Status of emergency response system		PMU

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		sites. ▶ Access to labour camp sites will be restricted to only authorised persons with ID card. Caution boards, barricades, etc., will be used to warn the public about unauthorized access and danger. ▶ Install lighting devices and safety signal devices in the temporary access areas and construction sites. ▶ A transportation plan of materials will be prepared by the contractor, approved by the ULB, and implemented to avoid their delivery at peak traffic hours. ▶ Legible warning signs, barriers and signals shall be placed at strategic locations in sufficient number and spacing for all prominent access ways to the sites. Warning signs and otherprotective barriers shall be erected to prevent accidents to citizens due to open ditches, heavy machinery and construction vehicles etc. ▶ No equipment/heavy machinery will be parked on the roadside at night, and will be taken to the necessary parking bay. ▶ Security guards will be deployed at critical areas such as labour camps, all active hazardous construction sites, material and			

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		fuel storage areas at night time. In addition, the CSQC safety officer will conduct a risk assessment regarding the security arrangements prior to deploying of security guards and necessary risk control measures like additional security, barricading, illumination, will be implemented along the road alignment and construction sites and labour camps. ► The construction of the proposed road may necessitate the re-routing of some vehicular and pedestrian traffic and introducing traffic delays thereby increasing in travel time. The contractor will follow all necessary arrangements for traffic safety in the OHS plan. ► If there is a delay in utility shifting, connecting households to new water supply lines, electric lines that may impact the service delivery communities will be notified, and the necessary mitigation actions will be put in place like supply of tanker water. ► The GRM and complaint handling mechanism will be made widely available to the public at the ULB office, and signboards on the project site.			

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		▶ Warning signs and other protective barriers shall be erected to prevent accidents to citizens due to open ditches, heavy machinery and construction vehicles etc sures suggested for impact on air, water, soil and noise environment to be implemented. ▶ Asphalt mixing plants will be sited over 1000 m from any communities. Mixing equipment will be well sealed, and be equipped with a dust-removal device. ▶ Install lighting devices and safety signal devices in the temporary access during construction to ensure safe construction. ▶ Enforce rigorous traffic rules and regulations in these temporary accesses ▶ Adopt effective safety measures during construction			
2.11	Traffic congestion (impact-moderate	▶ Appropriate diversion of traffic to ensure smooth traffic flow, minimize accidents during construction, design of diversionary signage. ▶ Arrange delivery of materials at off-peak traffic hours ▶ Prepare a transportation plan of materials to avoid delivery of them at peak hours, especially on existing roads	▶ Accident records ▶ Visual Inspection of all signage, barriers and lighting. ▶ Any record of spill of hazardous waste	Implementation: Contractor Supervision: CSQC and PIU	Daily monitoring by PIU & PMC and Monthly monitoring by PMU. Monthly statement of any traffic accident incident near to construction site/labour camp due

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		▶ Efforts shall be made to move construction material early morning and late evening period. ▶ Traffic regulators (Guard) shall be posted in habitat area and at key junction areas to avoid congestion ▶ No construction, material, equipment or vehicle shall be stored or parked at any road or the non-project area ▶ Transportation vehicle shall strictly adhere to the designated routes and timings and shall avoid the peak traffic hours ▶ Parking space for dumpers shall be provided within the site so as to prevent parking of vehicles on road and other area and thus preventing traffic jams			to project activity to be submitted to JUIDCO-PMU
2.12	Impact on Terrestrial Ecology & Loss of Trees (impact-moderate)	xi. Permission for proposed Tree Cutting and transplantation needs to be ontained by the Divisional Forest Officer, Dhanbad. xii. Transplantation and compensatory planting will be undertaken as per guideline presented in Annexure VIII to ensure survival of trees; and as per the recommendations of the Jharkhand High Court HPCC meeting in Annex XV	▶ Review of status of implementation of suggested mitigation measures. ▶ Record of trees felled and planted. ▶ Tree/plants survival rate	Implementation: Contractor Supervision: CSQC and PIU and Forest Department	Daily monitoring by PIU & PMC and Monthly monitoring by PMU. Monthly statement of Ambient Air Quality Monitoring to be submitted to JUIDCO

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		xiii. A separate budget should be allocated for Maintaince of the saplings, young trees and transplanted trees to ensure a good survival rate. xiv. Apart from all transplanted trees, approximately 80 percent compensatory plantation is proposed along the expanded road of 19.9 Km road lenth (within the avenues of service lane and carriage lane). The remaning 20 % shall be in the Dhanbad block at various schools and public areas. If required, additional compensatory afforestation will be undertaken as specified by the DFO incase survival rate of the young plants is low. This is to ensure that all vegetation (17000 trees) proposed for compensationis in place. xv. Only local native species will be used for compensatory planting as per Annex VIII. These species are also specied as per the NHAI Green Highways Manual as species suitable for plantation in the RoW, and will not have any impacts on local biodiversity or on road safety.			

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		xvi. All active construction sites will be barricaded effectively so that no terrestrial fauna will trespass, or be impacted by construction hazards, electrocution etc. xvii. The footprint of the activities will be kept to the minimum to reduce disturbance to flora and fauna. Construction workers will protect natural resources & wild animals. xviii. Hunting is prohibited. xix. All the major junctions are to be enhanced with landscaping xx. Contractor needs to ensure that no trees/branches to be felled by laborer for fuel, warmth during winter. Enough provision of fuel to be ensured			
2.13	Impacts due to demobilisation of construction material, improper site restoration, temporary sheds etc. (impact- minor)	► To prepare site restoration prior to demobi-lization. On completion of the works, all temporary structures will be cleared away, all rubbish burnt, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy. ► Remove all construction equipment, material storage containers, tanks from construction site swith due care on health, safety and environment;	Review of status of implementation of suggested mitigation measures Visual inspection	Implementation: Contractor Supervision: CSQC and PIU	Daily monitoring by PIU & PMC and Monthly monitoring by PMU. Daily inspection by PMC and Audit at start and end of demobilization of construction equipment by

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		► Remove all demobilisation waste from the construction site and dispose of non-hazardous civil waste as per the Waste Management Plan in Annex V, while any hazardous waste is to be disposed as the requirement of JSPCB; ► Re-vegetate bare area as per the landscape development plan. road			JUIDCO
3.0	Operation Phase				
3.1	EHS Provisions	All EHS issues in the operational phase of the subproject should be addressed as per Annex IX.	RCD will undertake routine monitoring and inspection	RCD	Half yearly Audit by JUIDCO
3.2	Impacts on land and site restoration activities (impact- minor)	iv. Borrow area redevelopment will be completed as per Annex III v. All temporay haul roads for transportation of material etc. will be redeveloped to the satisfaction of the ULB vi. Affected productive area will be poured with top soil as per Top soil management guidelines	Contractor will sibmit photographs of the sites as before and after with compliance with the borrow area restoration/redevelopment. ULB and JUIDCo PIU will inspect restored borrow areas and haul roads and ensure these have been sucessfulyl respotred to the	Contractor	Half yearly Audit by JUIDCO

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
			satisfaction of the community.		
3.3	Community Health & Safety concern increases due to the runoff during monsoon will lead to silting of the drain resulting in increase in water borne disease. (impact- minor)	Regular visual checks and cleaning of drains along the alignment to ensure flow of water maintained through cross drains and other channels streams.	Regular visual check	RCD	Half yearly Audit by JUIDCO
3.4	Air Quality- Increase in fugitive dust and gaseous emission Impact- moderate	vi. Enforce Pollution Under Control (PUC) Programs. The public will be informed about the regulations on air pollution of vehicles vii. ULB can consider using street sweeper/vacuum trucks viii. Avenue plantation and landscaping to be maintained by ULB along the roadside will reduce dust dispersion. ix. Fuel-related air pollution abatement	PUC certificate of vehicles Regular inspection	RCD	Half yearly Audit by JUIDCO

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		measures include vehicle inspection programs, better fuel formulation, availability of unleaded and low sulphur fuels, and promotion/use of alternate fuels such as compressed natural gas (CNG), liquid natural gas (LNG), and liquid petroleum gas (LPG). These measures, if implemented as proposed, will reduce toxic and greenhouse gas emissions. x. Training and measuring equipment need to be provided to traffic police to enable them to enforce to pollution norms			
3.5	Impact on ground and surface water quality due to blockage of drains and culverts localized flooding and damage to the road (impact- minor)	vi. Provision of oil and grease traps in roadside drains has been considered to further reduce the risk of contamination to surface water bodies vii. Regular monitoring and maintenance of drains in roads of NCB-01 and 2 will be a requirement under the Project as per the project O&M EHS povisons in Annex XVI. viii. Road side drains should be cleaned before the monsoon, and will be maintained to accommodate storm water flow ix. Solid waste dumping in the culvert areas will be prohibited. x. The public will be informed about the	Ground and Surface Water monitoring Regular inspection by ULB	RCD	Half yearly Audit by JUIDCO

Sl. No	Impact	Mitigation Measures	Monitoring/ Action	Implementation Responsibility	Frequency of /Monitoring/ External Reporting
		regulations on water pollution and local people will be discouraged from establishing workshops and car wash near public drinking water source.			
3.6	Ambient Noise (impact-moderate)	vi. HORN PROHIBITED sign post will be enforced at sensitive receptors. vii. Monitoring of noise pollution will be done by ULB as per frequency and location mentioned under the ESMP	Ambient noise monitoring	RCD	Half yearly Audit by JUIDCO
3.7	Maintainence of plantation	viii. Proper maintenance of new saplings planted to ensure a good survival rate shall be undertaken by ULB. A cost of 4 CR has been designated as part of the DPR ix. Maintainence care for transplanted trees will also be undertaken by ULB after the contractor demobilizes. x. If required incase of lower survival rate, additional plantation will be undertaken at sites identified by ULB and DFO.	DFO will monitor survival rates (The expected Survival rate for plantation is expected to be 75%-80%, and the survival rate of transplanted trees is expected to be 40%-50%).and provide necessary technical inputs to ensure the reccomendations of the HPCC are met.	RCD will undertake the necessary Maintaince and care	Survival rate will be recorded by JUIDCo in the quarterly project safeguards reports.

10.3 Environment and Social Monitoring & Evaluation Program

10.3.1 Monitoring Programme

253. The monitoring programme of NCB-01 and 02 will be required to ensure effectiveness of implementation of suggested mitigation measures. The environmental monitoring will help in assessing the changes in environmental conditions by monitoring the effective implementation of mitigation measures proposed for NCB-01 & 02, and measuring deteriorations in environmental quality for further preventive actions.

254. Since project is likely to have impact on various components of environment, the monitoring requirement covering soil erosion, tree plantation, air quality, water quality noise, has been defined and included. It will be essential for contractor to comply with applicable National regulations and World Bank safeguard requirements. Contractor will also have to comply with applicable standards with respect to Water, air, Noise, Dredge Material, soil and as applicable to this project.

255. The Contractors team will carry out monitoring, the details of which are provided.Table 66. provides details of monitoring measures with implementation and supervision responsibility.

256. Which will be verified by the CSQC and JUIDCo PIU. The aspects to be covered include the following:

10.3.2 Monitoring Schedule and Parameters

257. To evaluate the effectiveness of environmental and social management programme, regular monitoring of the important environmental parameters will be taken up. The schedule, duration and parameters to be monitored for NCB-1 & 2 are shown in Table 56.

10.3.3 ESMP integration into bid documents

258. JUIDCo issue the bid documents, which would include ESMP to shortlist contractors, based on theirexpression of interest and capability. The contractor selection process will include consideration of the capacities of the entities to ensure compliance to legal environmental, labour and social requirements as well as adherence to the ESMP.

Mitigation measures & monitoring requirements

259. The cross-reference to these tables should be included as part of the General Conditions of Contract. As a standard practice, there is an overall reference to the environment, social and labour laws that have to be followed in this section / item. In addition, the adherence to the mitigation / enhancement measures and monitoring requirements tables should be included. The two tables will have to be added (without cost), and the full ESMP should be cross-referred in the description of this item.

260. Cost table: All the items in the ESMP cost table relevant to the contractor have to be referred in the Bill of Quantities (BoQ) tabl. The BoQ table in the bid documents includes the various tasks to be done by the contractor under different categories. Against each task, the contractor must indicate a unit rate while completing the bid documents

Table 56: Monitoring schedule NCB-1& 2

Type of Monitoring	Parameters for Monitoring	Frequency	Responsibility	Monitoring Locations
Pre-Construction Phase				
Tree Cutting Clearences	Permission for tree cutting, and transplantation activities	Before construction	► JUIDCO PMU	Entire project stretch of Road 11
Tree Cutting	Tree fellingAs per management plan in Annex VIII	Before construction	Implmentation: Contractor Supervision: CSQC, Forest Department and JUIDCo PIU	Entire project stretch of Road 11
Disposal of tree stumps and wood as per agreed actions with Forest Department	MoRTH clause 201.5	Before Construction- daily	Implmentation: Contractor Supervision: CSQC, Forest Department and JUIDCo PIU	Entire project stretch of Road 11
Tree Transplantation	As per management plan in Annex VIII	Before Construction- daily	Implmentation: Contractor Supervision: C Entire project stretch SQC, Forest Department and JUIDCo PIU	Entire project stretch of Road 11
Relocation of CPRs	RAP Cultural Properties Management Plan Annex XIII	Before Construction- daily	Implmentation: Contractor RAP implmentation agency Supervisionl: CSQC, Forest Department and JUIDCo PIU	NCB1 stretch
Utility relocation	All underground and over head community utilities will be shifted as per the respective departments scope of work. (Electricity, Telecommunications, Water works etc.)	Before Construction- daily	Implmentation: Utility Departments Supervisionl: CSQC, and JUIDCo PIU	Entire project stretch of Road 11

Type of Monitoring	Parameters for Monitoring	Frequency	Responsibility	Monitoring Locations
Construction				
Ambient air quality Standards: NAAQS, 2009	PM_{10}, $PM_{2.5}$, SO_x, NOx, CO, HC, Total Suspended Particulate (TSP). (Monitoring and sampling through approved monitoring agencies)	Weekly	Implmentation: Contractor Verification: CSQC	▶ Baseline locations /Near sensitive receptors ▶ Borrow areas ▶ Near Batching Plant, Hot Mix Plant ▶ Plant sites and vicinity, unpaved road sections. (Sampler to be located 50 m from the plant in the downwind direction. Use method specified by CPCB for analysis)
Dust generation	Adequacy of dust suppression techniques- Visual Inspection	Daily	Implmentation: Contractor Verification: CSQC	▶ All along Project Road ▶ Vehicle laoding/unloading ▶ Borrow areas and haul roads
Ambient Noise Standards as per Noise Rules, 2000	Ambient noise levels in dB(A) of day time and night time (Monitoring and sampling through approved monitoring agencies) Noise monitoring will be carried out in each contract section in daytime and at night on a weekly basis at construction sites.	Weekly Once a week for 2 days. 2 times per day (including late evenings).	Implmentation: Contractor Verification: CSQC	▶ At all residential and sensitive areas, such as schools, hospitals, etc. located within 200m of the construction sites ▶ Hot mix / batching plant ▶ Near partically affected cultural properties ▶ Material borrow sites and ▶ Major construction materials hauling roads. ▶ Baseline locations- Equivalent noise levels using an integrated noise level meter kept at a distance of 15m from edge of pavement ▶ Ad hoc monitoring will also be undertaken.

Type of Monitoring	Parameters for Monitoring	Frequency	Responsibility	Monitoring Locations
Noise -OHS Standards as per Noise Rules, 2000	Occupational exposure (Monitoring and sampling through approved monitoring agencies)	At least once a month.	Implmentation: Contractor Verification: CSQC	► For personnel working in high noise areas i.e. areas generating noise levels more than 85 dB (A). like batching plant, labour camp
Water Quality	Total Suspended Solids (TSS), Conductivity, Chemical Oxygen Demand (COD), Biological Oxygen Demand (BOD5), and Oil and Grease (O&G).	3 times a year with two measurements per day (am and pm).	Implmentation: Contractor Verification: CSQC	► Baseline locations ► Water bodies in the vicinity of construction sites and in particular at crossing locations
Drinking Water Quality	Drinking water quality (as per IS:10500-2012) (Monitoring and sampling through approved monitoring agencies)	Once a month	Implmentation: Contractor Verification: CSQC	Source of drinking water at ► Labour accommodation (Labour camps if established) and ► Project sites- mobile drinking water tanks ► All the primary baseline sampling locations
Waste generation as per Waste Management Plan provisions	Visual inspection, and verification of Records of waste generation, handling and disposal methods	Weekly	Implmentation: Contractor Verification: CSQC	► Labour camp ► All along project road
Soil Erosion	Measures to prevent runoff from site including bunding around loose construction material Periodic checking to be carried to assess the effectiveness of the stabilization measures viz. turfing, stone pitching, Necessary measures to be followed wherever there	Weekly	Implmentation: Contractor Verification: CSQC	Unprotected and excavated soils Borrow areas

Type of Monitoring	Parameters for Monitoring	Frequency	Responsibility	Monitoring Locations
	are failures.			
Drainage	▶ Ensure no water logging ▶ Ensure contour levels are restored	Weekly	Implmentation: Contractor Verification: CSQC	▶ Project Site and staging area
Soil Quality	▶ Inspection of stores to see storage conditions ▶ Monitoring of Pb, SAR and Oil & Grease (Sample of soil collected to acidified and analyzed using absorption spectrophotometer)	Quarterly	Implmentation: Contractor Verification: CSQC	▶ baseline Locations ▶ Construction sites ▶ Material Storage areas
Solid Waste management	▶ General cleanliness ▶ Periodical removal of garbage and clearing of roads.	Daily	Implmentation: Contractor Verification: CSQC	▶ Project Site and staging area
Hygiene in toilets/sanitary system	▶ Inspection to check hygienic conditions and general cleanliness.	Weekly	Implmentation: Contractor Verification: CSQC	▶ Labour Accommodation facility
Worker Health	▶ General health check-up of workers as per OHS management, Emergency response plan, and labour camp management ▶ Regular medical testing for HIV and other communicable	Monthly Weekly	Implmentation: Contractor Verification: CSQC	▶ Labour Accommodation facility ▶ Project site

Type of Monitoring	Parameters for Monitoring	Frequency	Responsibility	Monitoring Locations
	diseases.			
Occupational health and safety and Site Safety	OHS management provisions as per plan in Annex VI Usage of protective clothing and PPEs Worker Signages- health ans safety Ensure all heavy machinery is served and in good working condition	Daily every shift	Implmentation: Contractor Verification: CSQC and CSQC safety officer	All active construction sites, hot mix plant. Borrow areas
Security	General security - preventing un-authorized access tothe site by fencing and deployment of night security guard at labour camp site, material and fuel storage sites Check ID cards for all authorised personell Register of access to labour camp.	Every Shift Site Inspections	Implmentation: Contractor Verification: CSQC	Labour camp and major material store areas of NCB 1 and NBC 2
Tree Plantation	Survival rate of tree planted and transplanted	Continious.Formal reporting as suggested by DFO-	Contractor	Along road side and area where plantation has been undertaken

Type of Monitoring	Parameters for Monitoring	Frequency	Responsibility	Monitoring Locations
		Dhanbad		
Operation Phase				
Ambient air quality	PM10, PM2.5, SOX, NOX, CO, HC	2 times a year (Jan and Jul) for 5 consecutive days. Four times a day at 07:00, 10:00, 14:00 and 17:00.	ULB	Near sensitive receptors (hospital and school) along the road; and / or At locations determined as most polluted in residential or populated areas
Noise	Ambient noise levels	Four times a year for 2 consecutive days, 4 times per day (including night and on Sundays). Ad hoc monitoring to be undertaken as appropriate.	ULB	Near sensitive receptors (hospital and school) along the road.
Compensatory planting	No. of plants, species mix and survival status Furthur compensatory plantation needed if low survival rate is detected	Quarterly	ULB	Road avenue and median Areas where compensatory plantation has been undertaken Areas where trees have been transplanted.
Inspection of provisions as per Annex XVI EHS for O&M ► Illumination, ► Road sign marking, ► Safety Barriers and Pedestrian Guard Rails ► Safety precautions during	Visual Inspection and subsequent action by ULB	Quarterly	ULB	All along road 11

Type of Monitoring	Parameters for Monitoring	Frequency	Responsibility	Monitoring Locations
maintainence/repair works ► General inspection of potholes, drains, lane marking, drain cleaning, pavement cracks				

NOx – Oxides of Nitrogen, SO_x – Sulphur Dioxide, PM – Particulate Matter

10.3.4 Documentation and Record Keeping

261. Documentation and record keeping of requirements specified in ESMP will include the following databases and registers:

i. Project level Management Information System (MIS) will be updated by JUIDCO's Environmental and Social Specialisdts pertaining to ESMP implementation of NCB-01 nad NCB-02.
ii. Quaterly ESMP compliance, monitoring and verification report by PMU specialists and submitted to the World Bank.
iii. End of Project report submitted by PMU to the World Bank which contains all aspects of ESMP compliance, and findings and addressal of all safeguard audit issues.
iv. Monthly ESMP progress report submitted by CSQC consultant team to PMU and PIU
v. Monthly monitoring ESMP checklist/ verification report maintained by JUIDCo PIU and submitted to PMU (per format in Annex XI)

In addition, the PIU will maintain a file comprising of the following documents:

i. Legal register to track details of all NOCs, licenses and permits pertaining to the sub project
ii. Database of all project impacted entities to be compensated as per the proposed entitlement framework as well as grievance records.
iii. Labour camp monitoring checklist and accident/injury register
iv. OHS equipment and site management register
v. Record of all labour licences, registration of workers and labour camp establishment permit.
vi. Training register for contractor's team, and project staff
vii. Environmental Quality (Air, Water, Soil, Ambient Noise) monitoring register
viii. Waste management monitoring register
ix. Tree plantation survival register

Environment and social audit findings and compliance reports

JUIDCO-PMU is the primary agency responsible for ESMP implmentation and reporting to the World Bank. Hence the PMU shall coordinate all inputs from PIU, CSQC and submit the following environmental reporting documentation to World Bank pertaining to Dhanbad Roads NCB-01 and NCB-02 project:

262. JUIDCO-PMU shall submit the following environmental reporting documentation to World Bank:

Environmental & Social Monitoring Reports:

263. During Project Implmentation, quarterly environmental monitoring reports will be submitted by JUIDCo PMU to the Bank for environmental and social progress of JMDP. Specifically, the sub project ESMP progress report will include the following information:

i. Background/context of the monitoring report (adequate information on the project, including physical progress of project activities, scope of monitoring report, reporting period, and the monitoring requirements including frequency of submission as agreed upon);
ii. Changes in project scope and adjusted safeguard measures, if applicable;
iii. Qualitative and quantitative environment and social monitoring.
iv. Monitoring parameters/indicators and methods based on the monitoring plan/program in the ESMP;
v. Monitoring EHS compliance with WBG EHS Guidelines, and WBG, EBRD Worker accomodaton standards.
vi. Results of ambient environmental sampling (e.g., air quality and noise) and subsequent ambient sampling to be undertaken by contractors as specified in the ESMP (results to be compared to applicable standards).
vii. Monitoring of all mitigation measures listed in table 55
viii. If noncompliance or any major gaps identified, include a corrective action plan;
ix. Records on disclosure of monitoring information to affected communities;
x. Identification of key issues, or complaints from affected people, or recommendations for improvement;
xi. Monitoring adjustment measures recommended based on monitoring experience/trends and stakeholder's suggestions.
xii. Information about actual institutional arrangement for implementing the monitoring program/plan provided or adjusted, as may be required;
xiii. Information on occupational health and safety, injury, and accidents reported on site.
xiv. Monitoring of all waste and debris management
xv. Proposed items of focus for the next report and due date.

264. ***Monthly Progress Reports***

The CSQC consultantshall, by no later than 10th of the following month, submit a brief progress report summarizing the physical and financial progress of the construction contract and the activities undertaken by the supervision team for the preceding month including progress made on ESMP as per the scope in Annex XII. The reports shall include the

minutes of the monthly site coordination/stakeholder meetings and compliants handled and all verification of environment quality monitoring of water, air, noise and soil.

265. ***Sub-Project Completion Report:*** The PMU will submit a Sub-Project Completion Report to World Bank after completion of construction phase i.e. by the end of 18 months. This will also include performance evaluation on the Contractor's implmentation of the ESMP and compliance with audit findings and any non-compliance issues raised.

10.3.5 Capacity Building and Training

17. The implementation of the EMP for NCB-01 & 02 will require a robust social and environmental, health and safety training plan which will ensure that the job specific training and EHS induction training needs are identified based on the specific requirements of EMP and capacity of site and project personnel (including the Contractors and Subcontractors of NCB-01 & 02) to undertake the required actions and monitoring activities. General environmental awareness will be increased among the project's team to encourage the implementation of environmentally sound practices and compliance requirements of the project activities. This will help in minimising adverse environmental impacts, compliance with the applicable regulations and standards, and achieving performance beyond compliance. The same level of awareness and commitment will be imparted to the contractors and sub-contractors prior to the commencement of the project. The table below gives a brief overview of the capacity building and training plan.

Table 57: Capacity Building and Training Plan

Training program	Key stakeholders participating	Frequency of training	Methodology of training
Training program on ESMP, compliance for PIU and ULB officers	PIU and ULB representatives, Environment and Social specialist PIU, Supervising Enginner ULB	Annual	Workshop, face to face training. provided by JUIDCO PMU safeguards staff
Training on ESMP, Labour management, OHS, use of PPE, and emergency response measures for Contractor staff/labour	Contractor staff	During contractor mobilization phase, prior to commencement of work.	Orientation Session & During the construction phase progress as required. On-site awareness program at construction site and at labour camp Provided by

			JUIDCO PMU safeguards staff, supported by CSQC and CSQC,

10.3.6 Stakeholder Engagement

266. The Project will establish a Community Disclosure and Grievance Redressal (CDGR) system that will be form the crux of stakeholder engagement to be implemented during the execution of project. CDGR committee must be formed from various stakeholders to meet regularly with PAPs and attend to grievances. It is suggested that the system will be implemented by JUIDCO-PMU & PIU from support from appointed CSQC and RAP implementation support agency. The grievance mechanism should capture community grievance as well as worker's grievance.

267. The system will comprise of the following:

An accessible and simple grievance redressal procedure: The Grievance Redressal procedure will outline the process and steps to be taken the contractor, CSQC and PIU, the key people responsible, and the upper limit to the time taken to resolve a conflict to the satisfaction of the complainant. In case there are grievances that have reached a stalemate, a third-party mediation may be considered. The entire GR process will be disclosed to the community at individual project sites, and it should be JUIDCO's and its CSQC's endeavour to get all complaints recorded in the grievances log, and be addressed in a consistent manner.

Apart from this aGrievance redressal committee shall be constituted at the ULB level with representatives from PIU, other deparments and prominent citizens. Grievances could also be recorded by the aggrieved party with Deputy Project Director JUIDCO.

A public consultation plan: This plan will detail out the range of awareness and communication initiatives that will be implemented by JUIDCO in order to transparently and proactively address stakeholder concerns during the implementation of project activity.

268. The Environmental and Social Specialists of JUIDCO-PMU will also need to coordinate with the various government agencies and ULBs to meet the EMP's commitments to stakeholder engagement as follows:

i. Interface between JUIDCO, contractors, sub-contractors, relevant government departments (forest, utilities, traffic police) and the local community
ii. Disclosure of project specific information including the ESIA and ESMP on ULB website and District Library

iii. Establish a mechanism to obtain, report and monitor all grievances from the local community

iv. Regular engagement with gram panchayats and other local stakeholder groups identified in this report

v. For better implementation of environmental management plan, grievance redressal mechanism has been proposed (as detailed in section 9.3).

10.3.7 Budget allocation for environment and social management plan

269. The indicative split up of capital and recurring cost for the ESMP for NCB-01 & 02 is presented in Table 58&Table 59 respectively. Mitigation measures proposed in the ESMP will be implemented by the Contractor and supervised by the CSQC consultant. The works to be undertaken by the contractor have been quantified and the quantities included in the respective BOQ items. The specifics of environmentalhealth and safety measures to be followed by the contractor have been included in the Annex II Borrow Area management, Annex IV Labour Camp Site management, Annex V Waste Manageemnt, Annex VI OHS Management in this document.

270. The budgetary provisions for the implementation of the environment and social management plan and enhancement measures for the Project road are presented in Table 6-1. The Costs pertaining Cultural properties relocation have been included as part of the resettlement action plan.

Table 58: Indicative Budgetary allocation for EMP implementation for NCB-01

Sl. No.	Particular	Capital Cost[7]
A)	Construction Phase	
1	**Trainings** to be provided to contractors staff/workers with information pertaining to minimizing solid waste, camp site hygiene, usage of designated toilets; HIV prevention, gender, and occupational health and safety including usage of PPE, and maintaining Workplace EHS signage.	Covered under Project Cost
2	**Utility Shifting** The cost of existing utility shifting is taken separately in engineering costing, the mitigation and monitoring measures have been incorporated under the engineering costs	Covered under Project Cost
3	**Cultural Properties** Relocation, Mititgation and enhacnements.	Covered Part of Project cost- RAP implmentation
4	**Tree Cutting** No# 1560 trees	Covered under Project

[7] *This is indicative cost for 24 months for the project*

Sl. No.	Particular	Capital Cost'
		Cost
6	Compensatory Plantation including Avenue Plantation- Road side avenue plantation, Plantation within available space at junctions, between main carriageway and service land and Remaining within/near schools/colleges/hostels/slope of bund walls.	4.35 crore for Dhanbad road project covered under Project Cost
7	Transplantation of trees	3.45 crore for NCB 1 covered under Project Cost
8	Shrub plantation in Median	Cost covered under Engineering Cost
9	Landscaping at major junctions	Cost covered under Engineering Cost
10	Setting up of Labour Camp and all required provisions per Annex IV	Cost covered under Engineering Cost
11	Mitigation measures of Dust Suppression, drainage structures, borrow area management and maintenance of haul roads related to borrow areas Air/noise pollution control measures in construction equipments; Management and disposal of waste, bituminous material, oil interceptors, silt fencing, soak pits etc.	Cost covered under Engineering Cost
12	Waste management provisions as per Annex V	Cost covered under Engineering Cost
13	Provision of adequate drainage and bunds/ diversion dykes, water sprinkling etc. to prevent soil/ raw material escape	Cost covered under Engineering Cost
15	Mobile Water points and toilets for workers and sewage disposal facility	Cost covered under Engineering Cost
16	Air Quality monitoring at critical locations [8]	18.89 Lakhs
17	Water Quality monitoring[9]	3.97 Lakhs
18	Noise and vibration Monitoring (ccupational & Ambient)[10]	7.6 Lakhs
19	Maintaining hygiene and labour welfare- Campsite toilets, waste management and cleanliness Health and Safety- PPE, illumination, site safety, barricading, fencing	10.0 Lakhs
20	Dust Control, Water sprinkling, tarpaulin sheets to	Cost covered under

[8] *Air Monitoring's 4920per sample, 4 locations per week atconstruction area& 1 labor camp for continuous 24 months. Average cost over 2 years' period has been assumed.*

[9] *Water Monitoring (1 Labour camp & 1 SW) :Rs 8280 per sample ;2 locations .If construction camp has surface water body nearby then additional water monitoring to be added for 24 months*

[10] *Noise Monitoring: Rs 1980 per Sample: 4 locations per week during construction phase 1 labour camp& 3 Sensitive zone for 24 months. May increase if time taken for construction increases.*

Sl. No.	Particular	Capital Cost'
	cover sand and other loose material when transported by trucks	Engineering Cost
21	Miscellaneous expenses for construction phase ESMP implementation and monitoring	2.7 Lakhs
	Total Cost of Environmental Mitigation and Quality Monitoring	**43.16 Lakhs**
B)	Operation Phase	
1	Air Quality Monitoring- (2 times per year)	0.4 lakh/ year
3	Ambient Noise Monitoring (4 times a year)	0.3 lakh/year
4	Maintainence of compensatory plantation and transplanted trees	To be carried out by ULB own cost
5	Routine Maintaince of Traffic Operation Facilities, illumination, road safety marking and pavements	To be carried out by ULB own cost
6	Road Safety Monitoring, Emergency accident plan etc.	To be carried out by ULB own cost
7	Inspection of Culverts, pavements, drains, and road safety markers	To be carried out by ULB own cost

Note: The above cost does not include cost of manpower needed for the EMP implementation

Table 59: Indicative Budgetary allocation for EMP implementation for NCB-02

Sl. No.	Particular	Capital Cost[11] (INR in Lakhs)
A)	Construction Phase	
1	**Trainings** to be provided to contractors staff/workers with information pertaining to minimizing solid waste, camp site hygiene, usage of designated toilets; HIV prevention, gender, and occupational health and safety including usage of PPE, and maintaining Workplace EHS signage.	Covered under Project Cost
2	**Utility Shifting** The cost of existing utility shifting is taken separately in engineering costing, the mitigation and monitoring measures have been incorporated under the engineering costs	Covered under Project Cost
3	**Tree Cutting** No# 1560 trees	Covered under Project Cost
4	**Compensatory Plantation** including Avenue Plantation Road side avenue plantation, Plantation within available space at junctions, between main carriageway and service land and Remaining	4.35 crore for Dhanbad road project covered under Project Cost

[11] *This is indicative cost for 24 months for the project*

Sl. No.	Particular	Capital Cost[11] (INR in Lakhs)
	within/near schools/colleges/hostels/slope of bund walls.	
6	**Transplantation** of trees	2.45 crore for NCB 2 covered under Project Cost
7	**Shrub plantation in Median**	Cost covered under Engineering Cost
8	**Landscaping** at major junctions	Cost covered under Engineering Cost
9	Setting up of Labour Camp and all required provisions per Annex IV	Cost covered under Engineering Cost
10	Mitigation measures of Dust Suppression, drainage structures, borrow area management and maintenance of haul roads related to borrow areas Air/noise pollution control measures in construction equipments; Management and disposal of waste, bituminous material, oil interceptors, silt fencing, soak pits etc.	Cost covered under Engineering Cost
11	Waste management provisions as per Annex V	Cost covered under Engineering Cost
12	Provision of adequate drainage and bunds/ diversion dykes, water sprinkling etc. to prevent soil/ raw material escape	Cost covered under Engineering Cost
13	Mobile Water points and toilets for workers and sewage disposal facility	Cost covered under Engineering Cost
15	Air Quality monitoring at critical locations [12]	9.44 lakhs
16	Water Quality monitoring[13]	3.97 Lakhs
17	Noise and vibration Monitoring (ccupational & Ambient)[14]	3.8 lakhs
18	Maintaining hygiene and labour welfare- Campsite toilets, waste management and cleanliness Health and Safety- PPE, illumination, site safety, barricading, fencing	10.0 Lakhs
19	Dust Control, Water sprinkling, tarpaulin sheets to cover sand and other loose material when transported by trucks	Cost covered under Engineering Cost
20	Miscellaneous expenses for construction phase ESMP implementation and monitoring	2.7 Lakhs

[12]Air Monitoring's 4920 per sample, 2 locations per week 1 atconstruction site& 1 labor camp for continuous 24 months. Average cost over 2 years period has been assumed.

[13]Water Monitoring(Labour camp& 1 SW) :Rs 8280per sample ;2 locations .If construction camp has surface water body nearby then additional water monitoring to be added for 24 months

[14]Noise Monitoring: Rs 1980per Sample: 2 locations per week during construction phase at 1 Sensitive zone & 1 labour camp for 24 months. May increase if time taken for construction increases

Sl. No.	Particular	Capital Cost[11] (INR in Lakhs)
	Total Cost of Environmental Quality Monitoring	**29.9 Lakhs**
B)	Operation Phase	
1	Air Quality Monitoring- (2 times per year)	0.3 lakh/ year
3	Ambient Noise Monitoring (4 times a year)	0.2 lakh/year
4	Maintainence of compensatory plantation and transplanted trees	To be carried out by ULB own cost
5	Routine Maintaince of Traffic Operation Facilities, illumination, road safety marking and pavements	To be carried out by ULB own cost
6	Road Safety Monitoring, Emergency accident plan etc.	To be carried out by ULB own cost
7	Inspection of Culverts, pavements, drains, and road safety markers	To be carried out by ULB own cost