

Draft Initial Environmental Examination

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India: Tripura Industrial Infrastructure Development Project (Bodhjunagar Industrial Estate)

Prepared by the Department of Industries and Commerce (DoIC), Government of Tripura, for the Asian Development Bank (ADB).

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Initial Environmental Examination

Tripura Industrial Infrastructure Development Project

Project Number: 58021-001

**Infrastructure Development for Bodhjungnagar
Industrial Estate, West Tripura District, Tripura**

**Prepared by the Department of Industries & Commerce (DoIC), Government of
Tripura**

February 2025

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ABBREVIATIONS

AC	: Assembly Coordinator
ACSR	: Aluminum Conductor Steel Reinforced
ADB	: Asian Development Bank
AEE	: Assistant Engineer Environment
AHU	: Air Handling Unit
AIDS	: Acquired Immune Deficiency Syndrome
AMC	: Agartala Municipal Commission
AQ	: Air Quality
ASI	: Archaeological Survey of India
BIS	: Bureau of Indian Standards
CAR	: Contractor All Risk
CCTV	: Closed-Circuit Television
CDRC	: Capacity Development Resource Centre
CEMP	: Contractor's Environmental Management Plan
CETP	: Common Effluent Treatment Plant
CFC	: Common Facility Centre
CGWA	: Central Ground Water Authority
CGWB	: Central Ground Water Board
CITES	: Convention on International Trade in Endangered Species
CoC	: Code of Conduct
CoI	: Corridor of Impact
CPCB	: Central Pollution Control Board
CPGRMS	: Centralized Public Grievance Redress Monitoring System
CPHEEO	: Central Public Health & Environmental Engineering Organization
CPWD	: Central Public Works Department
CRA	: Climate Risk and Adaptation
CRO	: Complaint Receiving Officer
CTE	: Consent to Establish
CTO	: Consent to Operate
CWR	: Clear Water Reservoir
DFO	: Divisional Forest Officer
DG	: Diesel Power Generating Set
DoIC	: Department of Industries & Commerce
DLP	: Defect Liability Period
DOT	: Department of Telecommunications
DTr	: Distribution Transformer
DTW	: Deep Tube Well
EA	: Executing Agency
EC	: Environmental Clearance
EC	: Emergency Controller
EHS	: Environment, Health and Safety
EIA	: Environmental Impact Assessment
EMoP	: Environmental Monitoring Plan
EMP	: Environmental Management Plan
EMR	: Environment Monitoring Report
ERP	: Emergency Response Plan
ESGC	: Environmental, Social and Gender Cell
ETP	: Effluent Treatment Plant
FI	: Financial Intermediary
FRO	: Forest Range Officer

GBV	: Gender Based Violence
GHG	: Green House Gases
GIIP	: Good International Industry Practices
GoI	: Government of India
GoT	: Government of Tripura
GPS	: Global Positioning System
GPH	: Gallons Per Hour
GRC	: Grievance Redressal Committee
GRM	: Grievance Redressal Mechanism
GW	: Ground Water
Ha.	: Hectare
HDPE	: High-density Polyethylene
HIV	: Human Immunodeficiency Viruses
HSD	: High Speed Diesel
HT	: High Tension Line
IA	: Implementing Agency
IBAs	: Important Bird Areas
IBAT	: Integrated Biodiversity Assessment Tool
IC	: Incident Controller
ICCC	: Integrated Command and Control Centre
ICP	: Integrated Check Post
IE	: Industrial Estate
IEE	: Initial Environmental Examination
IFC	: International Finance Corporation
IMD	: Indian Metrological Department
INRM	: India Resident Mission
IRC	: Indian Road Congress
IRP	: Iron Removal Plan
IUCN	: International Union for Conservation of Nature
KLD	: Kilo Liter Per Day
KW	: Kilo Watt
LED	: Light Emitting Device
LT	: Low Tension Line
LULC	: Land Use Land Cover
MDPE	: Medium Density Polyethylene Pipe
MLD	: Million Liters Per Day
MoEF&CC	: Ministry of Environment, Forest and Climate Change
MPN	: Most Probable Number
MS	: Mild Steel
MSL	: Mean Sea Level
MSW	: Municipal Solid Waste
MT	: Metric Tonne(s)
MUD	: Multi Utility Duct
MVA	: Mega Volt Amp
MW	: Mega Watt
NAAQS	: National Ambient Air Quality Standards
NABET	: National Accreditation Board for Education and Training
NABL	: National Accreditation Board for Testing and Calibration Laboratories
NEEPCO	: Northeastern Electric Power Corporation Limited
NEP	: National Environment Policy
NG	: Natural Gas
NGO	: Non-Governmental Organization

NGT	: National Green Tribunal
NH	: National Highway
NOC	: No Objection Certificate
NQ	: Noise Quality
NRSC	: National Remote Sensing Centre
OFC	: Optical Fiber Cable
OHS	: Occupational Health and Safety
OH	: Over Head
OHT	: Over Head Tank
O&M	: Operation and Maintenance
OSD	: Officer on Special Duty
OSHA	: Occupational Safety and Health Administration
PCC	: Plain Cement Concrete
PCR	: Project Completion Report
PDMC	: Project Design and Management Consultant
PF	: Protected Forest
PIB	: Public Information Booklet
PIU	: Project Implementation Unit
PMSC	: Project Management and Supervision Consultant
PMU	: Project Management Unit
PNG	: Piped Natural Gas
POL	: Petroleum, Oil and Lubricants
PPE	: Personal Protective Equipment
PRF	: Project Readiness Financing
PRF	: Proposed Reserve Forest
PTr	: Power Transformer
PUC	: Pollution Under Control
PWD	: Public Works Department
QPR	: Quarterly Progress Report
REIA	: Rapid Environmental Impact Assessment
RET	: Rare, Endangered and Threatened
RF	: Reserve Forest
RFCTLARRA	: Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act
RoW	: Right of Way
RPD	: Rights of Persons with Disabilities
RWR	: Raw Water Reservoir
SCADA	: Supervisory Control and Data Acquisition
SCM	: Standard Cubic Meter
SEIAA	: State Environmental Impact Assessment Authority
SEMP	: Site Environmental Management Plan
SEMR	: Semi-annual Environment Monitoring Report
SEP	: Site Environmental Plan
SLD	: Single Line Diagram
SOP	: Standard Operating Procedures
SPS	: Safeguard Policy Statement
SQ	: Soil Quality
ST	: Scheduled Tribe
STP	: Sewage Treatment Plant
SW	: Surface Water
SWD	: Storm Water Drain
TIDCL	: Tripura Industrial Development Corporation Limited

TIIDP	:	Tripura Industrial Infrastructure Development Project
TSPCB	:	Tripura State Pollution Control Board
UG	:	Under Ground
UGSR	:	Under Ground Service Reservoir
ULB	:	Urban Local Body
UPVC	:	Unplasticized Polyvinyl Chloride
VCB	:	Vacuum Circuit Breaker
VdB	:	Vibration Decibels
WLS	:	Wildlife Sanctuary
WMM	:	Wet Mix Macadam
WTP	:	Water Treatment Plant
XLPE	:	Cross Link Polyethylene

CURRENCY EQUIVALENTS
(as of 12th December 2024)
Currency unit – Indian rupee (Rs)
Rs1.00 = \$0.012
\$1.00 = INR 84.82

NOTES

In this report, "\$" refers to US dollars.
"INR", ₹ and "Rs" refer to Indian rupees.

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EXECUTIVE SUMMARY

1. The DoIC is an executing agency (EA), and Tripura Industrial Development Corporation Limited (TIDCL) is designated as implementing agency (IA) for the PRF (Loan 6046-IND). The DoIC has engaged a Project Design and Management Consultant (PDMC) for preparation of the feasibility and detailed project reports, and other assigned deliverables for all prioritized industrial estates under PRF and to enable DoIC for seeking the ensuing loan (Project Number: 58021-001 - Tripura Industrial Infrastructure Development Project (TIIDP)) from ADB. Further, ADB has engaged a TA consultant (Environment) for compilation and finalization of all nine initial environmental examination (IEE) reports under the PRF.

2. The project will support Tripura's industrial infrastructure development. Industrial estates are critical drivers of industrialization. The state government has prioritized the development of nine industrial estates with ADB's support. The project builds on due diligence and preparation completed under a \$2.0 million PRF- loan to develop integrated, inclusive, climate-resilient, and sustainable infrastructure at the industrial estates. The project is aligned with the following impact: boost the manufacturing sector's competitiveness and create new and better job opportunities, including for women, and foster regional cooperation. This will be achieved through the following outcome: improved industrial infrastructure and business environment. The project will achieve this outcome by supporting the following outputs.

3. **Output 1: Institutional structures and mechanisms for industrial development strengthened, and business environment enhanced.** This output includes the establishment of a project management unit (PMU) and four project implementation units (PIUs) within TIDCL and a dedicated environment, social, and gender (ESG) cell to address ESG-related issues observed during implementation of infrastructure development within the nine industrial estates under the project. It also includes training programs in gender-responsive industrial estate management and climate change and safeguards. Output 1 also includes engaging Project Management and Supervision Consultants (PMSC) and individual experts to support TIDCL to strengthen institutional structures and mechanisms and to improve the business environment.

4. **Output 2: Climate-resilient infrastructure and gender-responsive and inclusive industrial environment built.** This output includes the development of (i) 34.16 km of climate-resilient road infrastructure and adjoining utility trenches built in nine industrial estates; (ii) about 66.55 km of stormwater drainage, 4 nos. minor bridges, 150 nos. box culverts built in nine industrial estates, and 70 rainwater harvesting systems, with 10 retention ponds built at seven industrial estates; and (iii) 13.30 MLD water supply system backed with 35.71 km of water supply distribution pipeline at six industrial estates. It also includes the construction of 2.1 km of geo-cell earth retaining wall for protection and erosion control. The project also includes the development of gender-responsive infrastructure at the industrial estates, including dedicated space for day care centers at all nine industrial estates, with at least three centers operational, and gender desks at six industrial estates to address the concerns of women workers. The Bodhjunnagar industrial estate will be promoted as a gender-responsive estate to serve as a model for other industrial estates. This also includes earmarking of at least 300 square meters of land in all industrial estates reserved exclusively for women-led enterprises. This output also includes at least five new women-led enterprises to receive incentives under the Tripura industrial investment promotion incentive scheme,

promoting women ITI at Agartala as a state hub for skill training of women in emerging and non-traditional sectors and the “SHE Skills” program; and develop and adopt a five-year road map for implementation of the Tripura State Policy for Empowerment of Women, 2022, aimed at increasing employment of women in state’s industrial estates at TIDCL.

5. **Output 3: Industrial estates developed and upgraded.** This output is the major component of the project and includes activities to upgrade the nine industrial estates. To ensure adequate energy supply at the industrial estates, power distribution networks will be upgraded at all nine industrial estates, while 1255 streetlights and 37 high mast lights will be installed, and solar power facilities will be established in nine industrial estates. This output includes repairing and restoring the CETP at one industrial estate with 2 nos. clear water retention pond and building common multi-facility buildings at six industrial estates. At least 12 additional industrial pre-engineered sheds will be built at three industrial estates, and a parking area of 5 acres spread over six industrial estates will be developed. The transport systems of the industrial estates will be improved by introducing four compressed natural gas buses, 18 electrical vehicles, and nine electric vehicle charging stations. To improve safety and security at the industrial estates (i) one fire station will be proposed; (ii) seven weigh bridges will be built; (iii) 11 km of boundary walls will be built at eight industrial estates, and another 5.1 km of the existing wall will be upgraded; (iv) 14 watchtowers will be built; (v) 462 cameras with junction board as security and surveillance systems will be installed; and (vi) one integrated command and control center will be built to monitor two industrial estates in West Tripura. At least six industrial estates will have enabled accessible sanitation with ramps and grab rails in all toilets, and separate female toilets with menstrual hygiene facilities. All infrastructure will be inclusively managed, with women trained and provided employment opportunities in facility management services to the extent possible.

6. The project includes infrastructure development of nine IEs (namely Bodhjungnagar, R.K.Nagar, Kumarghat, Dhajanagar, Dharmanagar, Deewanpasa, Dukli, Sarasima and Nagicherra) spread across 5 districts (namely West Tripura, North Tripura, South Tripura, Gomati, Unakoti) in the state of Tripura. Bodhjungnagar is one of the nine prioritized industrial estates, spread over an area of 207.641 ha, existing since year 1998, located at 2.5 km from NH-108 B, 4 km from NH-8 and 15 km from Jirania Railway Station. Currently, there are 132 industrial units in Bodhjungnagar IE, out of which 65 are functional, 19 are closed for a considerable period, 4 are temporarily closed and 42 units are allocated & are being set up.

7. Based on the need analysis, infrastructure development components considered within the Bodhjungnagar IE comprise are (i) development of vacant land into additional industrial plots (42 industrial plots spread over 20.83 ha); (ii) improvement of internal roads from single lane to intermediate/ two lane along with improvement of intersections/ junctions with adequate lighting facilities (16.260 km); (iii) storm water drains (31.03 km) with 49 culverts and 4 minor bridges; (iv) augmentation of water supply (10 raw water reservoirs, 7 new deep tube wells, 4.6 MLD capacity water treatment plant and 16.089 km distribution pipelines), (v)

¹ The net planning area of Bodhjungnagar Industrial Estate is spread over an area of 207.64 ha. (512.82 acres) out of total 217.30 ha. (536.72 acres). Within the IE, 9.68 ha. (23.90 acre) of land has been excluded for development, as it is under un-authorized settlements.

rainwater percolation wells at 22 locations (vi) utility corridor (32.54 km); (vii) augmentation of power system (HT/ LT/ SCADA cables/ OFC), 500 KW solar power generation (9 different locations within IE); and (viii) infrastructure and buildings for common facilities spread over nearly 16,000 sqm (1.6 ha.) like administrative office, multipurpose hall, & conference hall, creche facility, dispensary, canteen & food preparation area, miscellaneous utility centers & other common facilities like, recreational areas, bus stop, safety and security (ix) shops & business center; (x) future provision for residential housing – staff quarter, worker housing, women hostel etc. (d) refurbishment of common effluent treatment plant (CETP) -500 KLD; and (xii) development of parks and open areas (20.22 ha) under the project; (xii) 02 nos. of CNG Buses and 2 nos. of battery-operated small E-vehicles, along with the necessary charging infrastructure, have been proposed to be improving internal mobility within the Industrial Estate.

8. All the proposed developments are spread over 52.14 ha. vacant land area (25.10% of total 207.64ha), within the existing boundary of Bodhjunnagar IE. In addition, the existing 500 KLD CETP located within IE is also proposed to be refurbished by improving plant equipment and performance, re-use of treated effluent/ water for industrial purpose by collecting it in two existing ponds with an estimated cumulative capacity of 10 million liters as a resource conservation measure and also to achieve the project development objective in a sustainable manner.

9. The objective of the IEE is to determine the applicable regulatory framework, assess the baseline environment surrounding the industrial estate (IE) along with the likely impacts due to the proposed infrastructure development works and suggest the mitigation measures as required. The IEE includes a commensurate environmental management plan (EMP) along with institutional arrangements to mitigate the likely impacts under the project.

10. The IEE report has determined that the proposed development works at Bodhjunnagar IE will not require prior environmental clearance (as per EIA notification 2006 and amendment thereof) either from the state or central levels in compliance with environmental regulations of the country. The proposed development works will require felling of 286 trees, which include 47 Agar trees (*Aquilaria malaccensis*) and 4 Jalpai trees (*Elaeocarpus serratu*) and rest of trees are commonly found in the region. The Agar and Jalpai trees are listed as endangered and threatened species by Tripura state forest department. TIDCL has completed the joint verification survey with the Forest Department, yet to receive permission for felling these 286 trees from the State Forest Department. The cutting of trees would be initiated only after obtaining the requisite tree cutting permission from the forest department. The contractor will be required to obtain CTE and CTO for establishing campsites, construction plants (hot-mix plants, concrete batch plants, crushers, wet mix macadam, etc.) from the Tripura State Pollution Control Board. No Objection Certificate (NOC) will be required from the Central Ground Water Authority for construction of new tube wells to meet the projected industrial water demand of the IE. Seeking such required permissions, consents and NOC will not pose any regulatory risks.

11. The Bodhjunnagar IE does not have any project component(s) which qualify as “associated facility². Further, an on-site assessment³ of all other existing infrastructure like roads, entrance gate, boundary wall and other utilities including the CETP was undertaken to identify past or present concerns relating to impact on the environment. The on-site assessment identified environmental concerns with respect to the functioning of common effluent treatment plant (CETP) and measures to address outstanding concerns and thus considered as “existing facility⁴” in accordance with the ADB’s SPS, 2009. Accordingly, an environmental audit of the CETP has been carried out and a corrective action plan with required budgetary provision is included in EMP.

12. Geologically, the core and buffer zones⁵ is occupied by upper tertiary and does not have geological reserves of rock/stone aggregates. The core and buffer zones have adequate groundwater resources with yield ranging between 100 to 150 cum. per hour and has not been notified for restricted groundwater development by the CGWA.

13. The core and buffer zones fall within the Khowai river catchment under Barak sub-basin, which predominantly has dendritic drainage pattern with first order followed by second order drains/streams and none of them are prone to floods even during the monsoon season or heavy rainfall years. Although the state has 408 freshwater wetlands, Rudrasagar Lake, a RAMSAR site is the only surface water body, which is at about 40 km aerial distance from the Bodhjunnagar IE.

14. The elevation of Bodhjunnagar IE ranges between 26 to 52 meters above mean sea level (MSL) and is at a relatively higher level as compared to the surrounding region. Consequently, Bodhjunnagar IE is not prone to submergence and/ or floods even during heavy rainfall years. The soil types in the area are predominantly red loamy, red & yellow, light & red earth, which are generally acidic in nature and deficient in nutrients like nitrogen, phosphate calcium, magnesium and sulfur, whereas available potash levels are medium to high.

15. The climate of the core and buffer zones is characterized by moderate temperatures with high humidity throughout the year. Winter season starts in November and lasts till the end of February. Summer season starts from March and lasts up to May and is followed by Southwest monsoon lasting till October. Generally, maximum summer temperature ranges

² Associated Facility - that are not funded as part of the project (funding may be provided separately by the borrower/client or by third parties), and whose viability and existence depend exclusively on the project and whose goods or services are essential for successful operation of the project (Para 6, Appendix 1 of Safeguard Policy Statement, 2009).

³ On-site assessment of the existing infrastructure within the IE was carried out as a pre-cursor to the IEE. The assessment included field inspection and interactions with the owner representative(s) of the industrial units within the IE. The field inspection indicated the industrial estate has no settlement areas, sensitive receptors like educational institutions/ hospitals/ religious structures, surface water bodies, lakes, forest/ ecologically sensitive areas, flood/ drainage concerns within its boundary or surrounding 500m peripheral area.

⁴ If a project involves an upgrade or expansion of existing facilities that has potential impacts on the environment, involuntary resettlement, and/or Indigenous Peoples, the requirements for environmental and social impact assessments and planning specified in Safeguard Requirements 1-3 will apply in addition to compliance audit. (Para 12, Appendix 4 of Safeguard Policy Statement, 2009).

⁵ IEE considers Bodhjunnagar IE and a 500m wide strip all along its periphery as core zone and entire West Tripura district as buffer zone for assessment of baseline environment.

from 35°C to 40°C and average minimum temperature is in winter nights range between 6°C to 8°C.

16. The average annual rainfall received in the core and buffer zones between 2018 and 2022 is 1862 mm, most of which occur between May to October months. The visibility range between 4 to 10 km for over 300 days in a year. The pre-dominant wind direction is South followed by Southeast both during morning and evening hours throughout the year. The wind speed ranges between 1 to 19 km per hour for 247 days and calm days for nearly 117 days in normal years.

17. The baseline environmental monitoring (ambient air quality, ambient noise levels, surface water, ground water, and soil quality) within the area indicates that all tested parameters at all sampling locations were within the respective standards or does not critically exceed the respective stipulated limits/standards.

18. The core zone extending up to 500-metre beyond the boundary of the industrial estate does not have forest areas of any type/ category. The Sepahijala Wildlife Sanctuary (WLS) and its notified eco-sensitive zone is the nearest protected area, which is at an aerial distance of 21.64 km from the Bodhjungnagar IE.

19. Ecological investigations carried out through I-BAT has cataloged 84 flora and 195 fauna groups within 500m core zone, including Bodhjungnagar IE, as compared to the 195 flora and 197 fauna groups in the buffer zone (beyond 500m and up to 20 kms). This abridgment/ curtailment in the flora and its richness in the core zone can be attributed to the hustle of industrial operations and consequent environmental stressors within the Bodhjungnagar IE. Consultations with the forest department officials as well as local community has not indicated presence/ sighting of any wildlife and/or any animal-human conflicts in the area during the past 10 years. The faunal surveys carried out within the core zone have not reported sighting of any reptilian fauna. However, the presence of reptilian fauna cannot be ruled out.

20. Tripura has eight protected archeological and/or historical monuments protected under the Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010 and amendments thereof. However, none of them are within 300m radius (in all directions) of Bodhjungnagar IE. Likewise, the core zone does not have any physical cultural resources.

21. Tripura state is vulnerable to earthquakes, floods, landslides, cyclones, extended dry spells and other natural and human induced disasters. Among these, the state is very highly vulnerable to earthquakes as it is situated in Seismic Zone-V and has a higher probability of occurrence of big earthquakes measuring 8 and above on the Richter scale.

22. The IEE report has not identified any significant and irreversible environmental impacts and is not anticipated to have long term impacts on geology, hydrogeology, soil, flora, fauna etc. of the core and buffer zones. The proposed construction works will have localized, largely reversible short-term impacts, confined to the existing Bodhjungnagar IE boundary.

23. Measures to minimize the impacts due to construction activities like vegetation clearance, dust and noise levels, air pollution due to vehicular emissions, worker's safety, construction site management, construction material management including debris disposal on and off-site

sanitation management are described under environmental management plan (EMP) for pre-construction, construction, and operations phase. The implementation of the EMP by the contractor(s) and PIU will be supervised and monitored by the environmental, social and gender (ESG) cell under the PMU. The EMP and environmental monitoring plan (EMP) will be included (sector-wise) in the bid document, to make it part of civil works contract and binding of awarded contractors for its implementation during construction phase.

24. Additionally, several environmental conservation measures like balancing earthwork cut and fill quantities (86198.52 cum) and reuse for green area development, construction of stormwater holding/ retention ponds at 5 locations with a cumulative capacity of 73.25 million liters, groundwater recharging/ percolation wells at 22 locations to offset the withdrawal of groundwater and 1 nos. of sump for industrial purposes of the IE, plantation of 1430 saplings (5 saplings for each of 286 trees felled) with 3 year maintenance for minimum 70% survival rate to offset the net loss and ensure net gain from 3rd year onwards, development of green belt in open areas (20.22 ha) and 12,845.77 sqm of green belt beside the pond pathways, 32.54 km long utility corridor, periodical monitoring of ambient air quality, ambient noise levels, water and soil quality at construction sites throughout the construction stage, and capacity development (of PMU, PIUs, and contractors) have been considered along with necessary budgetary provisions (INR 193.23 lakhs).

25. The utility corridor proposed along the roads within the IE, to accommodate various utilities viz; water/ effluent pipelines, power cables (HT/LT), SCADA, Optical Fiber Cable (OFC) and piped natural gas (PNG) will enable to avoid repetitive excavation and restoration for routine maintenance and fault repairing as and when required.

26. The stakeholders, i.e. owners of the existing industries as well as the workforce (within the IE) and visitors to the IE have been consulted, and many of their suggestions have been included in the project design.

27. Alternative analysis has compared options like (i) no project scenario (ii) proposed development works with minimal impacts along with additional environment conservation measures. The IEE includes grievance redressal mechanism to resolve any complaints from aggrieved existing industries and/or their workforce, and any stake holders during pre-construction, construction and operation stages of the project.

28. Based on the baseline environmental assessment of the core and buffer zones as well as the proposed infrastructure (linear as well as area based) development works within Bodhjungnagar IE, the IEE has not identified any significant and irreversible long term environmental impacts on geology, hydrogeology, soil, flora, fauna etc. of the core and buffer zones. The proposed improvements will have short-term and localized construction stage impacts confined to the existing boundary. The Installation of 500 KW solar power generation component within its existing dis-functional solar park will lead to 1.51% reduction in greenhouse gases (GHG) emissions by offsetting the energy demand from fossil fuel. The rapid environmental assessment (REA) checklist (ref. **Appendix-1**) has been prepared for the Bodhjungnagar IE. Therefore, as per ADB's SPS 2009, the Project (Bodhjungnagar IE) is defined as "category B" for environment safeguards and the IEE report has been prepared.

1.0 INTRODUCTION

1.1 Background

29. The Department of Industries & Commerce (DoIC), Government of Tripura has initiated an ambitious program for the infrastructure development in nine prioritized industrial estates through a loan 6046-IND from the Asian Development Bank (ADB) to promote the industrial growth and economy of the state. The DoIC has received a Project Readiness Financing (PRF) facility from the ADB to prepare the prioritized industrial estates for the anticipated loan.

30. The DoIC is an executing agency (EA), and Tripura Industrial Development Corporation Limited (TIDCL) is designated as an implementing agency (IA) for the PRF (Loan 6046-IND). The DoIC has engaged a Project Design and Management Consultant (PDMC)⁶ for preparation of the feasibility and detailed project reports, and other assigned deliverables for all prioritized industrial estates under PRF and to enable DoIC for seeking the ensuing loan (Project Number: 58021-001 - Tripura Industrial Development Project) from ADB. Further, ADB has engaged a TA consultant (Environment) for compilation and finalization of all nine initial environmental examination (IEE) reports under the PRF.

31. The project will support Tripura's industrial infrastructure development. Industrial estates are critical drivers of industrialization. The state government has prioritized the development of nine industrial estates with ADB's support. The project builds on due diligence and preparation completed under a \$2.0 million PRF- loan to develop integrated, inclusive, climate-resilient, and sustainable infrastructure at the industrial estates. The project is aligned with the following impact: boost the manufacturing sector's competitiveness and create new and better job opportunities, including for women, and foster regional cooperation. This will be achieved through the following outcome: improved industrial infrastructure and business environment. The project will achieve this outcome by supporting the following outputs.

32. **Output 1: Institutional structures and mechanisms for industrial development strengthened, and business environment enhanced.** This output includes the establishment of a project management unit (PMU) and four project implementation units (PIUs) within TIDCL and a dedicated environment, social, and gender (ESG) cell to address ESG-related issues observed during implementation of infrastructure development within the nine industrial estates under the project. It also includes training programs in gender-responsive industrial estate management and climate change and safeguards. Output 1 also includes engaging Project Management and Supervision Consultants (PMSC) and individual experts to support TIDCL to strengthen institutional structures and mechanisms and to improve the business environment.

33. **Output 2: Climate-resilient infrastructure and gender-responsive and inclusive industrial environment built.** This output includes the development of (i) 34.16 km of climate-resilient road infrastructure and adjoining utility trenches built in nine industrial estates; (ii) about 66.55 km of stormwater drainage, 4 nos. minor bridges, 150 nos. box culverts built in nine industrial estates, and 70 rainwater harvesting systems, with 10 retention ponds built at seven industrial estates; and (iii) 13.30 MLD water supply system backed with 35.71 km of water supply distribution pipeline at six industrial estates. It also includes the construction of

⁶ M/s. Mott MacDonald Private Limited has been engaged by DoIC/ TIDCL as PDMC.

2.1 km of geo-cell earth retaining wall for protection and erosion control. The project also includes the development of gender-responsive infrastructure at the industrial estates, including dedicated space for day care centers at all nine industrial estates, with at least three centers operational, and gender desks at six industrial estates to address the concerns of women workers. The Bodhjunnagar industrial estate will be promoted as a gender-responsive estate to serve as a model for other industrial estates. This also includes earmarking of at least 300 square meters of land in all industrial estates reserved exclusively for women-led enterprises. This output also includes at least five new women-led enterprises to receive incentives under the Tripura industrial investment promotion incentive scheme, promoting women ITI at Agartala as a state hub for skill training of women in emerging and non-traditional sectors and the “SHE Skills” program; and develop and adopt a five-year road map for implementation of the Tripura State Policy for Empowerment of Women, 2022, aimed at increasing employment of women in state’s industrial estates at TIDCL.

34. Output 3: Industrial estates developed and upgraded. This output is the major component of the project and includes activities to upgrade the nine industrial estates. To ensure adequate energy supply at the industrial estates, power distribution networks will be upgraded at all nine industrial estates, while 1255 streetlights and 37 high mast lights will be installed, and solar power facilities will be established in nine industrial estates. This output includes repairing and restoring the CETP at one industrial estate with 2 nos. clear water retention pond and building common multi-facility buildings at six industrial estates. At least 12 additional industrial pre-engineered sheds will be built at three industrial estates, and a parking area of 5 acres spread over six industrial estates will be developed. The transport systems of the industrial estates will be improved by introducing four compressed natural gas buses, 18 electrical vehicles, and nine electric vehicle charging stations. To improve safety and security at the industrial estates (i) one fire station will be proposed; (ii) seven weigh bridges will be built; (iii) 11 km of boundary walls will be built at eight industrial estates, and another 5.1 km of the existing wall will be upgraded; (iv) 14 watchtowers will be built; (v) 462 cameras with junction board as security and surveillance systems will be installed; and (vi) one integrated command and control center will be built to monitor two industrial estates in West Tripura. At least six industrial estates will have enabled accessible sanitation with ramps and grab rails in all toilets, and separate female toilets with menstrual hygiene facilities All infrastructure will be inclusively managed, with women trained and provided employment opportunities in facility management services to the extent possible.

1.2 Prioritized Industrial Estates

35. In line with objectives and scope under PRF, DoIC has prioritized nine industrial estates spread across five districts in Tripura for ensuing ADB loan. The list of the prioritized industrial estates comprises eight existing (brownfield) and the remaining one new (greenfield) industrial estate is given in **Table 1-1**.

Table 1-1: Prioritized Industrial Estates under PRF

Sl. No.	Industrial Estate	Nearest Town	District	Present Status	Area (in Ha.)	Area (in acres)
1	Bodhjunnagar	Agartala	West Tripura	Existing/ Brownfield	207.6	512.87
2	R. K. Nagar	Agartala	West Tripura	Existing/ Brownfield	83.23	205.57
3	Kumarghat	Agartala	Unakoti	Existing/ Brownfield	14.60	36.05
4	Dharmanagar	Dharmanagar	North Tripura	Existing/ Brownfield	3.22	7.95
5	Nagicherra	Agartala	West Tripura	New/ Greenfield	12.56	31.02

Sl. No.	Industrial Estate	Nearest Town	District	Present Status	Area (in Ha.)	Area (in acres)
6	Deewanpasa	Dharmanagar	North Tripura	Existing/ Brownfield	22.51	55.6
7	Dhajanagar	Udaipur	Gomati	Existing/ Brownfield	7.60	18.76
8	Sarasima	Belonia	South Tripura	Existing/ Brownfield	15.94	39.38
9	Dukli	Agartala	West Tripura	Existing/ Brownfield	16.30	40.27

1.3 Objectives and Methodology of IEE

36. Bodhjungnagar is one of the nine prioritized industrial estates under PRF for which an initial environmental examination (IEE) report is prepared. The objective of the IEE report is to determine the applicable regulatory framework, assess the baseline environment surrounding the industrial estate (IE) along with the likely environmental impacts and associated mitigation measures due to the proposed development works. The IEE report includes evolving a commensurate environmental management plan (EMP) along with institutional arrangements to mitigate the likely impacts.

37. The entire Bodhjungnagar IE as well as a 500-metre-wide strip all along the peripheral boundary has been considered as the core zone for assessment of present baseline environment. The core zone can be vulnerable to various construction activities during the project implementation stage. The West Tripura district as a whole has been considered as a buffer zone for assessment of the baseline environmental conditions within the region surrounding the Bodhjungnagar IE.

38. The baseline environmental profile of the core and buffer zones have been assessed for key attributes like physical resources (viz. geology, hydrogeology, physiography, soil, drainage, land use, climate, ambient air quality, water quality, ambient noise levels, natural hazards and vulnerability status.), ecological resources (viz. flora, fauna, forest/vegetation cover, trees wetlands, critically endangered species protected monuments and social and cultural resources among others).

39. The baseline information on various environmental attributes for both core and buffer zones has been collected through field surveys and supplemented by secondary data sources from authentic and verifiable sources.

1.4 Structure of IEE Report

40. This IEE report contains the following sections:

- Executive Summary
- 1.0. Introduction
- 2.0. Policy, Legal and Administrative Framework
- 3.0. Description of the Project
- 4.0. Description of the Environment
- 5.0. Anticipated Environmental Impacts and Mitigation Measures
- 6.0. Analysis of Alternatives
- 7.0. Public consultation and information disclosure
- 8.0. Grievance Redress Mechanism
- 9.0. Environmental Management Plan
- 10.0. Conclusions and Recommendations

2.0 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

41. A review of the policy, legal and regulatory framework related to the (a) Govt. of India (GoI)/Government of Tripura (GoT); and (b) ADB's Safeguard Policy Statement (SPS) 2009 pertaining to the environmental safeguards in terms of their relevance and applicability to the Bodhjunnagar IE development is presented in this section.

2.1 Applicable Regulations of GoI/Government of Tripura

42. GoI has laid out various policies, acts, regulations and guidelines pertaining to environment safeguards requirements for varied type of developmental projects. The implementation of the project will be governed by national laws and state specific environmental rules, regulations, and standards. These regulations impose restrictions on activities to minimize/mitigate likely impacts on the environment. Compliance is required in all stages of the project's implementation including design, construction, and maintenance. All the relevant/ applicable GoI/ GoT regulations and their relevance to Bodhjunnagar IE are given in **Table 2-1**.

Table 2-1: Summary of Applicable Environmental Regulations of Govt. of Tripura

Sl. No.	Act / Rules	Key Purpose	Applicability to Bodhjungnagar industrial estate
1.	Environmental Protection Act, 1986 and subsequent amendments	The Act is an “umbrella” legislation that provides framework for the environmental regulation regime in India and the role and responsibilities of various central and state authorities established under other environment-related laws, such as the Water Act and the Air Act. The Act relates to the protection and improvement of the environment and the prevention of hazards to human beings, other living creatures, plants and property.	Yes Although the development of Bodhjungnagar IE does not fall under the listed projects and activities, which require prior environmental clearances from central or state levels, CTE and CTO for construction plants (such as the hot-mix plants, ready mix concrete plants, crushers, DG sets, etc.) are to be obtained from the TSPCB under the relevant water and air acts.
2.	National Environment Policy (NEP), 2006	NEP is a comprehensive guiding document in India for all environmental conservation programs and legislations by Central, State and Local Government. The dominant theme of this policy is to promote betterment of livelihoods without compromising or degrading environmental resources. The policy also advocates collaboration methods of different stakeholders to harness potential resources and strengthen environmental management.	Yes The DoIC, Government of Tripura should adhere to NEP principle of “enhancing and conservation of environmental resources and abatement of pollution” in all stages of project.
3.	Environmental Impact Assessment Notification-2006 notified on 14 th September 2006, as amended in 2009 and 2013	To regulate construction of new projects and/or expansion or modernization of existing projects and provide environmental clearance to new development activities following environmental impact assessment	No. The extent of land of Bodhjungnagar industrial estate is less than 500 hectares. Also, the industrial estate does not have any industry of Category “A” or “B” as specified under the EIA Notification, 2006. Further, the development area as well as building and construction projects within the industrial estate is less than (i) 50 hectares area, (ii) 20,000 and 150,000 sqm of respectively (ref. 8a & 8b schedule of EIA Notification, 2006) (ref. Appendix-2). Therefore, infrastructure development within the Bodhjungnagar IE will not require prior environmental clearance under the current EIA Notification, 2006 and its amendments thereof.

Sl. No.	Act / Rules	Key Purpose	Applicability to Bodhjungnagar industrial estate
			The existing CETP within Bodhjungnagar IE received an environmental clearance (EC) on 16 th Aug. 2016 with a validity of 5 years, which stand expired as on 15 th Aug. 2021. However, Ministry of Environment, Forest and Climate Change (MoEF&CC), Govt. of India has made an amendment vide notification dated 19 th Dec. 2018, which exempts environmental clearance for CETPs setup for or within projects or activities, which do not require environmental clearance. Thus, CETP at Bodhjungnagar IE will not require further renewal of EC. Confirmation letter of this provision issued by TSPCB is given in Appendix-3 (Enclosure-2).
4.	MoEF&CC Notification for use of fly ash, 28 th April 2016.	Reuse large quantity of fly ash discharged from thermal power plant to minimize land use for disposal	No There is no coal based thermal power plant within 300 km of the Bodhjungnagar IE. The improvement of Bodhjungnagar industrial estate does not involve construction of large-scale embankments or reclamation of low-lying areas, which can consume significant quantities of fly ash. Therefore, utilization of fly ash is not warranted for Bodhjungnagar IE.
5.	The Forest (Conservation) Act. 1980	To check deforestation by restricting diversion of forest areas into non- forest uses.	No The infrastructure development of Bodhjungnagar IE is limited to the land owned by the DoIC, Govt. of Tripura and does not warrant diversion of forest land and therefore, no forest clearances are required under the Forest Conservation Act,1980.
6.	The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006	It grants legal recognition to the rights of traditional forest dwelling communities.	NA This rule is applicable, if land acquisition of forest dwelling ST and other traditional forest dwelling communities may be required.
7.	MoEF&CC circular (1998) on linear Plantation on roadside, canals and railway lines modifying the applicability of provisions	Protection / planting roadside strip as avenue/strip plantations as these are declared protected forest areas.	No Although, the infrastructure development of Bodhjungnagar IE is limited to the land owned by DoIC, Govt. of Tripura. The development work will require the felling of trees. TIDCL has completed the joint verification survey for cutting of trees (286

Sl. No.	Act / Rules	Key Purpose	Applicability to Bodhjungnagar industrial estate
	of forest (Conversation) Act, to linear Plantation		number) with the Forest Department, and permission is yet to receive.
8.	The Wildlife Protection Act, 1972	To protect wildlife such as National Parks and Sanctuaries	No No Wildlife Sanctuary or National Park and/or their notified eco-sensitive zones are within 10 km of Bodhjungnagar IE. The nearest protected area is Sepahijala Wildlife Sanctuary and Clouded Leopard National Park, which is at a distance of 21.64 kms from the Bodhjungnagar IE.
9.	Biological Diversity Act, 2002 and Biological Diversity (Amendment) ACT, 2023	Conservation of biodiversity	Yes Bodhjungnagar IE has existed since the year 2000 and ecological investigations carried out during August-September 2023 have reported presence of two endangered tree species within the industrial estate. However, TIDCL has obtained tree felling permission from the competent authorities of the forest department.
10.	Wetlands (Conservation and Management) Rules, 2017	Wetlands (Conservation and Management) Rules 2017 have enhanced the focus of management of wetlands from a central authority to state bodies. The rules provide for an advisory role for the National Wetland Committee, to guide the state bodies on the integrated management of wetlands based on wise-use principle and review the progress of integrated management of Ramsar Convention sites among other roles.	Not applicable as subprojects components are not located in or near to designated wetland area.
11.	Air (Prevention and Control of Pollution) Act, 1981	To control air pollution Pollutants	Yes (during the construction stage, contractor will have to obtain CTE and CTO) to regulate ambient air quality by use of construction plants along the construction sites within Bodhjungnagar IE.
12.	Water (Prevention and Control of Pollution) Act, 1974	To control water pollution by controlling discharge of pollutants as per the prescribed standards	Yes (during construction phase, contractors will have to obtain CTE and CTO) to regulate the water quality by use of construction plants along the construction sites within Bodhjungnagar IE.
13.	Noise Pollution (Regulation and Control Act) 1990	The standards for noise for day and night have been promulgated by the MoEF&CC for various land uses.	Yes (during construction stage, contractors will have to obtain CTE and CTO) to regulate ambient noise levels by use of construction plants along the construction sites within Bodhjungnagar IE.

Sl. No.	Act / Rules	Key Purpose	Applicability to Bodhjungnagar industrial estate
14.	The Explosive Act 1884	Safe transportation, storage and use of explosive material	No (as explosives are prohibited to be used.)
15.	The Mines and Minerals (Development and Regulation) Act 1957	For opening a new quarry.	No Only licensed quarries will be used, and no new quarries will be developed for sourcing sand. The sand requirement can be met through existing licensed sand mining areas within the West Tripura and adjoining districts of the state. Further, if any project specific to new sand quarries/ mining is warranted to be opened, contractor shall obtain clearances from State Environmental Impact Assessment Authority (SEIAA)/ State Pollution Control Board and other competent authorities as per environmental regulations. Bodhjungnagar IE and the entire Tripura state do not have stone quarries. The stone aggregate requirement of the state is met through quarries in the adjacent Assam state, transported through road and rail network.
16.	The Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010 and The Tripura Ancient Monuments and Archaeological Sites and Remains Act, 1997	Conservation of cultural and historical remains found in India	No The present regulations of Government of India prohibit any construction activity within 100 meters and regulate construction activity within 200m, beyond the first 100 meters of prohibited area of any protected monument under the Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010 and amendments thereof. Bodhjungnagar industrial estate does not have any such protected monument and archaeological sites within 300 meters in all directions. In case of chance finding (below the ground levels), the contractor/ PIU will be required to follow a protocol as defined in the Environmental Management Plan (EMP) during implementation of the Project.
17.	Municipal Solid Waste (Management &	Segregation, Handling & safe disposal of domestic solid waste	Yes Solid waste generated at proposed facilities shall be managed and disposed in accordance with the Rules.

Sl. No.	Act / Rules	Key Purpose	Applicability to Bodhjungnagar industrial estate
	Handling) Rules, 2000 (MSW Rules)		The work force camp and camp site shall have facility for collecting the waste, and access controlled to prevent the entry of stray animals for scavenging of waste.
18.	Hazardous Wastes (Management, Handling and Trans-boundary Movement) Rules, 2008.	Safe handling, storage, transportation & disposal of hazardous wastes	No Contractor shall obtain the requisite licenses for handling and disposal of hazardous waste generated during construction stage, if becomes applicable during construction stage.
19.	The Occupational Safety, Health and Working Conditions Code, 2020	Comprehensive Code on Occupational Safety, Health and Working Conditions, amalgamates 13 existing labour laws/acts relating to Safety, Health, working Conditions and Wages	Yes This shall be contractors' responsibility for compliance
20.	Batteries (Management and Handling) Rules, 2001	Safe recycling of lead acid batteries	Yes This shall be the contractors' responsibility for compliance during construction stage. Contractors shall adopt recycling of lead acid batteries of construction vehicles and equipment during construction stage.
21.	Central Motor Vehicle Act 1988 and Central Motor Vehicle Rules 1989	To check vehicular air and noise pollution	Yes This shall be the contractors' responsibility for compliance during construction stage. The contractor shall obtain requisite Pollution Under Control certificates during the construction stage for all vehicles deployed for construction activities.
22.	National Labour Act, 1970.	An Act to regulate the employment of contract labour in certain establishments and to provide for its abolition in certain circumstances and for matters connected therewith	Yes This shall be contractors' responsibility for compliance
23.	The Child Labour (Prohibition and Regulation) Amendment Act, 2016, The Child Labour (Prohibition and Regulation) Act, 1986	No child under 14 years of age will be employed or permitted to work in any of the occupations set forth in the Act's Part A of the Schedule or in any workshop wherein any of the processes set forth in Part B of the Schedule. Child can help his family or family enterprise, which is other than any hazardous occupations or	Yes No children between the ages of 14 to 18 years will be engaged in hazardous working conditions. This shall be the contractors' responsibility for compliance.

Sl. No.	Act / Rules	Key Purpose	Applicability to Bodhjungnagar industrial estate
		processes set forth in the Schedule, after his school hours or during vacations.	
24.	The Inter-State Migrant Workmen (Regulation of Employment and Conditions of Service) Act 1979	The Act is applicable to an establishment which employs 5 or more interstate migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The interstate migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc.	Yes Contractors shall register with the Labour Department, if the Interstate migrant construction workforce is engaged. Adequate and appropriate amenities and facilities to be provided to workers - housing, medical aid, traveling expenses.
25.	Public Liability and Insurance Act 1991	An Act to provide for public liability insurance for the purpose of providing immediate relief to the persons affected by an accident occurring while handling any hazardous substance and for matters connected therewith or incidental thereto.	No This shall be contractors' responsibility for compliance, if warranted
26.	Workmen Compensation Act, 1923	The Act provides for compensation in case of injury by accident arising out of and during employment.	Yes Compensation for workers in case of injury by accident. This shall be the contractor's responsibility for compliance. The main contractor (who has been awarded) will also be responsible if the subcontractors are engaged under the Project.
27.	The National Green Tribunal (NGT) Act, 2010	NGT provides an effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to the environment and giving relief and compensation for damages to persons and property and for matters connected therewith. NGT has jurisdiction over matters related to the Water Act, 1974; Water Cess Act, 1977; Forest (Conservation) Act, 1980; Air Act, 1981; Environment (Protection) Act, 1986; Public Liability	Yes Stakeholders / affected persons may approach NGT to resolve project induced environmental issues. This shall be DoIC and contractors' responsibility for compliance.

Sl. No.	Act / Rules	Key Purpose	Applicability to Bodhjungnagar industrial estate
		Insurance Act, 1991; and Biodiversity Act, 2002. Consequently, no other court will have jurisdiction over matters related to the environment falling under the above referred Acts. Being a dedicated tribunal for environmental matters with the necessary expertise to handle environmental disputes.	
28.	Building and Other Construction Workers Act, 1998 and 2006	To regulate the employment and conditions of service of building and other construction workers and to provide for their safety, health and welfare measures and for other matters connected therewith or incidental thereto.	Yes This shall be contractors' responsibility for compliance
29.	The Tripura Building and Other Construction Workers (Regulation of Employment and Conditions of Service) (Seventh Amendment) Rules 2017	To regulate the employment and conditions of service of building and other construction workers and to provide for their safety, health and welfare measures and for other matters connected therewith or incidental thereto.	Yes This shall be contractors' responsibility for compliance
30.	The Petroleum Rules, 2002	Safe use and storage of petroleum products will need to be complied by the contractors.	No Applicable only if the storage of petroleum product exceeds the stipulated threshold limits. As per the current regulations under Petroleum Rules, 2002, no license is required for transport or storage of limited quantities of petroleum Class B (HSD or Kerosene), if the total quantity at any one place does not exceed two thousand and five hundred liters and none of it is contained in a receptacle exceeding one thousand liters in capacity; however, the stipulations for storing such quantities shall be in accordance with the rules.
31.	The E-Waste (Management) Rules, 2016 & Solar Waste Treatment under E-	This provides for management of E-wastes (but not covering lead acid batteries and radio-active wastes) aiming to enable the recovery and/or reuse of useful material from e-waste, thereby reducing	Yes The contractor shall obtain the requisite licenses for handling and disposal of E-waste generated (if it becomes applicable) during the construction stage.

Sl. No.	Act / Rules	Key Purpose	Applicability to Bodhjunagar industrial estate
	Waste (Management) Rules, 2022	the hazardous wastes destined for disposal and to ensure the environmentally sound management of all types of waste of electrical and electronic equipment. The Ministry of Environment, Forest and Climate Change has also notified the E-Waste (Management) Rules, 2022 . Management of solar PV modules panels/ cells in Chapter V of the rules for compliance by every manufacturer and producer of solar photo-voltaic modules or panels.	Also, the contractor is responsible for safe keeping of damaged/ malfunctioning solar panels, for handing it over to manufacturer/ producer/ supplier during construction/ operation stage, to comply with Solar Waste Treatment under E-Waste (Management) Rules, 2022.
32.	Plastic waste Management Rules, 2016	This provides for control and management of the plastic waste generated from any activity.	No (Ordinarily not anticipated but it shall be contractors' responsibility for compliance during the construction stage)
33.	Central/ State Groundwater Acts and Rules for Ground Water Regulation, Development, control and Management	The Act provide for Regulation and Control of Development and Management of Ground water in any form	Yes No objection certificate (NOC) shall be obtained from the CGWA by the contractors to use water from existing /new tube wells within the industrial estate for construction purposes under the Project. NOC shall be obtained by DoIC/ TIDCL for construction of new tube wells within the industrial estate for industrial use. NOC shall be obtained in accordance with the notification by the Ministry of Jal Shakti/ CGWA, vide Gol, gazette notification dated 24 th Sept. 2020.
34.	Construction & Demolition, Waste Management Rules, 2016	This rule shall be applicable to construction waste/debris resulting from construction activities	Not anticipated since the infrastructure within the existing Bodhjunagar IE is merely being upgraded and unlikely to generate the demolition waste as per Rules. Applicable only, if the developmental activities within Bodhjunagar industrial estate is likely to generate more than 20MT waste per day and/or 300 MT in a month, a project specific waste management plan will be required as per the stipulations under this rule. Project design considers balancing the cut and filling volumes and reusing the debris/muck generated for reclamation of low-lying areas within the industrial estate.

Sl. No.	Act / Rules	Key Purpose	Applicability to Bodhjungnagar industrial estate
35.	Tripura Right to Information Rules, 2008	The Act provides for setting out the practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, the constitution of a Central Information Commission and State Information Commissions and for matters connected therewith or incidental thereto.	Yes This shall be DoIC/ TIDCL's responsibility for compliance
36.	The Rights of Persons with Disabilities Act, 2016	The Act ensures that persons with disabilities enjoy the right to equality and non-discrimination in all aspects of life. Every entity has to comply with the accessibility standards relating to physical environment, transport and information and communication technology as per the standards prescribed in the RPD Act. These include barrier free built environment having elevators/ramps for the benefit of wheelchairs, including retrofitting old modes of transport, wherever technically feasible.	Yes Applicable to the Bodhjungnagar IE infrastructure in terms of making it more accessible to person with disabilities/physically challenged and project design considers the same.

2.2 ADB's Safeguard Requirements

43. As per ADB's Safeguard Policy Statement (SPS 2009), all proposed developmental projects are to be screened and categorized at the earliest stage of project preparation, when sufficient information is available for this purpose. Screening and categorization are undertaken to (i) reflect the significance of potential impacts or risks that a project might present; (ii) identify the level of assessment and institutional resources required for the safeguard measures; and (iii) determine disclosure requirements.

44. The process of determining a project's environment category is to prepare a rapid environmental assessment (REA) checklist, taking into account the type, size, and location of the proposed project. Based on ADB's SPS 2009, a project is classified as one of the four environmental categories (A, B, C, or FI) as follows:

Category A: A proposed project is classified as "category A" if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment (EIA) is required.

Category B: A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination (IEE) is required.

Category C: A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.

Category FI: Projects are classified as category FI, if they involve investment of funds in or through a financial intermediary. Where the FIs investment has minimal or no adverse environmental risks. The FI project will be treated as category C. All other FIs must establish and maintain an environmental and social management system and must comply with the environmental safeguards requirements specified in SPS 2009, if the FIs subprojects have the potential for significant adverse environmental impacts.

45. The rapid environmental assessment checklist (ref. **Appendix-1**) has been prepared for the Bodhjunnagar IE development indicates that it is unlikely to cause irreversible and significant adverse impacts. Therefore, as per ADB's SPS 2009 the project is categorized as "category B" for environmental safeguards and the IEE report including EMP (component-wise) has been prepared under the Project.

2.3 Statutory Clearances and Permissions

46. The pre-construction and construction stage statutory clearances/ permissions required for the Bodhjunnagar IE development are given in **Table 2-2**.

Table 2-2: Statutory Clearances/ Permissions Required for Bodhjunnagar IE

Sl. No.	Clearances/ Permissions required	Competent Authority to Accord Clearances	Responsibility to Obtain Clearance
A. Pre-construction Stage			
1	No Objection Certificate (NOC) for construction of new tube wells for	Central Ground Water Authority, Govt. of India/ Designated/	TIDCL/ DoIC, Govt of Tripura

Sl. No.	Clearances/ Permissions required	Competent Authority to Accord Clearances	Responsibility to Obtain Clearance
	industrial use within Bodhjunnagar IE	Competent Department of the State Govt. of Tripura	
2	Permission for felling of trees, which are within areas of proposed development works inside Bodhjunnagar IE	Divisional Forest officer, West Tripura District, Department of Forests, Govt. of Tripura	TIDCL/ DoIC, Govt of Tripura
B. Construction Stage			
1	Consent to establish and operate construction camp sites, crusher units, hot mix plants, concrete batch mix plants, Wet Mix Macadam (WMM) plant, work force camps etc.	Tripura State Pollution Control Board	Respective PIU/ Contractor
2	No Objection Certificate (NOC) for use of ground water for construction purposes from existing tube wells	Central Ground Water Authority, Govt. of India/ Designated/ Competent Department of the State Govt. of Tripura	Respective PIU/ Contractor
3	License to store HSD at Construction camp. A license will be required only if the storage capacity is beyond 1000 liters of storage.	Regional office of Chief Controller of Explosives, Gol, Guwahati	Respective PIU/ Contractor
4	Permission to establish construction camps, only if require to be established outside of industrial estate	District Magistrate & Local Panchayat` (s), landowners in case of private land	Respective PIU/ Contractor
5	Sand mining license and/or opening of new quarry sites for stone aggregates	Principal Chief Conservator of Forests/ Director Department of Industries and Commerce, Govt. of Tripura	Respective PIU/ Contractor
6	Labour license/ permits for engaging construction workers (skilled & unskilled)	Respective District Level Labour Officer under Directorate of Labour, Govt. of Tripura	Respective PIU/ Contractor

3.0 DESCRIPTION OF THE PROJECT

3.1 Bodhjungnagar Industrial Estate

47. Bodhjungnagar is one of the nine prioritized industrial estates, in Mohanpur Block of West Tripura district, existing since 1998, located at 2.5 km from NH-108 B and 4 km from NH-8 and 15 km from Jirania Railway Station.

48. Bodhjungnagar IE, spread over an area of 207.6⁷ ha, currently has 132 industrial units, out of which 65 are functional, 19 are closed for considerable period, 4 are temporarily closed and 44 units are allocated & are being set up. The IE has been categorized into four zones namely growth center, export promotion industrial park, rubber park and food park. The common facilities within IE include warehouses, cold storage, food testing laboratory, food packaging unit, commercial center, canteen, guest house, fire station, weigh bridge and a common effluent treatment plant for rubber industries.

49. The surrounding area of Bodhjungnagar IE is gradually developing with few commercial, industrial and educational institutions among others. Agartala gas-based power generation plant (135 MW capacity) of Northeastern Electric Power Corporation Limited (NEEPCO) shares the boundary with the industrial estate.

50. Bodhjungnagar is in proximity to RK Nagar industrial estate, another prioritized industrial estate and the entire area is also popularly known as Bodhjungnagar Industrial Area. Both these industrial estates have rail, road and air connectivity to the rest of the country and adjacent Bangladesh for accessing both domestic and international markets.

51. The salient features of Bodhjungnagar IE are given in **Table 3-1**. The key regional connectivity is given in **Figure 3-1**.

Table 3-1: Salient Features of Bodhjungnagar IE

Particulars	Features
Year of Establishment	1998
Location	Mohanpur Block, West Tripura District (Latitude 23°53'16.81"N and Longitude 91°21'37.13"E)
Total Land Area for development	207.6 ha/512.87 acres (as per revenue record)
Ownership	Owned by the Department of Industry & Commerce and managed by Tripura Industrial Development Corporation Limited (TIDCL)
Topography	Undulating terrain
Connectivity	2.5 km from NH-108 B and 4 km from NH-8 15 km from Jirania Railway Station, 18 km from Agartala Integrated Check Post (ICP) 18 km from Maharaja Bir Bikram International Airport, Agartala
Major existing industries	Rubber Industries 28.87%, Food Processing 13%, Construction and General Industries 58.1%
Area under Industrial Units/ Plots	118.20 ha.

⁷ The net planning area of Bodhjungnagar Industrial Estate is spread over an area of 207.64 ha. (512.82 acres) out of total 217.30 ha. (536.72 acres). Within the IE, 9.68 ha. (23.90 acre) of land has been excluded for development, as it is under un-authorized settlements.

Particulars	Features
Total Number of Industrial Plots/sheds	132 units
Distance of wetland (Protected/RAMSAR Site)	Rudrasagar (Neermahal), a RAMSAR site is located at an aerial distance of 40 Kms from Bodhjunnagar IE
Distance from River /water bodies	IE boundary located at 5km from Haora River
Distance from Reserve Forest area/forest area.	IE up to 500m surrounding peripheral area does not have any forest areas

3.2 Associated Facility

52. Bodhjunnagar IE, established in the year 1998, currently has 132 industrial units and the viability and existence of these industrial units do not depend upon proposed improvement works and neither of these are included under ensuing ADB loan. The existing industrial units are regulated under the Air (Prevention and Control of Pollution) Act, 1981, Water (Prevention and Control of Pollution) Act, 1974 and have the valid CTE and CTO from the Tripura State Pollution Control Board. Therefore, these industrial units do not qualify as “associated facility” in accordance with the ADB’s SPS, 2009 (Para 6, **Appendix 1** of Safeguard Policy Statement, 2009).

3.3 Existing Facility

53. An on-site assessment of all other existing infrastructure like roads, entrance gate, boundary wall and other utilities within the IE was undertaken to identify past or present concerns, if any relating to the impact on the environment. The on-site assessment⁸ did not identify any past and present concerns/ outstanding environmental concerns/ issues, except the existing common effluent treatment plant (CETP) which had outstanding environmental concerns and thus considered as “existing facility⁹” in accordance with the ADB’s SPS, 2009.

54. Accordingly, an environmental audit of the CETP has been carried out, which has recommended a corrective action plan (CAP), to make CETP fully functional as per regulatory requirements (ref. **Appendix-3**). The CAP will be scheduled for implementation, concurrently with the construction of proposed all other infrastructure development in Bodhjunnagar industrial estate between March 2025 to February 2028. The budgetary provisions made in the IEE/ DPR include capital cost for all corrective measures as well as operation and maintenance of the CETP for a period of five years.

⁸ On-site assessment of the existing infrastructure facilities within the IE was carried out as a pre-cursor to the IEE. The assessment included field inspection and interactions with the owner representative(s) of the industrial units within the IE. The field inspection indicated the industrial estate has no settlement areas, sensitive receptors like educational institutions/ hospitals/ religious structures, surface water bodies, lakes, forest/ ecologically sensitive areas, flood/ drainage concerns within its boundary or surrounding 500m peripheral area.

⁹ If a project involves an upgrade or expansion of existing facilities that has potential impacts on the environment, involuntary resettlement, and/or Indigenous Peoples, the requirements for environmental and social impact assessments and planning specified in Safeguard Requirements 1-3 will apply in addition to compliance audit. (Para 12, Appendix 4 of Safeguard Policy Statement, 2009).

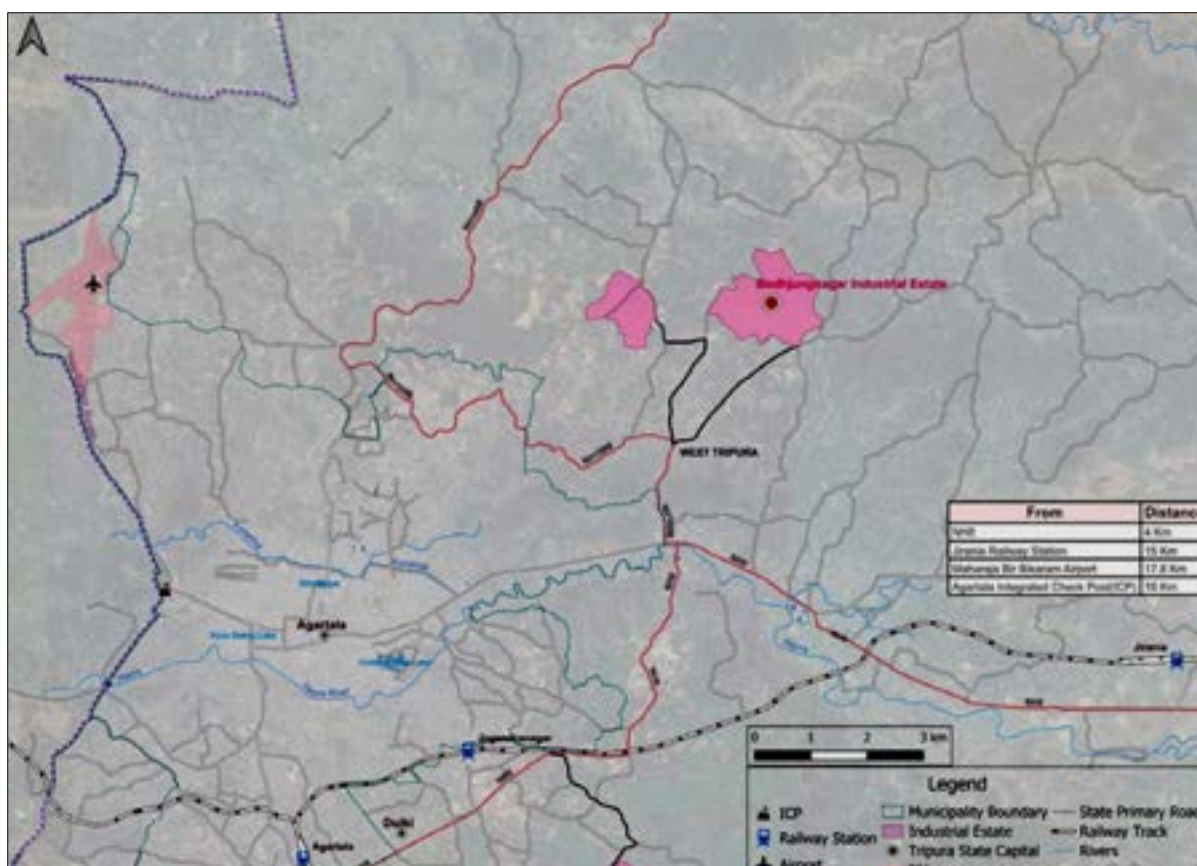


Figure 3-1: Regional Connectivity of Bodhjunganar IE

3.4 Existing Industries

55. Currently, Bodhjunganar IE has 132 industrial units, out of which 65 are functional, 19 are closed for a considerable period, 4 are temporarily closed and 42 units are allocated & are being set up. These 132 allocated industrial units occupying an area of 118.2 ha. out of the total 207.6 ha. The existing industries and the workforce are given in **Table 3-2**.

Table 3-2: Existing Industries of Bodhjunganar IE

Sl. No.	Type of Industries	No. of Industries	Area (Ha.)	Present Workforce
1	Agri. based	8	3.59	260
2	Cements & Hollow Blocks	19	24.62	607
3	Chemical formulations	4	0.95	450
4	Distilleries and blending Packaging	2	0.6	61
5	Electrical equipment's manufacturing	3	1.42	43
6	Food & Beverages	16	7.72	934
7	Gas testing & Manufacturing	6	1.27	91
8	Lathe Machine servicing	2	0.38	36
9	Metal industries	9	18.81	398
10	Miscellaneous	14	16.34	638
11	Oil	2	0.79	59
12	Plastics & Paper	17	5.33	393
13	Rubber	26	34.5	1227
14	Textile	1	0.87	90
15	Water Bottling	3	1.01	61
	Total	132	118.2	5348

3.5 Proposed Development Works

56. Based on the need analysis, the infrastructure works considered within the Bodhjunnagar IE comprise development of vacant land into additional industrial plots, improvement of internal roads, storm water drainage, augmentation of water supply, developed utility corridor, augmentation of power system, social infrastructure amenities like common facilitation center, shops & business center, residential housing, refurbishment of common effluent treatment plant, development of parks and open areas among others.

57. The summary of development components considered is given **Table 3-3 & 3-4**. The existing and proposed master plan development along with the respective land use distribution is shown in **Figure 3-2**.

Table 3-3: Development Components of Bodhjunnagar IE

Sl. No.	Development Components	Extent
1	Additional industrial plots	42 plots, spread over 20.83 ha
2	Roads	All peripheral roads are proposed as rigid pavement having carriageway 7.0 m, 5.5 m, 5 m, 3.75 m with RoW 16 m, 15 m, 14.0 m, 12.0 m and 9.0m. All roads are proposed as bi-camber except 3.75 m with RoW 9.0 m which is uni-camber. Proposed development of existing and new road 16.260 km.
3	Stormwater drains	<ul style="list-style-type: none"> Construction of Roadside drains on both sides of road except 9 m RoW where Single side drain provided. Total length of proposed SWD is about 31.03 km length and the minimum clear width of the drain is 0.3m and 1.2 km storm water drainage system along with geo-cell wall. Total no of proposed Culverts is 49 and 4 minor bridges.
4	Augmentation of water supply	10 nos raw water reservoirs, 7 new tube wells, 4.6 MLD capacity water treatment plant, 3 overhead tanks, 1 underground reservoir with pumping facilities, and laying of pipelines: 16.089 km.
5	CETP and associated components	Proposed to implement corrective action plan for Refurbishment of 500 KLD CETP by improving plant equipment and performance, re-use the treated water for industrial purpose by collecting it in two existing ponds with an estimated cumulative capacity of 10 million liters to conserve the resources.
6	Utility Corridor	32.540 km, for housing utilities like HT/ LT/ SCADA cables/ OFC, pipelines of water, effluent, natural gas pipeline, and formal green belt over the pond pathways 12,845.77 sqm.
7	Infrastructure and buildings for common facilities	<ul style="list-style-type: none"> Common Facilitation center :1 no. Common Public Toilet: 8 nos. Drivers Rest room: 2 nos. Food kiosk:2 nos. Fire Station:1 no Weigh Bridge:1 no. Bus stop: 4 nos. Site Grading, Surface Dressing, Geo-cell Reinforced Earth Retaining wall length 1.5 km, Roadside Pathway Landscape Development, Rotary, Road Island land scaping, Formal Area Landscape Rainwater percolation wells at 22 locations and 1 nos. of sumps. Retention Pond Development (Capacity of Storm Water Retention pond- 73.25 million litter and capacity of CETP treated water retention pond -10 million litter) Parks and open areas 20.22 ha.
8	Industrial Safety and Security	<ul style="list-style-type: none"> Retaining Boundary wall – 500 m, Gate – 4 Nos. with 3 security cabins,

Sl. No.	Development Components	Extent
		<ul style="list-style-type: none"> Security & Surveillance System (including ICCC), Fire and Safety System, Signage – direction and informative signages
9	Electrical and Power Supply	<p>Power connection has been considered for industrial plots, substations, facilities, offices, streetlights etc of the Industrial estate.</p> <p>The considered works in Bodhjunnagar IE are as below:</p> <ul style="list-style-type: none"> Reconstruction of 33 / 11 KV Rubber Park s/s with 7.5 MVA Power Transformer, Construction of new 33 / 11 KV S/s with 2x7.5 MVA Power Transformers at the zone 5 opposite of CRPF Camp, Construction of 33 KV feeders by laying 33KV UG cable through soil trench for 2nos 33/11KV S/s and 33 KV consumers, Construction of 11 KV feeders by laying 11KV UG cable through soil trench throughout entire IE area, Installation of energy efficient distribution transformers of capacity 500KVA, 315KVA and 200KVA capacity, Laying of UG LT cables and separate Street Light Network on GI Pole of 11 mtr is proposed. Additionally, 5 High Masts shall be installed. All UG Cables shall be laid in Soil Trench by Brick protection and Cable route Marking 500 KW solar panels at 9 locations within IE
10	Public Transport (E- Vehicle's)	<ul style="list-style-type: none"> 2 nos. of CNG buses and 2 nos. of battery-operated small E- vehicles, along with the necessary charging infrastructure have been proposed.

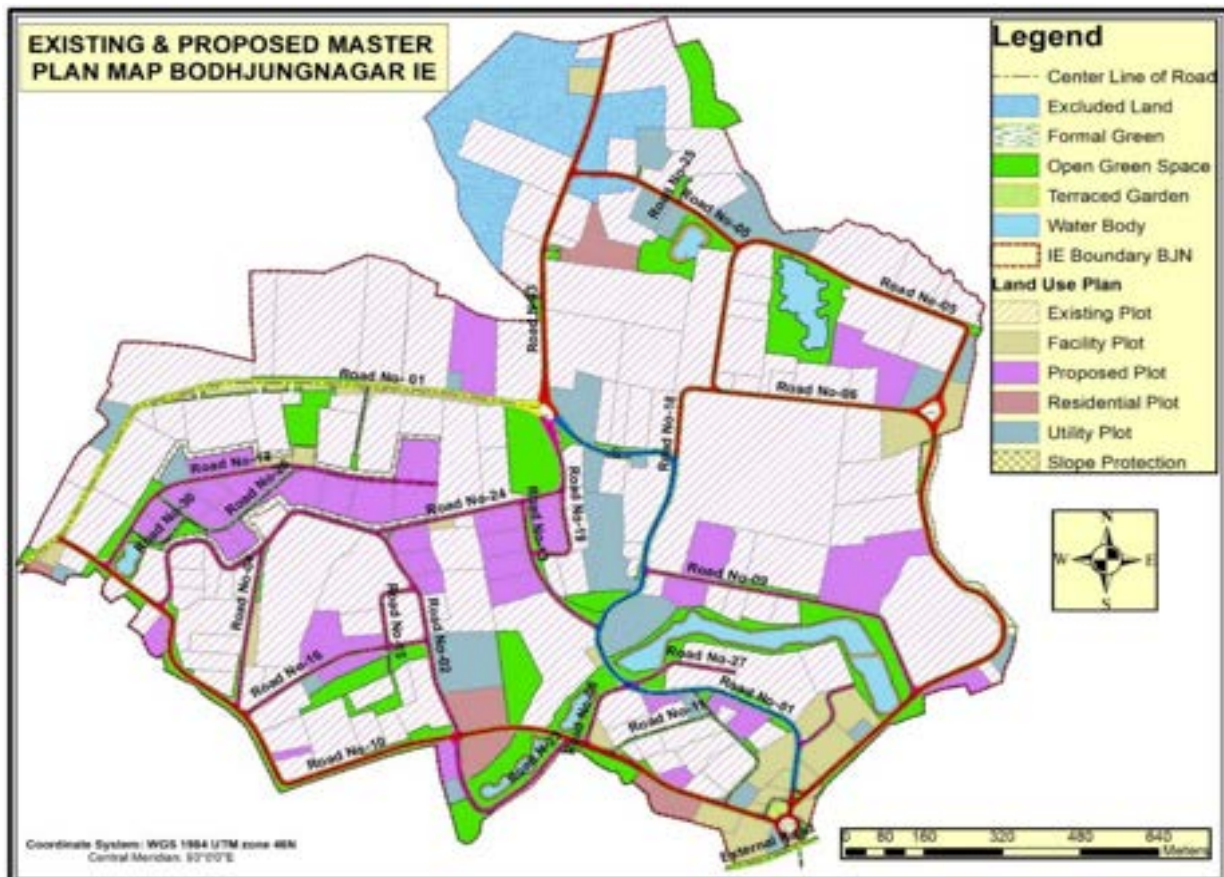


Figure 3-2: Existing and Proposed Master Plan Development

Table 3-4: Existing and Proposed Land Use for Masterplan Development

Sl. No.	Land Use	Existing Area (in ha)	In %	Proposed Area (in ha)	In %	Net Area (in ha)	In %
1	Industrial Area Plotted development, Industrial Sheds and Flatted industries	118.20	56.9%	20.83	39.9%	139.02	67.0%
2	Transportation Roads, Junction, parking etc.	15.91	7.7%	5.27	10.1%	21.18	10.2%
3	Residential Workers Housing	0.45	0.2%	1.98	3.8%	2.43	1.2%
4	Facilities <u>Public and Semi-Public:</u> Fire station, health care centre, educational institutes, warehouse and administration etc. <u>Utilities:</u> Electric sub-Station, CETPs, Pumping Stations, Underground Reservoirs / Fire Fighting Tanks and other utilities, etc.	15.58	7.5%	3.84	7.4%	19.42	9.4%
5	Open Space Parks, green area and open areas around it, steep slopes.	5.36	2.6%	20.22	38.8%	25.59	12.3%
6	Vacant Area Developable area	52.14	25.1%	-	-	-	-
	Total	207.6	100.0%	52.14		207.64	100.0%

3.6 Development of Industrial Plots

58. At present, Bodhjunnagar IE has 52.14 ha of vacant land, which is available for the development of industrial plots and other amenities (ref. Table 3-4). In accordance with the need analysis, the masterplan for infrastructure development has considered 25.1% ha of land for development of 42 industrial plots distributed in 5 zones, as given in **Table 3-5** and **Figure 3-3**.

Table 3-5: Proposed Industrial Plots

Sl. No.	Zones	Number of Plots
1	Zone 1	2
2	Zone 2	5
3	Zone 3	10
4	Zone 4	2
5	Zone 5	23
	Total	42

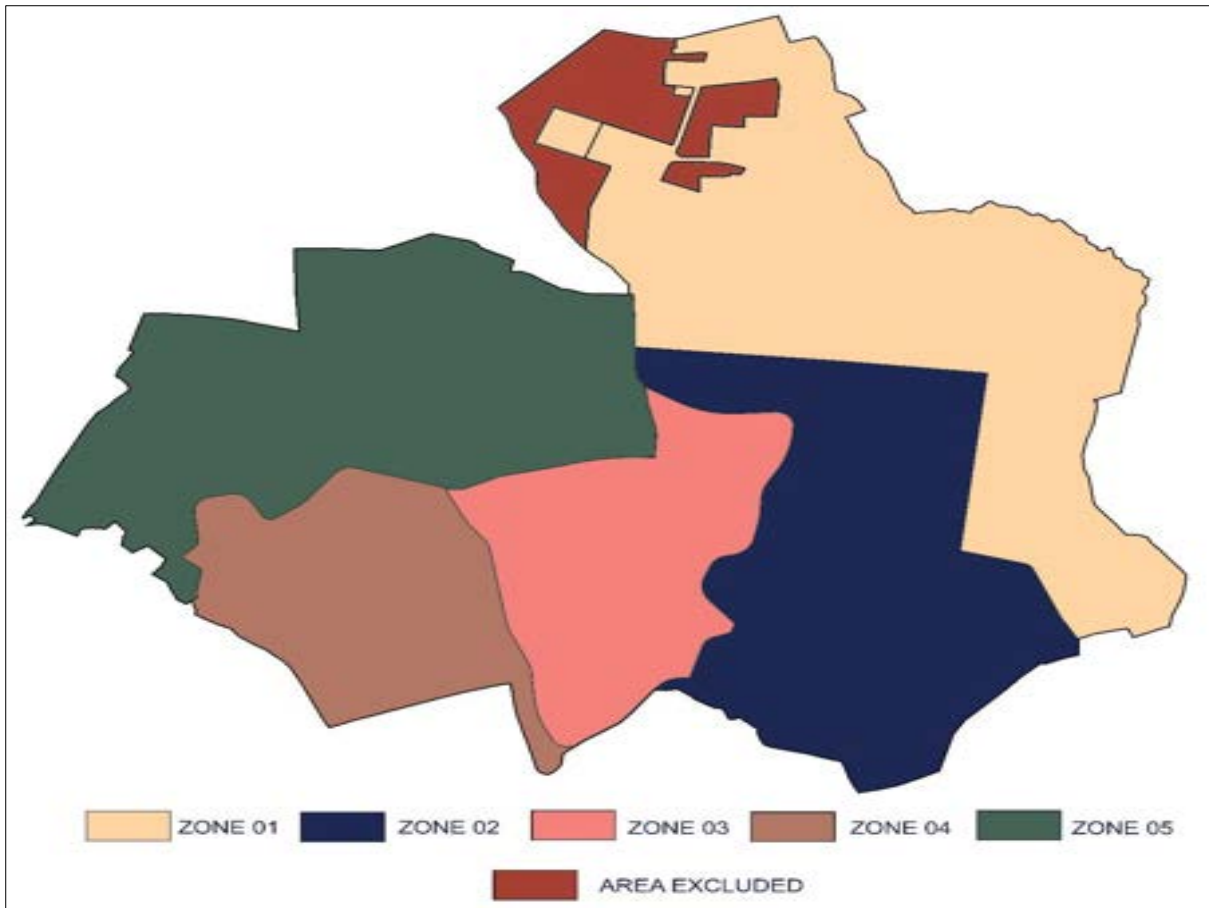


Figure 3-3: Zones of Proposed Industrial Plots within Bodhjunnagar IE

3.7 Infrastructure and Common Facilities

59. The existing infrastructure and common facilities, built more than two decades ago is in dire need of renovation, modification/ reconstruction to meet the growing needs of the industrial estate. Based on the need analysis, the proposed masterplan development for infrastructure and common facilities is spread over 7.5 ha, which includes common facilitation center, residential and commercial facilities and other common facilities as given in **Table 3-6** and **Figure 3-4**.

Table 3-6: Infrastructure and Common Facilities

Sl. No.	Type of Facilities	Provisions
1.	Common Facilitation Center	To be developed over a plot area of 6,330.37 sq. m (0.63 ha.) with a built-up area of 924 sq. m.
a.	Administrative Office	Total area allocated is 361 sq.m. for office room & cabin, reception area, Association office Area, TIDCL office Cabin courier dispatch room and tax/GST room
b.	Multipurpose Hall, & conference hall	Area allocated is 201 sq.m. with provision for office meetings and conferences etc.
c.	Creche facility	Total area allocated is 98 sq.m. for 50 children
d.	Dispensary	Total area allocated is 45 sq. mts.
e.	Canteen & Food Preparation Area	The total area allocated is 107 sq.m. including kitchen for both workers and visitors.

Sl. No.	Type of Facilities	Provisions
f.	Miscellaneous utility centers	Provision of 350 sq.m for printing/ xerox center, multipurpose hall, dining/pantry, control room & surveillance, server/UPS/AHU room, electrical room, public toilets and ATM.
2.	Residential facilities	Future Provision for Residential facilities such as workers housing, staff quarters and women's hostel has been proposed is 2.43 ha.
3.	Commercial facilities	IE has adequate commercial facilities which will be retained and refurbished. These include the commercial center near Gate 1, the business center, recently built guest houses under MIIUS and the five shops near Gate 2.
4.	Other common facilities	
a.	Food Kiosk	Provision of 2 nos. for food kiosk for visitors with a total built-up area of 24 sqm.
b.	Fire station	Demolish the existing fire station and build a new structure with a built-up area of 175.8 sq. m. with provision for parking fire trucks on the ground floor and dormitory for fire fighters on the first floor.
c.	Truck parking & Driver Rest Room	Provision for parking of 133 trucks at 13 separate locations, with a total area of 11,650 sq.m (1.16 ha) and restroom for drivers having built up area of 100 sq.m near truck parking area. And 2 nos. are proposed driver rest room
d.	Weigh bridge	1 nos. are planned near Gate 1.
e.	Bus stop	4 nos. bus stop have been proposed for easy pick up and drop off for industrial employees.
f.	Recreational area	Total buildup area 56 Sq.m of 1261 sqm is planned common facilitation center. It will have a kids' play zone with play equipment, seating arrangement and garden lighting. Additionally, it will also have multi-court sport facilities including basketball, badminton, and volleyball for adults,
g.	Public toilet	A total of 8 nos. A common public toilet has been proposed. Besides public toilets in the Common Facilitation Centre, three additional washrooms have been provided at different locations within the estate with a buildup area of 66 sqm each.
5	Safety and security	Retaining Boundary wall – 500 m, Gate – 4 Nos. with 3 security cabins, provision for CNG buses for workers transport-4 nos (2 nos. of CNG Bus and 2 battery operated vehicle's)

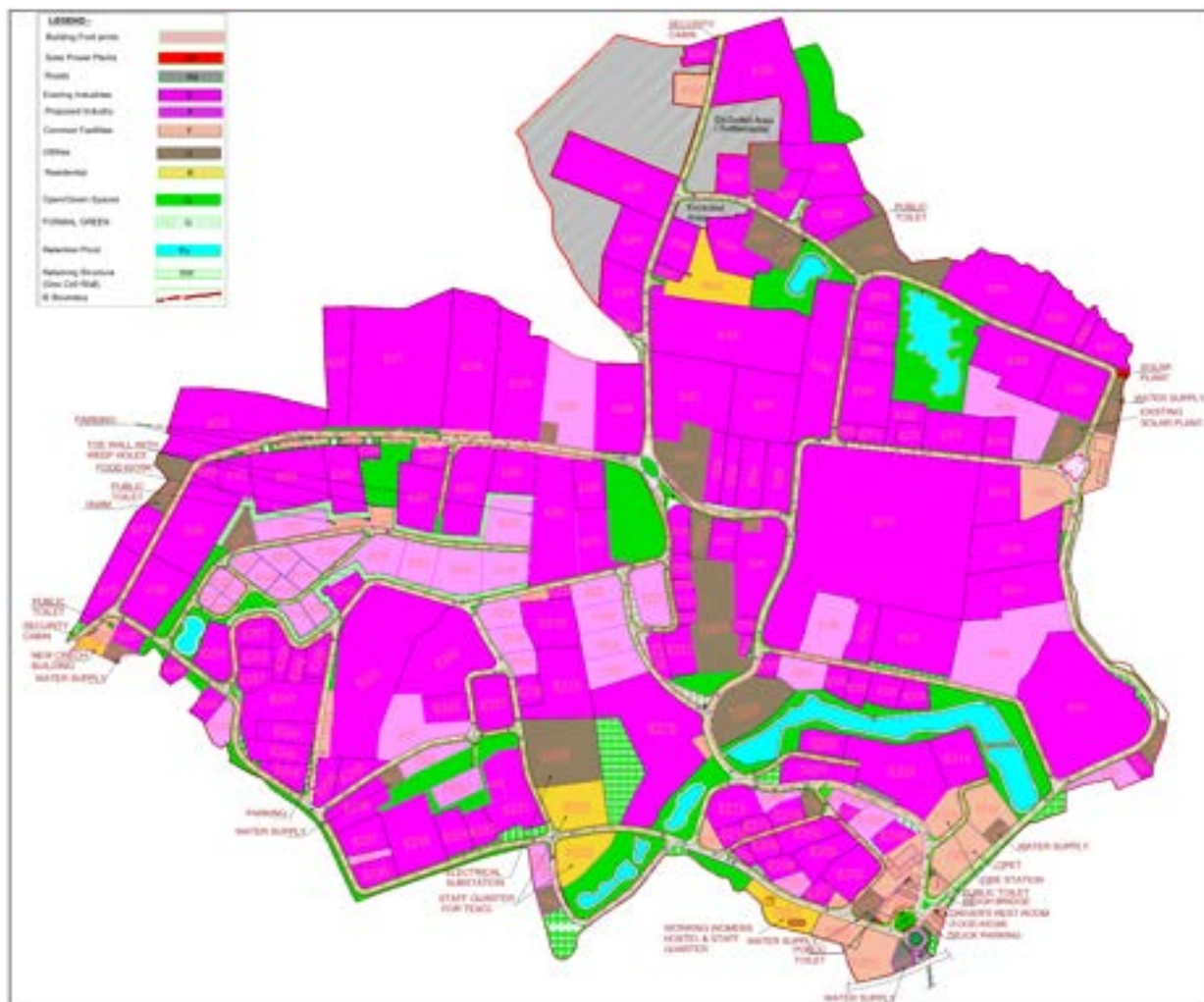


Figure 3-4: Proposed Infrastructure and Common Facilities

3.8 Widening/ Upgradation of Roads

60. Bodhjunnagar IE at present has got 12.451 km of internal roads, with carriageway width ranging between single, intermediate and double lanes (3.5 to 7.5 m). The existing road network does not have a well-defined road hierarchy leading to poor circulation interspersed with unpaved roads. At few stretches, road condition is poor due to potholes and wild vegetation alongside, which restricts mobility. The existing junctions do not comply with IRC standards in terms of alignment, minimum turning radius and gradient.

61. Under the proposed development, widening and strengthening of the existing roads from single lane to intermediate/ two lane with a cumulative length of 16.260 km (12.451 km existing and rest new within IE boundary) have been considered with rigid pavement. All the major and minor intersections/ junctions along the roads are considered for upgradation along with adequate lighting facilities as per the IRC standards.

62. The road network as per the proposed masterplan development along with typical cross sections are given in **Figures 3-5 & 3-6** respectively.

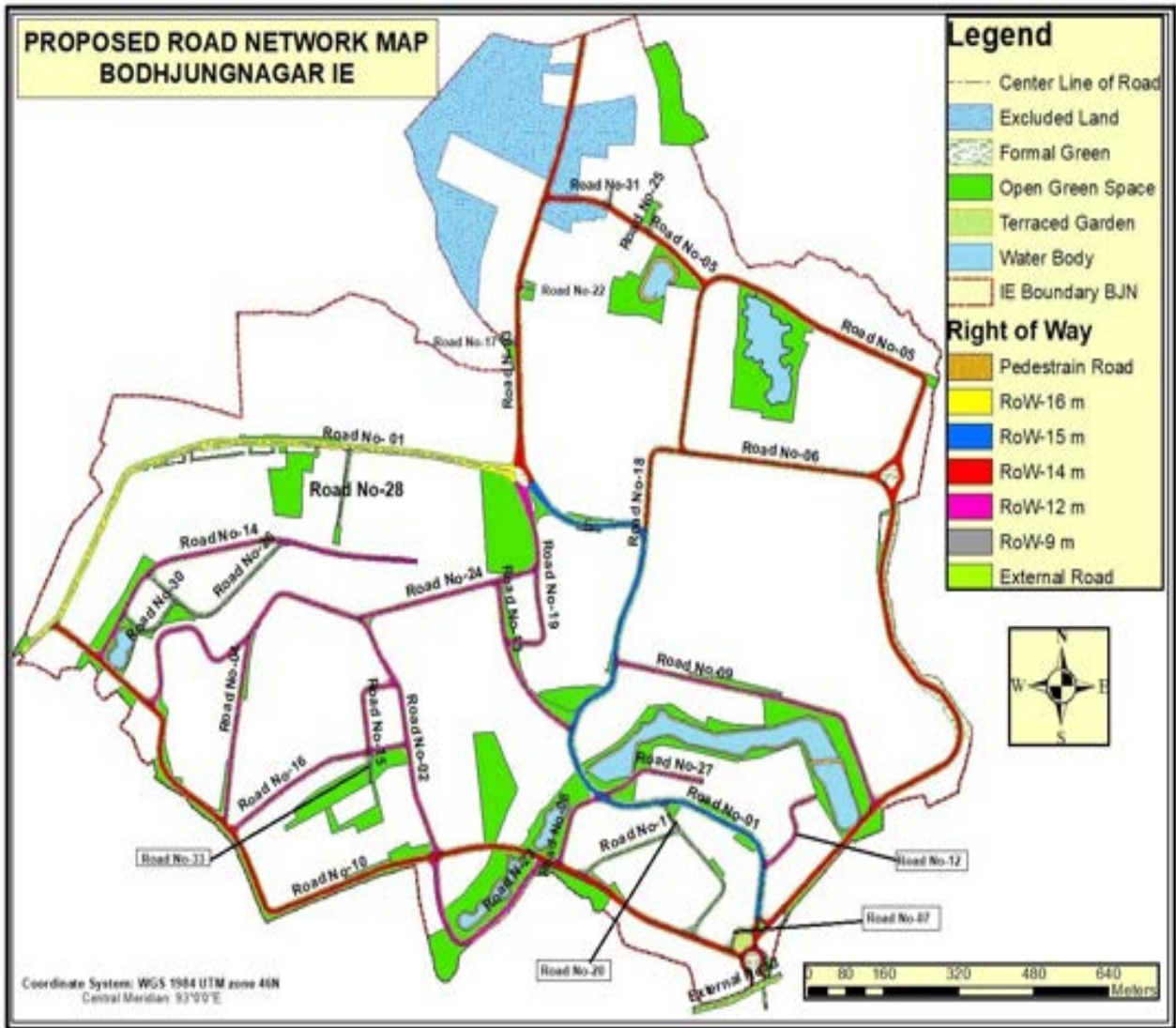
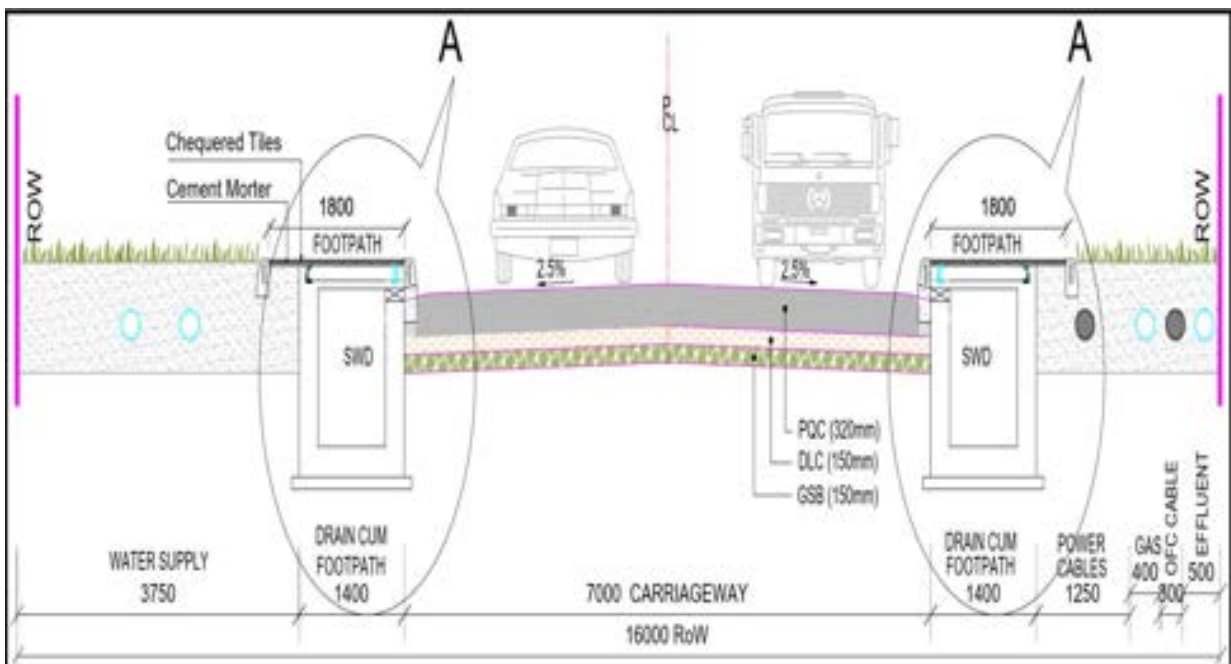
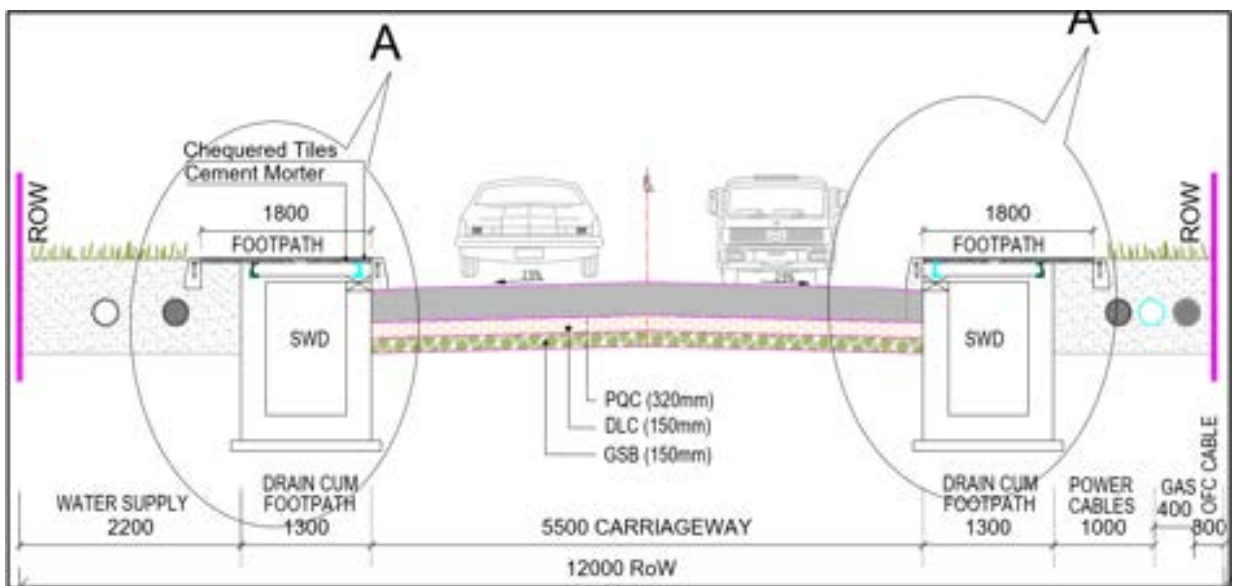
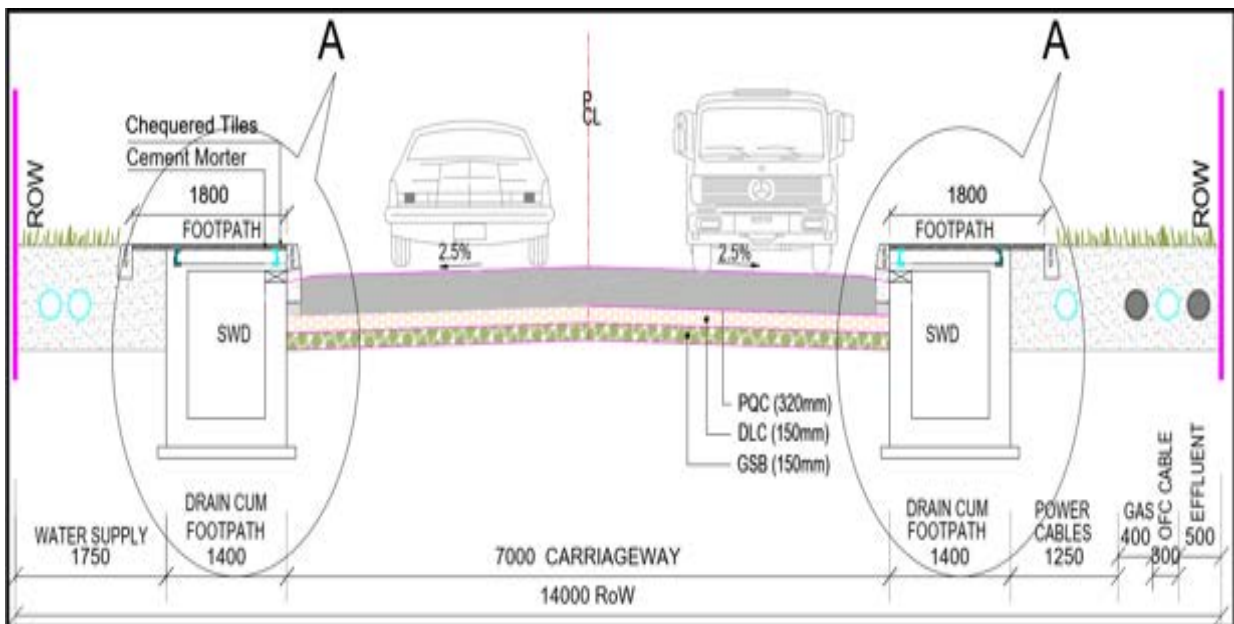
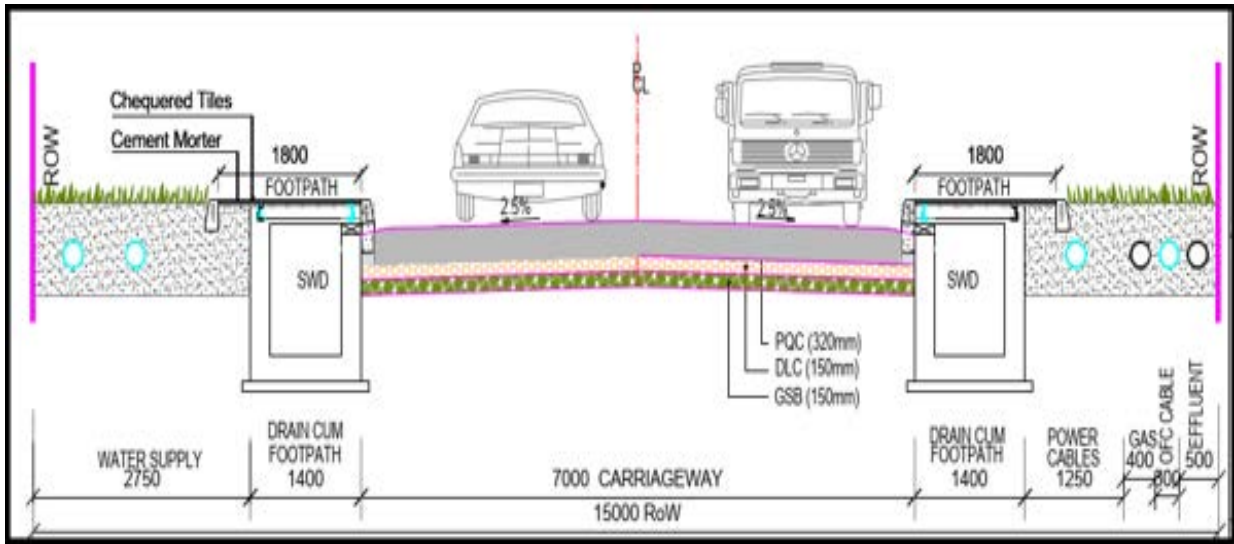


Figure 3-5: Proposed Road Network as per Master Plan Development





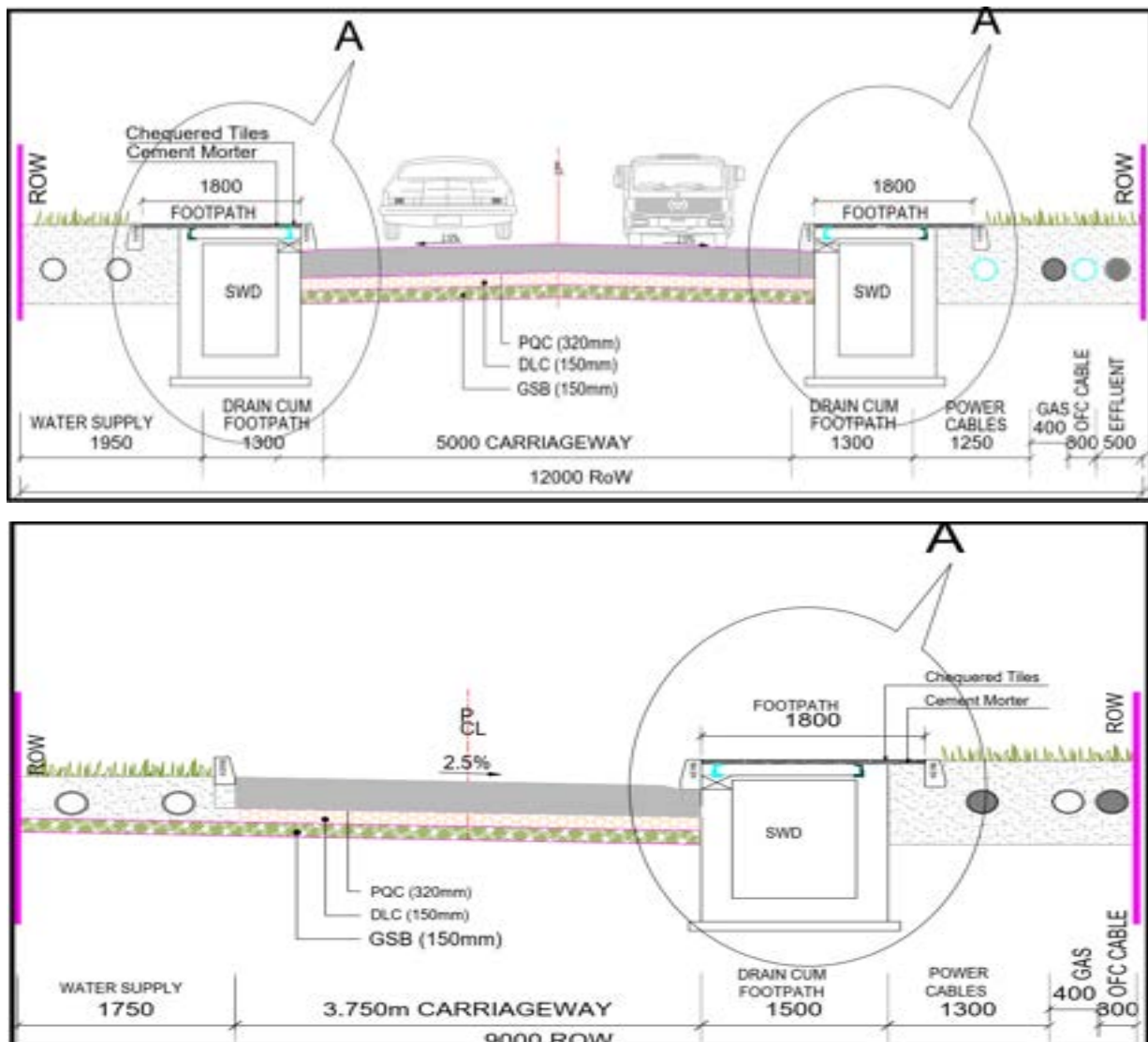


Figure 3-6: Typical Section of Road Network as per Master Plan Development

3.9 Augmentation of Water Supply & Treatment

63. The water supply demand of Bodhjunnagar IE is presently met through five deep tube wells¹⁰ (DTW) and water is distributed to the existing industries through three overhead tanks, one underground reservoir with pumping facilities. The IE has one iron removal plant, two conventional water treatment plants (WTP) with limited distribution network. The present water supply treatment and distribution system lacks maintenance and requires upgradation to meet future demand.

64. The projected water demand of the IE for a 30-years design period is given in **Table 3-7**. Accordingly, project design has proposed augmentation/ improvement to the water distribution system, while retaining the existing assets which are in good working condition as

¹⁰ The core zone surrounding the Bodhjunnagar IE does not have any dependable perineal surface water bodies and hence ground water is the only source of water for all purposes.

given in **Table 3-8**. The augmented water supply distribution system along with the schematic layout is given in **Figures 3-7 & 3-8**.

Table 3-7: Water Demand Projections for Bodhjunnagar IE

Sl. No.	Particulars	Projected Population	Water Demand (MLD)		
			Domestic	Industrial	Total
1	Base year (2025)	7531	0.48	7.59	8.07
2	Intermediate Phase (2040)	13170	0.95	8.53	9.48
3	Ultimate Phase (2055)	13170	0.95	8.53	9.48

Table 3-8: Existing and Proposed Components of Water Supply Scheme

Sl. No.	Components	Existing	Retained	Proposed	Total
1	Deep Tube Wells	5	5	7	12
2	Monitoring/ Piezometric wells	-	-	5	5
3	Iron Removal Plant	1	-	-	-
4	Pump House	2	0	13	13
5	Water Treatment Plant	2	0	1	1
6	Underground Service Reservoir with Pumping Facility	1	1	-	1
7	Overhead Tanks	3	1	3	4
8	Distribution Pipelines	Old & disused	-	16.089 km	16.089 km
9	Fire service reservoir	1	1	-	1
10	Other Ancillary Items, plot service connection and SCADA	-	-	As required	As required

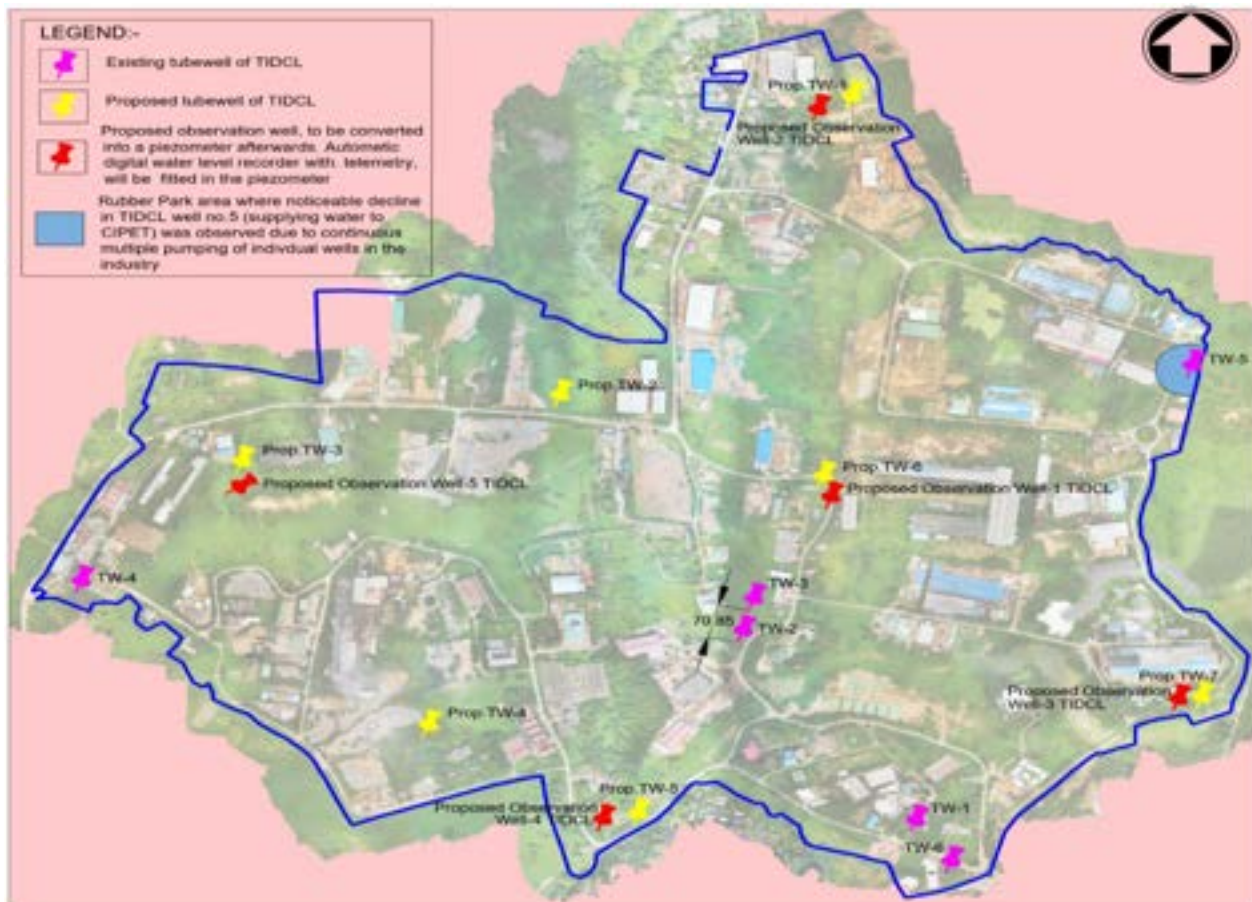


Figure 3-7: Augmentation of Water Supply System to Bodhjunnagar IE

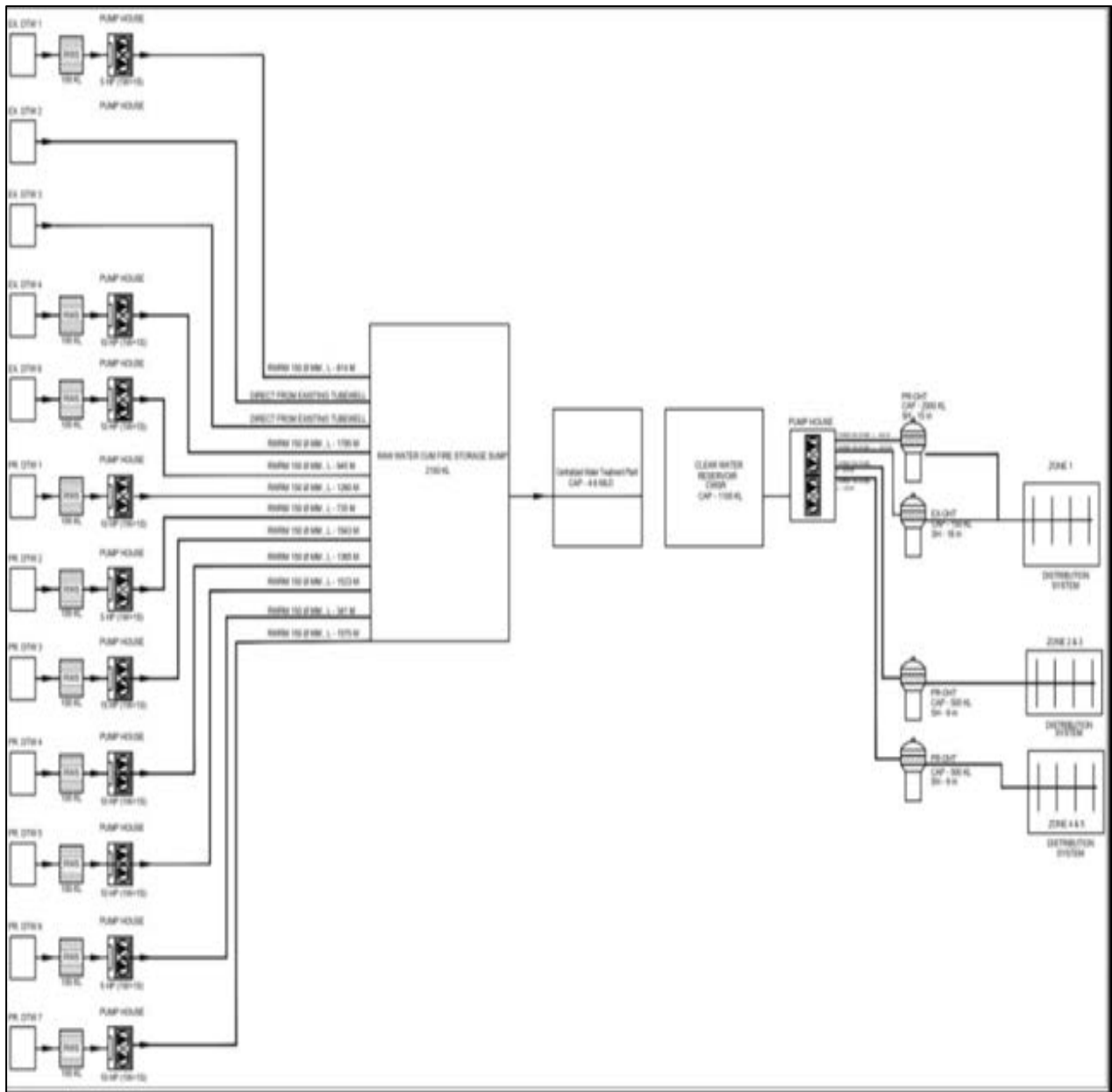


Figure 3-8: Schematic Diagram of Augmentation of Water Supply to Bodhjunnagar IE

3.10 Utility Corridor

65. At present, Bodhjunnagar IE does not have any dedicated corridor and all the utilities like electrical feeder cables, natural gas pipeline, water and effluent pipelines have been laid alongside the road within the IE at different time periods, which often pose problem for timely detection of faults/ leakages/ damages of the utilities and thus, results in inordinate delay in rectification/ repair works.

66. Bodhjunnagar is presently the largest industrial estate of the state and DoIC envisions it to be developed with “Best in Class” infrastructure. Accordingly, a utility corridor with a cumulative length of 32.540 km has been proposed for housing existing as well as proposed utilities like power supply feeder cables, water supply distribution pipelines, industrial effluent collection system, natural gas pipelines, SCADA/OFC and other communication cables as given in **Table 3-9**.

Table 3-9: Road wise detail of Utility Corridor with Bodhjunnagar IE

Sl. No.	Road No	RoW (in m)	Carriageway (in m)	Road Length (in m)	Utility Corridor (in m)		
					LHS	RHS	Total Length
1	Road No-01	16	7	1265.00	3.75	2.45	2530.00
2	Road No-01	15	7	1448.30	2.75	2.45	2896.61
3	Road No-02	12	5.5	1137.76	2.2	1.7	2275.51
4	Road No-03	14	7	852.17	1.75	2.45	1704.34
5	Road No-04	12	5	358.51	1.95	2.45	717.02
6	Road No-05	14	7	395.87	1.75	2.45	791.73
7	Road No-06	14	7	2641.33	1.75	2.45	5282.65
8	Road No-07	9	3.75	85.21	1.75	2	170.42
9	Road No-08	12	5	173.58	1.95	2.45	347.16
10	Road No-09	12	5	678.45	1.95	2.45	1356.90
11	Road No-10	14	7	1827.98	1.75	2.45	3655.97
12	Road No-11	9	3.75	484.97	1.75	2	969.94
13	Road No-12	12	5	203.98	1.95	2.45	407.95
14	Road No-13	12	5.5	341.67	2.2	1.7	683.35
15	Road No-14	12	5.5	782.02	2.2	1.7	1564.04
16	Road No-15	12	5	187.05	1.95	2.45	374.10
17	Road No-16	12	5	419.66	1.95	2.45	839.32
18	Road No-17	9	3.75	41.04	1.75	2	82.08
19	Road No-18	14	7	247.27	1.75	2.45	494.54
20	Road No-19	12	5	395.39	1.95	2.45	790.77
21	Road No-20	9	3.75	66.45	1.75	2	132.91
22	Road No-21	12	5	87.93	1.95	2.45	175.87
23	Road No-22	9	3.75	35.53	1.75	2	71.06
24	Road No-23	12	5	420.77	1.95	2.45	841.53
25	Road No-24	12	5.5	396.06	2.2	1.7	792.11
26	Road No-25	9	3.75	63.07	1.75	2	126.14
27	Road No-26	9	3.75	369.92	1.75	2	739.83
28	Road No-27	12	5	232.92	1.95	2.45	465.84
29	Road No-28	9	3.75	151.56	1.75	2	303.12
30	Road No-29	12	5	173.52	1.95	2.45	347.04
31	Road No-30	9	3.75	148.81	1.75	2	297.62
32	Road No-31	9	3.75	32.77	1.75	2	65.54
33	Road No-32	12	5	61.00	1.95	2.45	122.00
34	Road No-33	9	3.75	62.76	1.75	2	125.53
Total				16260.26			32540.53

3.11 Storm Water Management

67. Bodhjunnagar IE, at present does not have adequate stormwater collection and its disposal system. Therefore, the project design has considered rectangular covered storm water drains along all the roads with a cumulative length of 31.03 km and 1.2 km storm water

drainage system along with geo-cell wall and 49 cross drainage structures (culverts) and 4 minor bridges with 7 outfalls (ref. **Figures 3-9**).

68. The project design has considered a maximum of 24-hour rainfall intensity with 2-year return period for the design of storm water drains to facilitate drainage without overflowing even during the highest rainfall days/months.



Figure 3-9: Layout Network Plan of Storm Water Drain

3.12 Common Effluent Treatment Plant

69. Bodhjunnagar IE, although existing since the year 1998, there is no sewerage network or centralized Sewage Treatment Plant (STP). Individual industries, offices and establishments within the IE have their own septic tank-soak pit arrangements. The septage from septic tanks are collected on a bi-annual basis by sewer sucking & jetting trucks operated by Agartala Municipal Commission (AMC) and transported to their STP for further treatment and disposal.

70. IE has a Common Effluent Treatment Plant (CETP) of 500 KLD treatment capacity, which was intended to exclusively cater to the industries of the Rubber Park (ref. **Figure 3-10**). Though initially contemplated receiving effluents from seven industries of the Rubber Park, presently the plant is getting raw effluent from only two rubber industries, namely, M/s B S Rubber and M/s Brite Rubber. Three other rubber industries (M/s Malay Rubber, Aristo Rubber and Pallapalli Rubber) are unable to discharge their effluents to the plant, as the pipelines as well as pumping system are not functional. Consequently, the plant receives low inflow and remains underutilized. Moreover, many units and equipment of the plant are not functional and direly in need of replacement. The two bio-towers, including the “Fill Packs” have collapsed, putting one tower completely out of operation. Overall, the CETP is not functioning satisfactorily despite being commissioned between 2017-2018.

71. Under the proposed improvement works, the CETP qualifies as an “existing facility” in accordance with the ADB’s SPS, 2009 (ref. Section 3.3). Accordingly, an environmental audit of the CETP (ref. Appendix-3) has been carried out, which has suggested a corrective action plan (CAP) which is summarized hereunder:

- Refurbish the CETP with replacement of all dysfunctional/ damaged units including all equipment, instrumentation and control, to ensure a fully functional CETP, capable of treating the influent wastewater to the stipulated effluent standards by CPCB/ TSPCB.
- Identify all liquid waste generating industrial units and ensure their connectivity to the CETP by laying required additional pipeline network for conveyance of the effluent.
- Engage a qualified and experienced operation and maintenance agency with adequate staff to ensure satisfactory functioning of CETP including qualitative and quantitative monitoring of both inflow and outflow to the CETP.
- Establish a functional Online Continuous Emission Monitoring System (OCEMS) at the CETP and ensure its connectivity to CPCB as well as TSPCB.
- Ensure periodic renewals of CTO issued on 07.08.2020 (currently valid up to 30.08.2025) and fulfill all terms and conditions to the consent, including submission of mandated CETP monitoring reports to TSPCB.
- Engage an accredited and TSPCB /NABL approved laboratory/ agency for independent 3rd party periodical monitoring of the CETP including an annual CEPT performance evaluation.
- Ensure mandatory reuse of the treated effluent for industrial use either by the member units of the CETP and/ or any other industries and reduce the dependence on ground water resources for freshwater requirement.
- Implement construction of storm water holding ponds at suitable locations within industrial estate by impounding the existing valley/ local depression(s), with an outlet weir for discharge of excess/overflow (average annual rainfall of West Tripura is 2000mm). The stormwater holding ponds will serve as a supplementary water source, which can serve freshwater requirement of the industrial units (after requisite treatment, if required) reducing the withdrawal of groundwater for industrial use.
- Emptying the stagnated effluent ponds by pumping it to the refurbished CETP for treatment/ reuse and converting the emptied areas into stormwater runoff and/ or treated effluent retention ponds.

- Implement rainwater harvesting and groundwater recharging at suitable locations both within CETP and industrial estate.
- Develop green belt in all open areas within and periphery of CETP.
- Ensure allocation of adequate budgetary resources for both capital and recurring maintenance cost for trouble free operation of the CETP.
- The implementation of the CAP is expected to make the CETP compliant to the issues documented by State and Central Pollution Control Board reported between 2018 and 2022 and directions of NGT.

72. The CAP will be scheduled for implementation, concurrently with the construction of proposed all other infrastructure development in Bodhjungnagar industrial estate between March 2025 to February 2028. The budgetary provisions made in the EMP of IEE as well as in DPR include capital cost for all corrective measures as well as operation and maintenance of the CETP for a period of five years.



Figure 3-10: Present Condition of Bio-towers in CETP

3.13 Industrial Solid Waste Management

73. Bodhjungnagar IE, presently does not have any common facility for collection, treatment and disposal of solid waste generated within the industrial estate. The waste generated from various industrial units are being collected periodically by the waste collection trucks operated by the Agartala Municipal Commission (AMC) and transported to their solid waste management facility for further treatment and disposal.

74. The master plan development does not include any proposal for development of a centralized integrated solid waste management facility at Bodhjungnagar IE in the immediate future and continue with the present system.

75. The DoIC, through TIDCL, has plans to develop a common solid waste management facility for several industrial estates i.e. Bodhjungnagar IE, R.K.Nagar, Dukli, Nagicherra, A.D. Nagar and Badharghat at a suitable location in the next phase of development.

3.14 Electrical and Power Supply System

76. The existing power supply arrangements comprising 132, 33 and 11 KV network within the Bodhjungnagar IE is described hereunder:

77. The 132 / 33 / 11KV sub-station is located inside Bodhjungnagar IE, which has 2 X 25 MVA, 132 / 33 KV EHT Transformers. Out of these, one of the 25 MVA Transformer is a repaired unit and cannot be loaded beyond 50 % of its capacity. The combined peak load on both the 25 MVA transformers is 50 Amp each, as both the transformers are similar and are connected in parallel, equivalent to load of 10 MVA by each transformer.

78. There are 4 Nos of 33 KV feeders emanating from the 132 / 33 KV sub-station as follows:

- Rubber Park (feeding to Balaji Ispat at Bodhjungnagar)
- Dharampal – 1: Lying unfunctional
- Khayarpur – feeding to area outside Bodhjungnagar and Bodhjungnagar IE
- Tripura Ispat (at Bodhjungnagar)
- Bamboo Park (at RK Nagar IE)

79. There is a 33 / 11 KV sub-station within 132 / 33 KV sub-station at Bodhjungnagar, which has two 33 / 11 KV Transformers; one is of 7.5 MVA and other is of 5 MVA.

80. The 7.5 MVA, 33 /11 KV Transformer, has 6 No. 11 KV feeders, as below:

- Infra Feeder (Feeding to Brikolite Factory, Bodhjungnagar), Peak Load 50 Amp
- Veterinary College – Feeding to Veterinary College and RK Nagar IE, Peak Load 110 Amp
- RFL Feeder (Bodhjungnagar), Peak Load 35 amp
- Pran Feeder (Bodhjungnagar),
- Rajchantai – feeding to area outside Bodhjungnagar and Bodhjungnagar IE
- Banikya Chowmuhani Feeder – feeding to area outside Bodhjungnagar and Bodhjungnagar IE

81. The 5 MVA, 33 /11 KV Transformer has only 1 No. 11 KV Feeder, named as Factory feeder which is feeding to Bodhjungnagar and some little part of RK Nagar IE.

82. In summary, Bodhjungnagar IE gets power supply through following feeders:

- 33 KV Rubber Park Feeder
- 33 KV Tripura Ispat Feeder
- 11 KV Infra / Brikolite Feeder
- 11 KV RFL Feeder
- 11 KV Pran Feeder
- 11 KV Factory Feeder

83. The total installed capacity of Distribution Transformers in Bodhjungnagar IE is around 30 MVA. Excluding the installed capacities of HT Consumers, the total installed capacity for LT Industries is around 15 MVA.

84. The internal road length inside IE is around 14.5 Kms. The 11 KV network is on MS tubular pole / PCC Pole with conductor as ACSR Weasel. This conductor is old and worn out. Similar condition is of the LT network. There is LT Line Network inside the IE on Overhead conductors with configuration 3 Phase 5 Wire on PCC pole/ MS pole. Some of the streetlights are mounted on the same LT distribution pole and some have separate networks.

85. There is one 33 / 11 KV Sub-station inside the Bodhjunnagar IE with the name Rubber Park, fed from 33 KV Feeder from 132 / 33 KV Bodhjunnagar Sub-station. At present this Sub-station is lying abandoned with one damaged and unfunctional 3.15 MVA, 33/11 KV Power Transformer. An abandoned and empty Control Room Building exists in the same S/S.

86. The project design has assessed the existing 132, 33 and 11 KV network within the industrial estate and considered replacing all non-functional and/or under sized equipment as per projected load requirements. Additionally, all 33 KV, 11 KV and other feeder cables will be laid on the cable trays within the utility corridor.

87. The single line diagram (SLD) of 132 /33 / 11 KV Bodhjunnagar Substation is given in **Figure 3-11**.

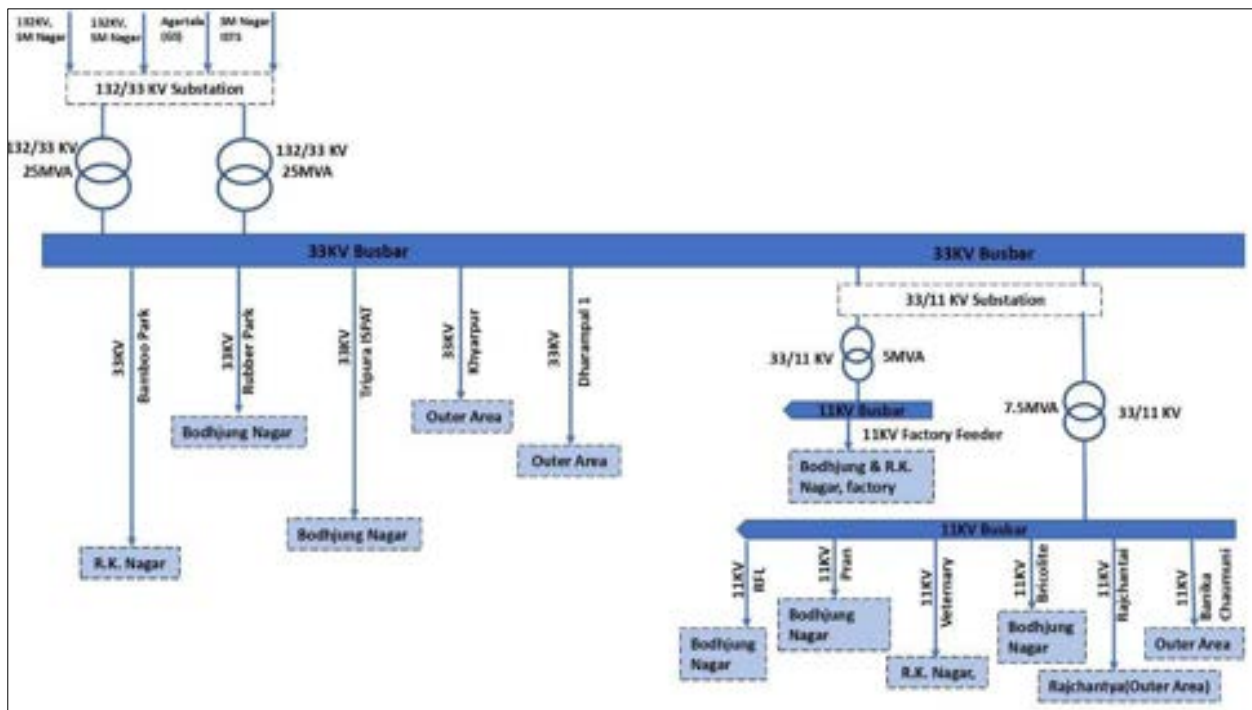


Figure 3-11: SLD of 132 /33 / 11 KV Network within Bodhjunnagar

3.15 Industrial Safety and Security

88. Safety and security provision are of utmost importance in an industrial estate to ensure safety of people, property, prevent theft and damage, early fire/threat detection, and quick response in case of emergencies.

89. Presently, safety and security infrastructure within Bodhjunnagar IE is very limited with very few CCTVs, guard rooms, limited peripheral boundary walls (without barb wire fencing) which is dilapidated condition at many places and the entry gates are without any boom barriers.

90. In line with DoIC’s envision to develop Bodhjungnagar IE with the “Best in Class” infrastructure, project design considers providing most modern industrial safety and security infrastructure with provisions of modern infrastructure like integrated command and control center (ICCC), closed-circuit television (CCTV) surveillance. In addition, 4 nos. entry gates with 3 nos. security cabin, 0.5 Km Retaining boundary wall long along with provision of concertina atop the walls to further enhance the security of the estate from unauthorized entrance and encroachments. is proposed to secure perimeter of Industrial estate.

91. Typical arrangements of the entrance gate, peripheral boundary wall with the provision of concertina s is given in **Figure 3-12**.

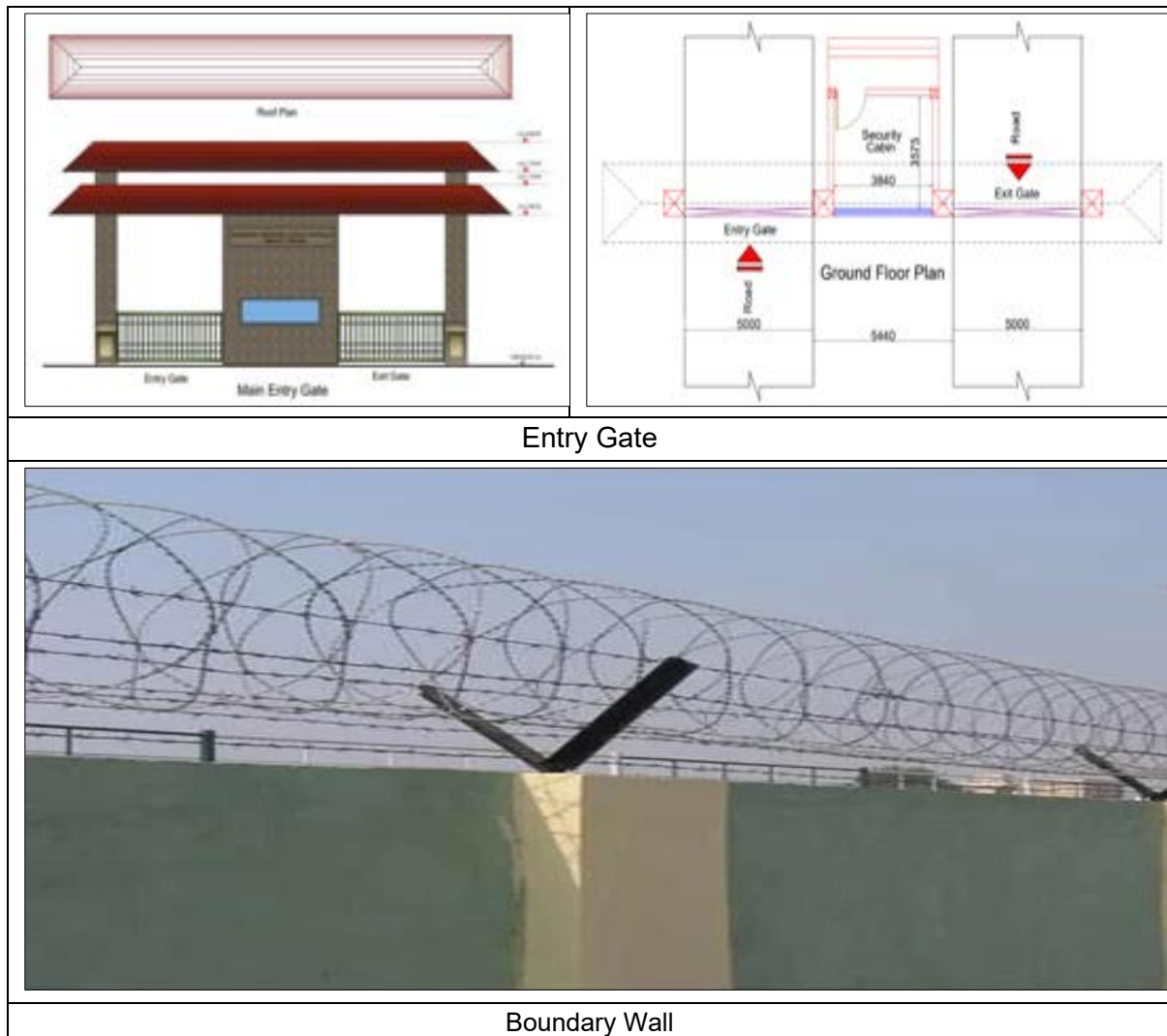


Figure 3-12: Provision for Safety and Security for Bodhjungnagar IE

3.16 Solar Power Generation

92. As a green initiative and concern for reducing the carbon footprint, 9 modules of ground mounted solar power generation unit with a cumulative capacity of 500 KW are proposed within Bodhjungnagar IE as given in **Table 3-10**.

Table 3-10: Proposed Solar Power Generation in Bodhjungnagar IE

Sl. No.	Location within IE	Capacity (KW)	No. of Solar Modules	Total Capacity (KW)	Area (Sqm)
1	ISWM	25	3	75	750
2	WPS at Zone 1	25	1	25	250
3	Food Laboratories	25	2	50	500
4	Truck Parking	25	1	25	250
5	CIPET Admin. Block	25	3	75	750
6	TIDC Admin Block	50	1	50	500
7	CIPET Academic Block	50	1	50	500
8	WTP	50	2	100	1000
9	Solar Control Room at Truck Parking	50	1	50	500
	Total		15	500	5,000

3.17 Public Transport

93. It is proposed to deploy 2 nos. of CNG buses which are eco-friendly and non-polluting. The State has a large number of CNG Stations, and one CNG Station is proposed near the Bodhjungnagar Industrial Park. These CNG buses offer a convenient and comfortable mode of transport for workers and visitors, reducing the physical strain of walking long distances. The CNG buses can significantly cut down travel time from the main gate to individual workplaces within IE, thereby improving overall productivity and inclusive industrial environment. Being eco-friendly, these vehicles produce zero emissions, contributing to a cleaner environment within IE. The buses are designed to be accessible for people with disabilities and ensure inclusivity within IE.

94. In addition, two battery-operated small vehicles, along with the necessary charging infrastructure, have been proposed to improve internal mobility within IE.

3.18 Construction Workforce Requirement

95. The infrastructure development at Bodhjungnagar will require an estimated construction workforce at all levels (2050 skilled and unskilled labour and 82 supervisory and managerial staff). It is anticipated that nearly 70-75% of skilled and unskilled labour (approx. 1,600) are likely to be migrant workers from other states and the rest are likely to be sourced from nearby villages and settlements areas (ref. **Table 3-11**).

Table 3-11: Estimated Construction Workers requirement at Bodhjungnagar IE

Sl. No.	Category of Workforce	Sector/ Package wise requirement					Total
		Road, Junction & Storm Water Drain	Electrical & power supply	Water Supply Infrastructure, RWH, & Refurbishment of existing CETP	Land Development, Landscaping, Common facilities & Social Infrastructure	Industrial Safety & Security, Civil Work	
1	Project Managers	3	1	1	1	1	7
2	Deputy Project Manager	6	1	1	1	1	10
3	Sector Specialist Construction Engineers including designated EHS officers	9	2	3	2	2	18
4	Junior Engineers	12	4	4	4	2	26
5	Subcontract Personnel	12	2	3	2	2	21

Sl. No.	Category of Workforce	Sector/ Package wise requirement					Total
		Road, Junction & Storm Water Drain	Electrical & power supply	Water Supply Infrastructure, RWH, & Refurbishment of existing CETP	Land Development, Landscaping, Common facilities & Social Infrastructure	Industrial Safety & Security, Civil Work	
	including designated EHS officers						
6	Skilled Labour	65	26	56	37	27	211
7	Unskilled Labour	624	57	535	356	267	1839
	Total						2132

3.19 Campsite and Workforce Camp Establishment

96. During the pre-construction stage, contractors will be required to establish workforce camp to accommodate all the migrant workforce, deployed for the construction works. Similarly, campsite establishments like hot-mix plants, concrete batch plants, crushers, wet mix macadam are also to be established by the contractor.

97. Both campsite and workforce camps will be established in the vacant plots within the boundary of IE with all the amenities like water, sanitation, medical facilities etc. (ref. Table 9-1 to 9-4 of EMP for more details).

3.20 Construction Material Requirement

98. The estimated construction material requirement of Bodhjungnagar IE development as per the project design is given in **Table 3-12**.

Table 3-12: Estimated Construction Material Requirement at Bodhjungnagar IE

Sl. No.	Item	Unit	Quantity
1	Excavated Earth	cum	205052.43
2	Backfilled Earth	cum	291250.95
3	Excess Earth	cum	-86198.52
4	Stone Aggregates	cum	126208.25
5	Sand	cum	69380.91
6	Cement	ton	42529.84
7	Bitumen	kg	-
8	Steel	ton	5699.97
9	Brick's	Nos.	829146
10	DI/CI Pipe	meter	2517
11	HDPE pipe	meter	19694.80

3.21 Implementation Schedule

99. The construction works related to infrastructure development of Bodhjungnagar IE is anticipated to be implemented in 36 months, including monsoon season, commencing from April 2025. The total implementation period including defect liability period (DLP) and the operation and maintenance phase would be till March 2032.

100. The infrastructure development works will be executed through the various state government departments having the domain expertise for components like roads, utility corridor, stormwater drains along with culverts, water, OHT, building works, electrical works, natural gas among others. These state government departments will function as the respective project implementing units (PIUs) with a dedicated team and will be headed by the designated executive engineers (EE)/ superintending engineers (SE) of the respective departments.

101. The DoIC will establish a PMU, comprising several domain experts and head by a Project Director. The DoIC will also appoint a project management and supervision consultant (PMSC), who will be responsible for the project management and work supervision at the field levels of all the prioritized industrial estates (including Bodhjungnagar). The PMSC shall comprise several domain experts and headed by a team leader and reporting PMU (ref. Section 9.4 for implementation arrangements including environmental safeguards management).

4.0 DESCRIPTION OF THE ENVIRONMENT

4.1 General

102. The baseline environment of the core and buffer zones surrounding the Bodhjungnagar IE is given in this section. The core zone considers the entire area within the Bodhjungnagar IE as well as a 500-metre-wide strip all along its peripheral boundary. The core zone can be vulnerable to various construction activities during the project implementation phase. The West Tripura district as a whole has been considered as buffer zone for assessment of the baseline environmental conditions prevailing in the region surrounding the Bodhjungnagar IE.

103. The baseline information on various environmental attributes for both core and buffer zones has been collected through field surveys and supplemented by secondary data sourced from authentic and verifiable sources given in **Table 4-1**.

Table 4-1: Data Sources for Assessment of Baseline Environment

Environmental Attribute	Source of data / Information	Date and Year of the Data
Climate/Weather Parameters like Temperature, rainfall, wind speed and other similar climatological parameters	IMD (Indian Metrological Department), Agartala and New Delhi	Last 5 years data between 2018-2022
Soil & Geology	Central Ground Water Authority, Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti, Government of India	Aquifer Mapping and Management Plan of West Tripura District, 2017-18 published by the Central Ground Water Authority, North-Eastern Region, Guwahati.
Landslide locations/Slope stability	Primary investigations and field surveys	Primary investigations during 2022-23.
Drainage/ Flooding	Satellite Imagery/ Toposheet /Hydrology study/State Water Resource Department. Ground truth verification by Physical inspections of the IE.	Aquifer Mapping and Management Plan of West Tripura District, 2017-18 published by the Central Ground Water Authority, North-Eastern Region, Guwahati. Primary investigations during 2022-23.
Surface Water Bodies, Surface water quality and Ground water Quality	Topography sheets/field study. Hydrological data from the CGWB Reports followed by ground truth verification by Physical inspections of the project road. Also, Monitoring of the surface and ground water quality along the project road	Aquifer Mapping and Management Plan of West Tripura District, 2017-18 published by the Central Ground Water Authority, North-Eastern Region, Guwahati. Monitoring of the surface and ground water quality through NABL Accredited Laboratory during 2023.
Ambient Air Quality and Ambient Noise levels, surface water quality, soil quality	Monitoring of the ambient air quality and ambient noise level measurements along the project road was carried out.	Monitoring of the surface and ground water quality through NABL Accredited Laboratory during 2023.
Forest/Protected Areas, Endangered Plant and Animal, Ecological Sensitive Area, Wildlife Corridors /Migratory routes	Department of Forest, Govt. of Tripura, Consultations with DFOs, Forest Range Officers of forest department and with local community.	Forest area as of 2022-23, published by Tripura Forest Department and Primary investigations/ ecological assessment of the core and buffer zones during May-September 2023.

Environmental Attribute	Source of data / Information	Date and Year of the Data
Trees and Vegetation Cover	Department of Forest, Govt. of Tripura, Consultations with DFOs, Forest Range Officers of forest department and with local community.	Primary investigations/ ecological assessment of the core and buffer zones during May-September 2023.
Cultural / Heritage and Ancient Structures.	Consultations with Archaeological Survey of India and Designated State Archaeological Officer under Education Department, Tripura and web-based data search.	Archaeological Survey of India and web-based data search for information on Cultural / Heritage and Ancient Structures within the core zone. Primary investigation of the core zone during May-September 2023.

4.2 Physical Resources

4.2.1 Geology

104. Geologically, both core and buffer zones are occupied by upper tertiary within the Dupitila group and formation consisting of earthy brown to buff sandy clay, mottled clay, clayey sandstone and coarse to gritty ferruginous sandstone overlie the Tipam Formation and are well developed in central portion of the synclinal valleys. These formations occur in the form of disconnected mounds with thickness of this formation varying from 10 – 30m.

105. The core and buffer zones do not have geological reserves of rock/stone aggregates. The geological succession of the buffer zone i.e. West Tripura district is given in **Table 4-2** and shown in **Figure 4-1**.

Table 4-2: Geological Succession of West Tripura District (Buffer Zone)

Age	Group	Formation	Lithology
Quaternary	Recent	Recent	Alluvium, represented by unconsolidated pale to dirty gray, silt, sand, clay, silty clay, sandy clay etc. and yellowish-brown coarse river sand, gravels & concretions.
			----- UNCONFORMITY-----
Upper Tertiary	Dupitila	Dupitila	Brown to buff sandy clay with grayish sandy loam, clayey sandstone with ferruginous materials & laterites.
			----- UNCONFORMITY-----
	Tipam	Champaknagar Manubazar	Massive medium to coarse sandstone with sandy shale. Fairly bedded fine to medium sub-arkosic sandstone with sandy shale and siltstone.
			----- UNCONFORMITY-----
Surma	Bokabil Bhuban	Thinly laminated, bedded sandstone and silt (repetition) with ferruginous material, medium to coarse micaceous sandstone with mudstone. Intruded, hard compact, both massive & well-bedded sandstone, dark to olive shale repeated.	

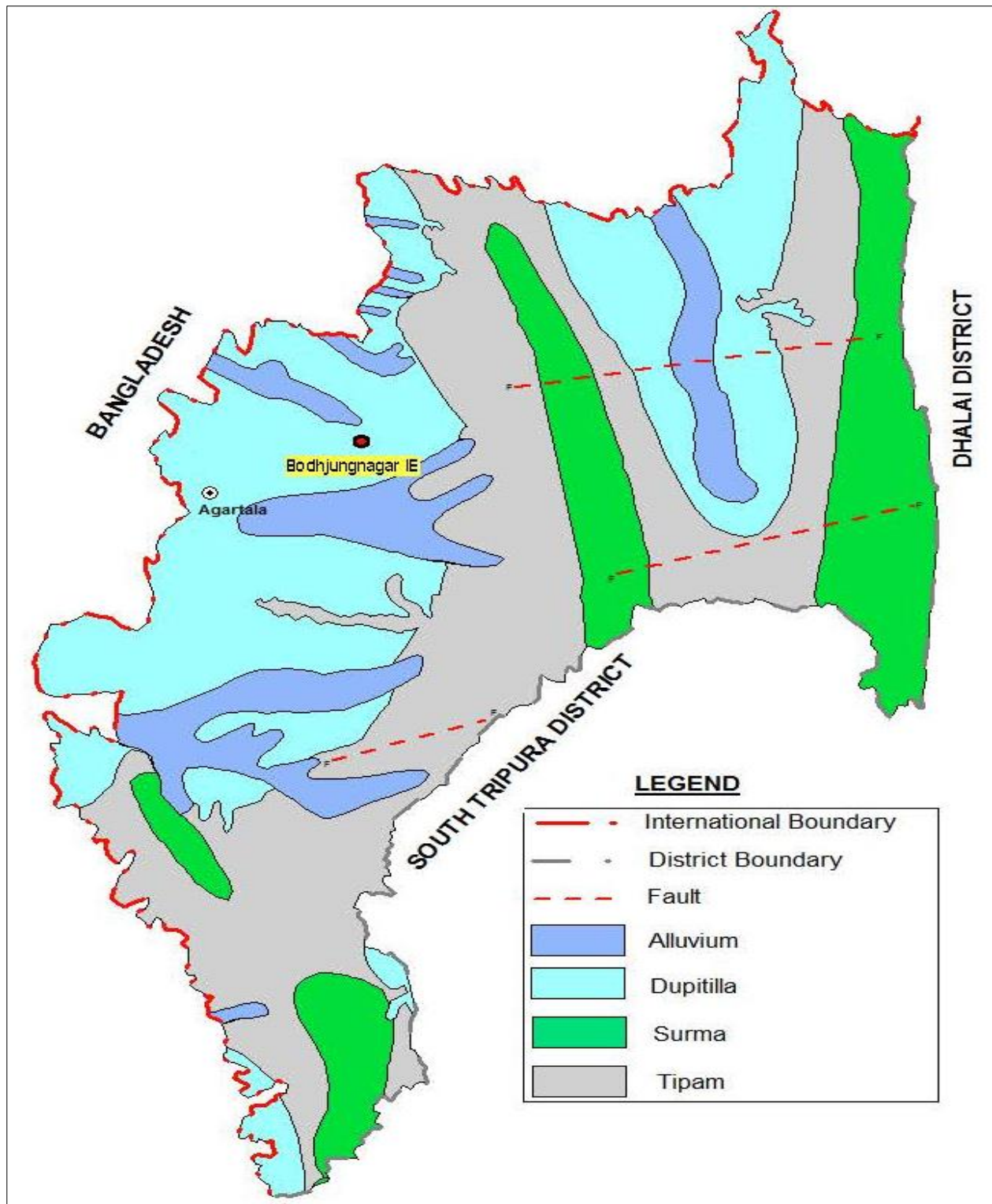


Figure 4-1: Geological Map of West Tripura District (Buffer Zone)

(Source: - Central Ground Water Board, Government of India Ministry of Water Resources)

4.2.2 Hydrogeology

106. Hydrogeological formations within the buffer zone i.e. West Tripura district largely comprising of Dupitilla, Tipam and Surma Formations of Upper Tertiary age and are considered as a single hydrogeological unit. The estimation of the ground water resources within the buffer zone i.e. West Tripura district carried out by the Central Ground Water Authority (CGWA) has

indicated availability of adequate groundwater resources and suitable for deep tube well with discharges ranging between 100 to 150 cum. per hour within a drawdown of 15 meters.

107. The assessment has indicated that the entire core and buffer zones are under the safe category and no area or block has been notified for restricted groundwater development by the Central Ground Water Authority (CGWA). The assessment also indicates that there is no saline/ brackish water aquifer or any other poor ground water quality in the region, except for the presence of the iron. The concentration of the iron in the groundwater exceeds the prescribed desirable and maximum permissible limit of 0.3 and 1 mg/l.

108. The ground water resources and iron levels within the groundwater of core and buffer zones i.e. West Tripura district are shown in **Figures 4-2 & 4-3**.

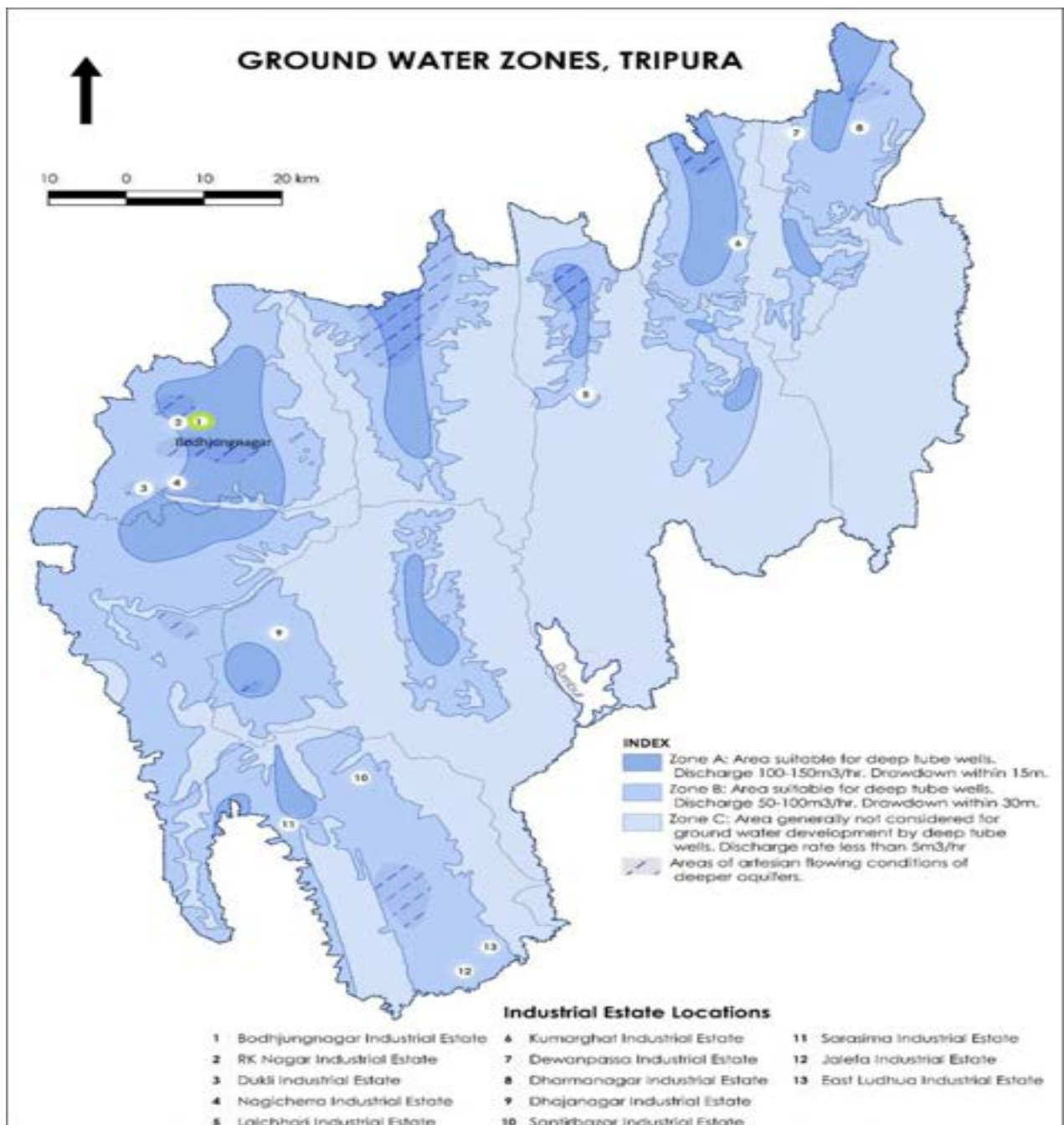


Figure 4-2: Ground Water Resources Map of Tripura

(Source: - Central Ground Water Board, Government of India Ministry of Water Resources)

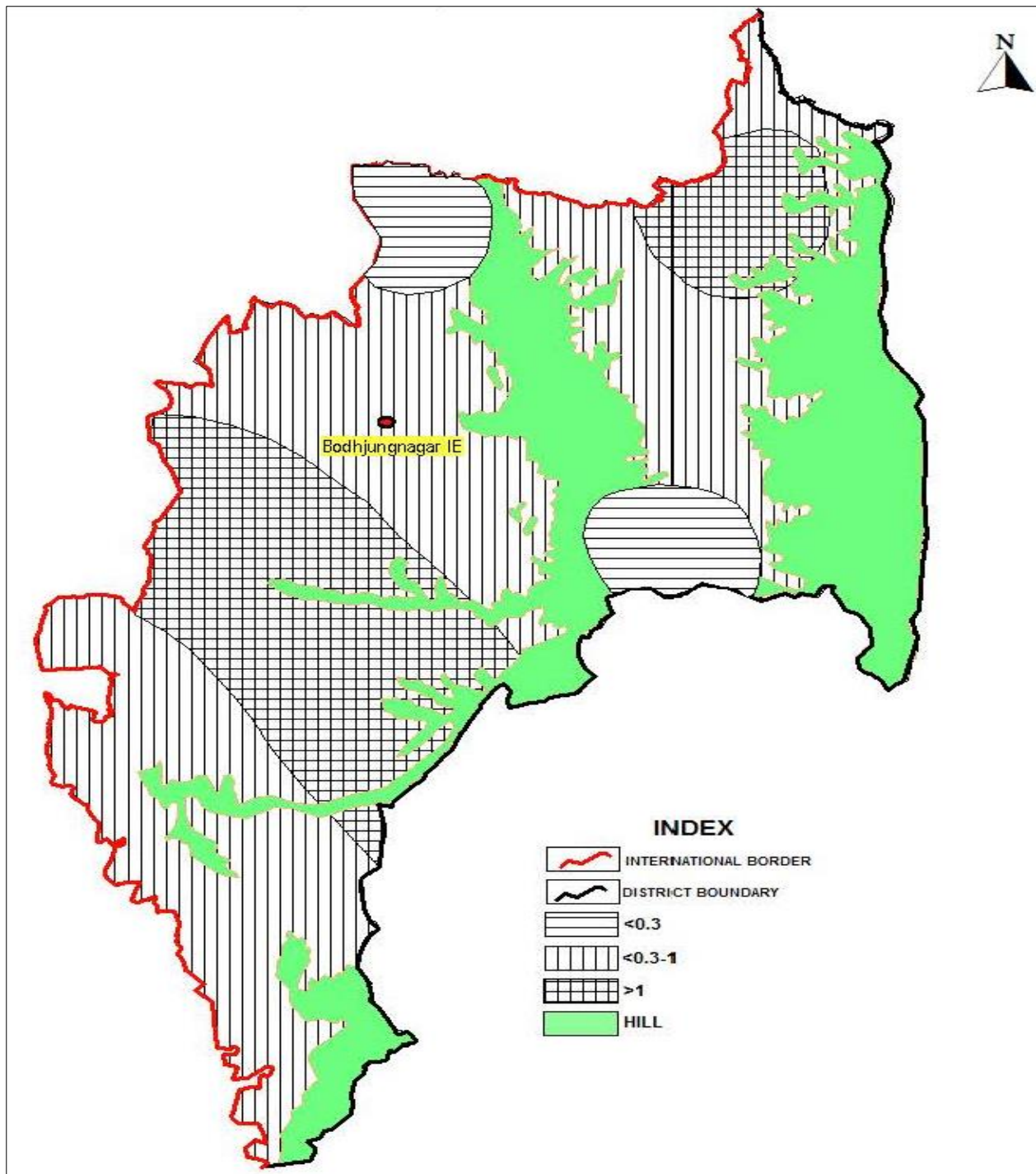


Figure 4-3: Distribution of Iron within West Tripura District (Buffer Zone)

(Source: - Central Ground Water Board, Government of India Ministry of Water Resources)

4.2.3 Physiography

109. Physiography of core and buffer zones can be divided into two parts i.e. Anticlinal Hill Ranges and Synclinal flat-bottomed valleys. The core zone including the Bodhjunnagar IE falls within the Agartala – Sonamura valley (or simply Agartala valley) of the synclinal flat-bottomed valleys. The master slope of the Agartala valley is generally towards west and gradually undulates with intermittent flood plains of small rivulets and streams. The undulations typically range between 10 – 30 m high mounds, with gullies in between them are locally called as “loonga”.

110. The core zone including Bodhjunnagar IE also has many such steeply undulating loonga lands.

4.2.4 Hydrology and Drainage

111. Tripura state is drained by 9 rivers and falls within the Barak, Gomti and Fenny sub-basins of Meghna River basin (ref. **Table 4-3**).

112. The core zone including Bodhjunnagar IE falls within the Khowai river catchment under Barak sub-basin, which has a predominantly dendritic drainage pattern with first order followed by second order drains/streams. The majority of these streams remain dry or carry meagre discharge during most of the year and none of them are prone to floods even during the monsoon season or heavy rainfall years. The core and buffer zones do not have any major surface water bodies and/or wetlands.

113. The core zone of Bodhjunnagar IE is not prone to any flood hazard (ref. **Figures 4-4 & 4-5**).



Figure 4-4: Drainage Pattern surrounding Bodhjunnagar IE (Core Zone)

Table 4-3: Rivers of Tripura and its Catchment Area

Sl. No.	Rivers	Catchment Area (sq. km)	Up to
1	Gumti	2400	Sonamura
2	Manu	2278	Kailashahar
3	Deo	908	Kumarghat
4	Juri	482	Dharmanagar
5	Dhalai	630	Kawalpur
6	Khowai	1328	Khowai Town
7	Haora	488	Agartala
8	Buriganga	414	Bisalgarh
9	Muhuri	1014	Belonia

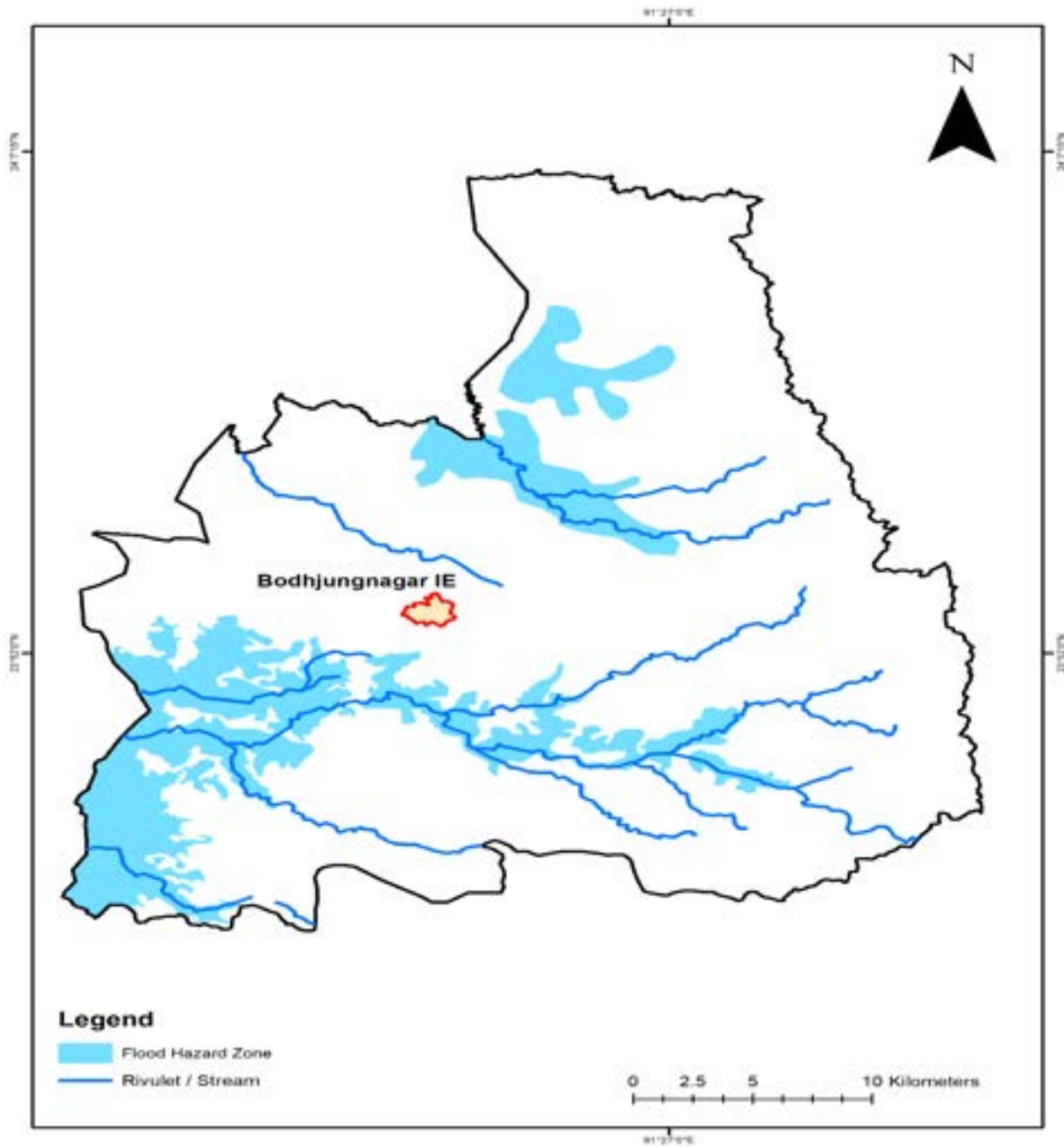


Figure 4-5: Drainage and Flood Prone Map of West Tripura District (Buffer Zone)

(Source: - Water Resources Department, Govt. of Tripura)

4.2.5 Topography and Elevation

114. The elevation of buffer zone i.e. West Tripura District range between 4 to 468 meters above mean sea level (MSL), whereas the elevation of the core zone i.e. Bodhjungnagar IE and peripheral areas up to 500m range between 20 to 56 meters above MSL (ref. **Figure 4-6**).

115. The elevation of the core zone i.e. Bodhjungnagar IE is at a relatively higher level as compared to the surrounding region. Consequently, core zones including Bodhjungnagar IE are not prone to submergence and/ or floods even during heavy rainfall periods.

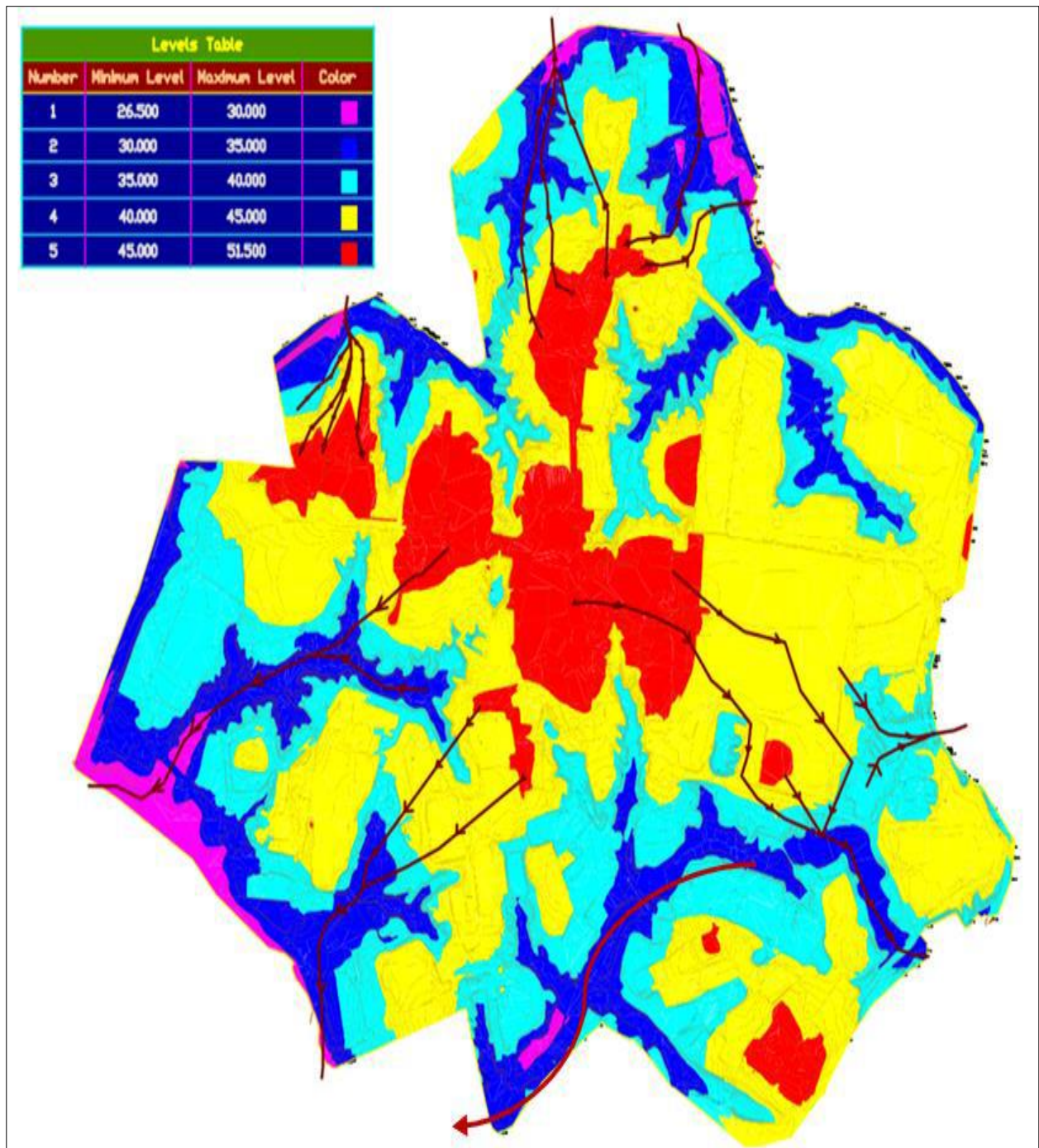


Figure 4-6: Elevation Profile of Bodhjungnagar IE (Core Zone)

4.2.6 Geo-morphology and Soils

116. Geo-morphologically both core and buffer zones predominantly have red loamy, red & yellow, light & red earth soil types (Haplustralfs, Paleustults, Rhodustalfs, Ocjraquults, Rhodustults, Haplustults). These soil types are generally acidic in nature with pH ranging between 5.5 to 5.75 and deficient in nutrients like nitrogen, phosphate calcium, magnesium and sulfur, whereas available potash levels are medium to high.

117. The pH value of soil can be increased by applying calcium oxide or calcium carbonate which in turn increases the availability of nitrogen, phosphorus, calcium and magnesium in acidic soils and thus enables increased production of crops. Since the iron content in groundwater within the core and buffer zones is high, it inhibits growth and decreases production of crops when used for irrigation.

4.2.7 Land Use

118. The land use land cover map (LULC) of buffer zone prepared using standard land use classification system followed by National Remote Sensing Centre (NRSC) is given in **Table 4-4**.

Table 4-4: LULC of West Tripura District (Buffer Zone)

Sl. No.	Particulars	Area (ha.)	
		Mohanpur Block	West Tripura District
1	Geographical Area	26166	299681
2	Area under Forest	5555	114580
3	Land not available for Agricultural use:		
	Land put to non-agri cultural use	7871	66115
	Barren uncultivable Land	91	1406
4	Permanent Pasture & other Grazing Land	97	196
5	Land under Misc. Tree crops & Groves (Not included in Net Sown Area)	110	2008
6	Cultivable Waste Land	61	697
7	Fallow Land other than Current Fallow	18	367
8	Current Fallow	32	371
9	Total Cropped Area	18359	211838
10	Total Cultivable Area	10977	114969
11	Cropping Intensity	172	190
	Total Area	37788	398157

119. The present land use of the core zone, particularly within the Bodhjungnagar IE, spread over an area of 207.64 ha is given in **Table 4-5**. It can be seen that 52.14 ha is presently vacant and available for development of plots and other infrastructure. The existing land use map of the core zone, restricted to the Bodhjungnagar IE is given in **Figure 4-7**.

Table 4-5: Existing Land Use within Bodhjungnagar IE (Core Zone)

Sl. No.	Land Use	Existing Area (in ha)	In % Percentage
1	Industrial Area Plotted development, Industrial Sheds and Flatted industries	118.20	56.9%
2	Transportation Roads, Junction, parking etc.	15.91	7.7%
3	Residential Workers Housing	0.45	0.2%

Sl. No.	Land Use	Existing Area (in ha)	In % Percentage
4	Facilities <u>Public and Semi-Public:</u> Fire station, health care centre, educational institutes, warehouse and administration etc. <u>Utilities:</u> Electric sub-Station, CETPs, Pumping Stations, Underground Reservoirs / Fire Fighting Tanks and other utilities, etc.	15.58	7.5%
5	Open Space Parks, green area and open areas around it, steep slopes	5.36	2.6%
6	Vacant Area Developable area	52.14	25.1%
	Total	207.64	100.0%

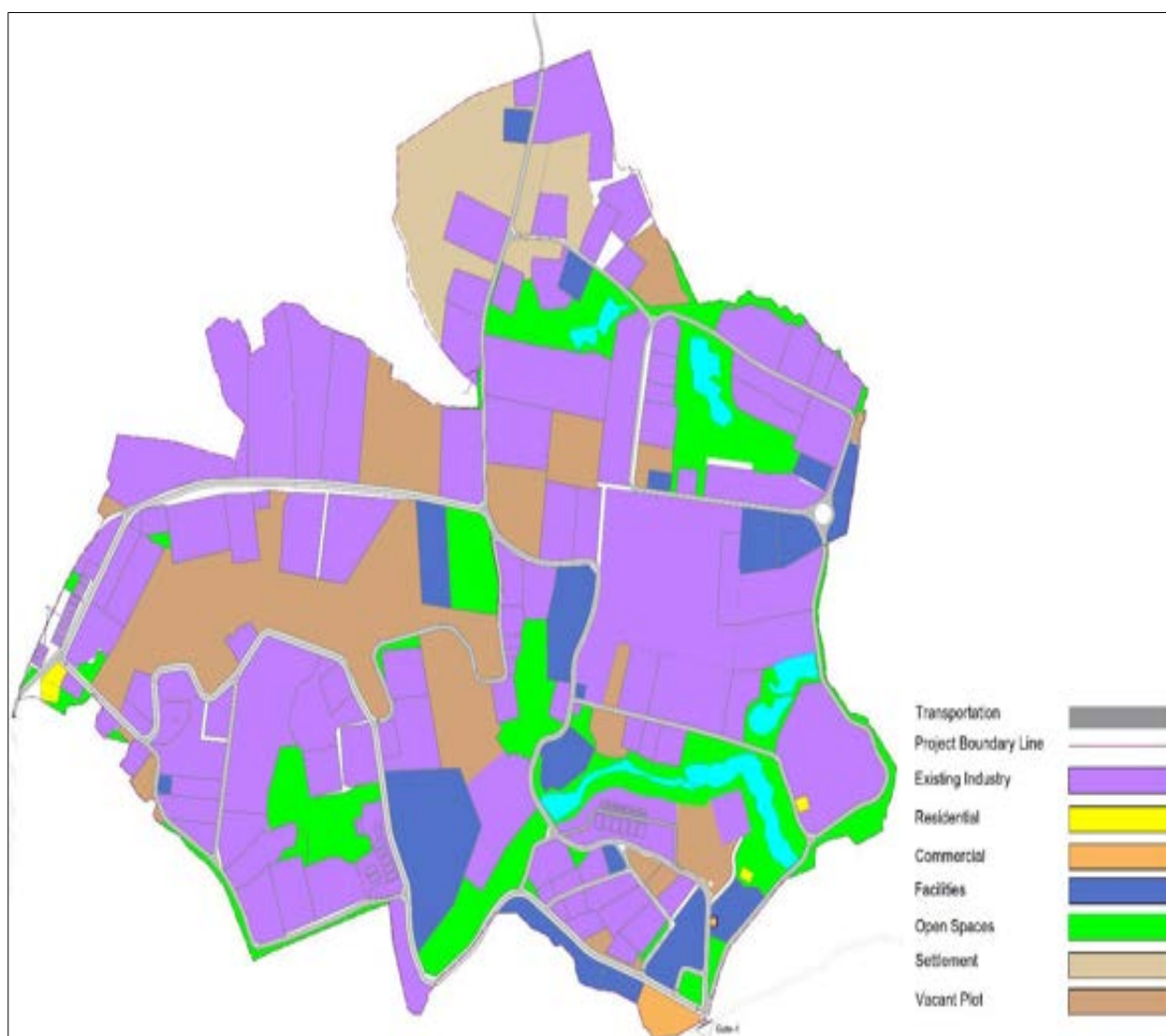


Figure 4-7: Existing Land Use of Bodhjurnagar IE (Core Zone)

4.2.8 Agriculture

120. The predominant crops grown within the buffer zone mainly comprise paddy of three varieties namely (i) monsoon paddy (Aman), (ii) winter paddy (Boro) and (iii) summer paddy (Aush). Both monsoon and winter paddy are cultivated in large areas whereas summer paddy is cultivated in limited areas. In addition, different vegetables, viz. potato, cabbage, gourds

etc., oil seeds and pulses are cultivated after the cultivation of monsoon paddy and before the cultivation of winter paddy. After winter paddy, jute is also grown on a limited scale.

121. In most of the cultivable land, only monsoon paddy is grown whereas in double-cropped areas, both monsoon and winter paddy along with vegetables are grown. Within the buffer zone, orchards of pineapples, jackfruits, mangoes, cashew nuts are also prevalent. Rubber plantations are grown on small mounds and foothills over a considerable area, which has shown an increasing trend in the last decade.

4.2.9 Climate and Rainfall

122. The climate of the core and buffer zones is characterized by moderate temperatures with high humidity. Winter season starts in November and lasts till the end of February. Summer season starts from March and lasts up to May and is followed by Southwest monsoon lasting till October. Generally, maximum summer temperature ranges from 35°C to 40°C and average minimum temperature is in winter nights range between 6°C to 8°C.

123. The core and buffer zone receives rainfall mainly from Southwest Monsoon between May to October months. The average annual rainfall received within the core and buffer zones i.e. West Tripura District between years 2018 to 2022 is 1862 mm. The monthly rainfall and histograms of annual rainfall for the period between 2018 and 2022 are given in **Table 4-6** and depicted in **Figure 4-8**.

Table 4-6: Annual Average Rainfall (mm) in West Tripura District (Buffer Zone)

Year	Months												Total	Average Departure
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec		
2018	2.5	10.1	35.8	200	596.1	402.3	210.7	148.4	94.5	43.5	18.2	22.1	1784	-25.33
2019	0	62.9	44.4	166.9	216.3	263.6	568.6	195.6	190.3	121.2	37.6	6.2	1874	-12.33
2020	20.8	0	6	141.4	302.1	480	376.7	208	320.7	207	16	0	2079	-15.33
2021	3.2	0	19	22.7	209.1	301	458.2	247.4	244.1	138.8	11.8	150.7	1806	61.25
2022	9.1	14.2	32.7	52.4	512.5	438.1	121.6	121.3	264.4	195.6	0.5	3.4	1766	-0.24

Source: India Meteorological Department, Gol, Agartala

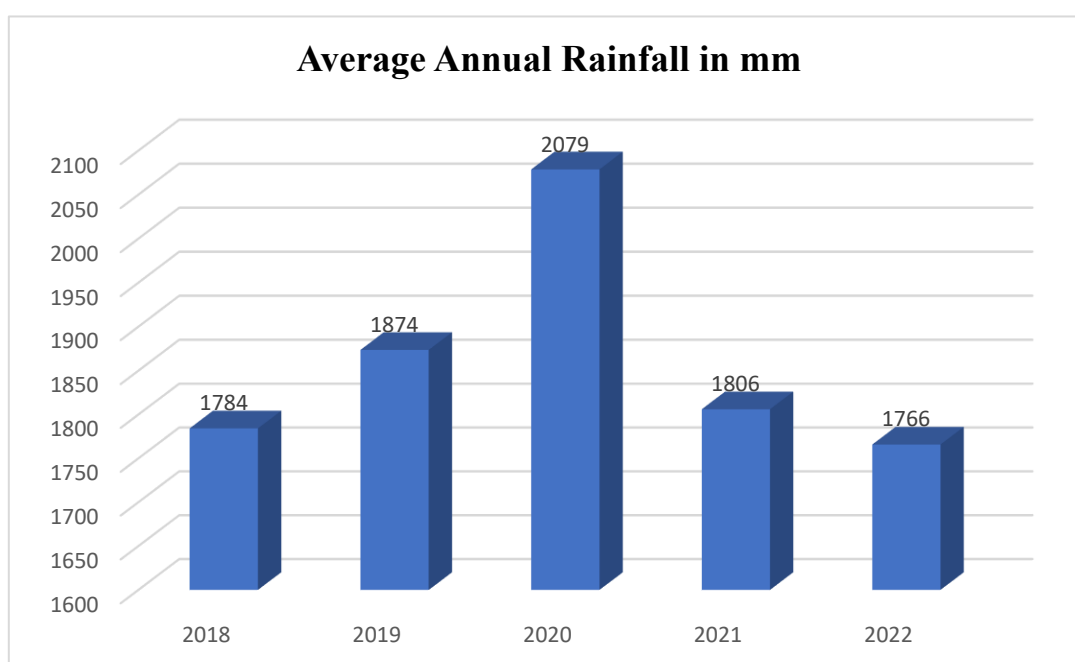


Figure 4-8: Annual Average Rainfall of West Tripura District (Buffer Zone)

4.2.10 Snowfall

124. The core and as well as buffer zones do not receive snowfall in normal years. As per the information sourced from the India Metrological Department, Agartala, no snowfall has been ever recorded within core and buffer zones or any part of the state in last decade.

4.2.11 Visibility

125. The core as well as buffer zones have a visibility of 4 to 10 km for over 300 days in a year both during morning and evening hours. The visibility reduces to less than 1 km for a few days during both morning and evening hours in a year particularly winter months (Nov. to Feb.).

4.2.12 Dust & Thunderstorms

126. As per the information sourced from the India Metrological Department, Agartala, no severe dust and thunderstorms has been recorded within core and buffer zones in last decade.

127. The pre monsoon season starts from March which also brings thunderstorms accompanied with rain and wind speed 150 km per hour and these thunderstorm events are known as 'Nor 'westers' or 'Kalbaisakhi' in Tripura. The Kalbaisakhi begins in March and progressively increases with the advance of the season reaching its peak in May and generally occurs only in some parts of the state.

4.2.13 Wind Speed and Direction

128. The core and buffer zones experience calm days for nearly 100 days followed by wind speed with 4 to 9 km per hour for 250 days in a year. The pre-dominant wind direction is South followed by Southeast both during morning and evening hours throughout the year.

4.2.14 Baseline Environment Monitoring

129. The baseline environmental monitoring comprising ambient air quality, ambient noise levels, water quality and soil fertility was carried out through an NABET accredited laboratory at selected locations within the core zone i.e. Bodhjunnagar IE in September 2023. The monitoring schedule, method of analysis, sampling locations along with its GPS coordinates are given in **Table 4-7** and **4-8**. The monitoring locations within the Bodhjunnagar IE are shown in **Figure 4-9**. The laboratory test reports are given in **Appendix-4**. The baseline environmental monitoring findings are described in the following sections.

Table 4-7: Baseline Environmental Monitoring Schedule & Methods

Sl. No.	Parameters	Monitoring Schedule	Sampling Method
1	Ambient Air Quality Monitoring	24 hourly samples monitoring at each location	Respirable Sampler with arrangement for monitoring PM ₁₀ and PM _{2.5} carried out through NABL accredited Laboratory
2	Water Quality Monitoring	Grab samples from identified locations	Grab sampling, representing both surface and ground water samples and analyzed through NABL accredited Laboratory
3	Ambient Noise Level Monitoring	Hourly recording of noise levels for one full day (24 hours) at each location)	Handheld Integrated Noise Level Monitoring Instrument and measured through NABL accredited Laboratory
4	Soil Testing & Analysis	Grab Sample from each identified location	Grab samples drawn from 30 cm below existing ground level at each location, and analyzed through NABL accredited Laboratory

Table 4-8: Baseline Environmental Monitoring Stations at Bodhjungnagar IE

Sl. No.	Parameters	Monitoring Location/ Category	Monitoring Date	Latitude and Longitude
A Ambient Air Quality				
1	AQ-01	Bodhjungnagar-1/ Industrial	16.09.2023	23°53'11.4396" N, 91°21'55.944" E
2	AQ-02	Bodhjungnagar-2/ Industrial	16.09.2023	23°53'3.2748" N, 91°21'39.5388" E
3	AQ-03	Bodhjungnagar-3/ Industrial	16.09.2023	23°53'7.1448" N, 91°21'14.9508" E
4	AQ-04	Bodhjungnagar-4/ Industrial	17.09.2023	23°52'58.6956" N, 91°21'15.8616" E
5	AQ-05	Bodhjungnagar-5/ Industrial	17.09.2023	23°53'23.3124" N, 91°21'50.868" E
6	AQ-06	Bodhjungnagar-6/ Industrial	17.09.2023	23°53'22.6356" N, 91°21'17.1468" E
7	AQ-07	Bodhjungnagar-7/ Industrial	21.09.2023	23°53'11.4396" N, 91°21'55.944" E
8	AQ-08	Bodhjungnagar-8/ Industrial	21.09.2023	23°53'3.2748" N, 91°21'39.5388" E
9	AQ-09	Bodhjungnagar-9/ Industrial	21.09.2023	23°53'7.1448" N, 91°21'14.9508" E
10	AQ-10	Bodhjungnagar-10/ Industrial	22.09.2023	23°52'58.6956" N, 91°21'15.8616" E
11	AQ-11	Bodhjungnagar-11/ Industrial	22.09.2023	23°53'23.3124" N, 91°21'50.868" E
12	AQ-12	Bodhjungnagar-12/ Industrial	22.09.2023	23°53'22.6356" N, 91°21'17.1468" E
B Ambient Noise Levels				
1	NQ-01	Bodhjungnagar-1/ Industrial	12.09.2023	23° 52' 51.51" N, 91° 21' 53.7732" E
2	NQ-02	Bodhjungnagar-2/ Industrial	12.09.2023	23° 52' 56.0028"N, 91° 21' 50.706"E
3	NQ-03	Bodhjungnagar-3/ Industrial	16.09.2023	23° 53' 7.71"N, 91° 22' 0.912"E
4	NQ-04	Bodhjungnagar-4/ Industrial	17.09.2023	23° 53' 11.5656"N, 91° 21' 55.944"E
5	NQ-05	Bodhjungnagar-5/ Industrial	17.09.2023	23° 53' 23.5752"N, 91° 21' 49.9932"E
6	NQ-06	Bodhjungnagar-6/ Industrial	17.09.2023	23° 53' 25.2564"N, 91° 21' 35.8092"E
7	NQ-07	Bodhjungnagar-7/ Industrial	17.09.2023	23° 53' 3.4728"N, 91° 21' 39.852"E
8	NQ-08	Bodhjungnagar-8/ Industrial	21.09.2023	23° 53' 7.3752"N, 91° 21' 14.7024"E
9	NQ-09	Bodhjungnagar-9/ Industrial	21.09.2023	23° 53' 1.4316"N, 91° 21' 14.13"E
10	NQ-10	Bodhjungnagar-10/ Industrial	21.09.2023	23° 53' 0.564"N, 91° 21' 15.3072"E
11	NQ-11	Bodhjungnagar-11/ Industrial	21.09.2023	23° 53' 10.9068"N, 91° 20' 57.9012"E
C Surface Water Quality.				
1	WQ-01 (SW)	Bodhjungnagar-1	19.09.2023	Surface Water
2	WQ-02 (SW)	Bodhjungnagar-2	19.09.2023	Surface Water
3	WQ-03 (SW)	Bodhjungnagar-3	20.09.2023	Surface Water
4	WQ-04 (SW)	Bodhjungnagar-4	20.09.2023	Surface Water
D Ground Water Quality.				
1	WQ-01(GW)	Bodhjungnagar-1	20.09.2023	Ground Water
2	WQ-02 (GW)	Bodhjungnagar-2	16.09.2023	Ground Water
3	WQ-03 (GW)	Bodhjungnagar-3	20.09.2023	Ground Water
4	WQ-04(GW)	Bodhjungnagar-4	20.09.2023	Ground Water
5	WQ-05 (GW)	Bodhjungnagar-5	20.09.2023	Ground Water
E Soil				
1	SQ-01	Bodhjungnagar-1	19.09.2023	Soil
2	SQ-02	Bodhjungnagar-2	19.09.2023	Soil



Figure 4-9: Location of Environment Monitoring Locations at Bodhjungnagar IE

4.2.15 Ambient Air Quality

130. The ambient air quality was tested at 6 locations (twice at each location) within core zone i.e. Bodhjungnagar IE during September 2023. The monitoring test results along with the respective national standards are given in **Table 4-9**. The laboratory test reports are given in Appendix-4.

131. It may be seen that the ambient air quality (for all tested parameters) at monitored locations are well below the National Ambient Air Quality Standards, whereas PM₁₀ and PM_{2.5} exceed the IFC-EHS guidelines value (24 hours) (ref. Table 4-9).

Table 4-9: Ambient Air Quality within Bodhjungnagar IE (Core Zone)

Sl. No.	Monitoring Location	Category	PM ₁₀	PM _{2.5}	SO ₂	NO _x	CO
			Units				
			µg/ m ³	µg/ m ³	µg/ m ³	µg/ m ³	mg/ m ³
1	Bodhjungnagar-1-AQ-01	Industrial	90.3	56.4	11.5	30.7	0.94
2	Bodhjungnagar-2-AQ-02	Industrial	82.7	45.9	9.2	26.1	0.84
3	Bodhjungnagar-3-AQ-03	Industrial	79.2	46.6	8.3	24.5	0.82
4	Bodhjungnagar-4-AQ-04	Industrial	83.7	44.1	9.6	27.3	0.86
5	Bodhjungnagar-5-AQ-05	Industrial	92.5	46.3	11.7	32.5	0.98

Sl. No.	Monitoring Location	Category	PM ₁₀	PM _{2.5}	SO ₂	NO _x	CO
			Units				
			µg/ m ³	µg/ m ³	µg/ m ³	µg/ m ³	mg/ m ³
6	Bodhjungnagar-6-AQ-06	Industrial	85.1	50.1	9.8	28.1	0.86
7	Bodhjungnagar-1-AQ-07	Industrial	78.5	41.3	8.1	24.7	0.80
8	Bodhjungnagar-2-AQ-08	Industrial	82.7	45.9	9.0	25.6	0.84
9	Bodhjungnagar-3-AQ-09	Industrial	74.2	43.6	7.8	23.5	0.76
10	Bodhjungnagar-4-AQ-10	Industrial	89.2	42.5	9.3	29.2	0.90
11	Bodhjungnagar-5-AQ-11	Industrial	79.5	44.2	8.1	25.3	0.80
12	Bodhjungnagar-6-AQ-12	Industrial	75.0	39.5	7.6	23.8	0.76
	National Ambient Air Quality Standards, CPCB (NAAQS)		100	60	80	80	02
	IFC- EHS Guideline Values (24 Hour values)		50	25	20	200	Not Specified

4.2.16 Ambient Noise Levels

132. The ambient noise levels within Bodhjungnagar IE were measured at 11 locations during both day and night times. The measured noise levels are given in **Table 4-10**. The test reports are given in Appendix-4.

133. It may be seen that the ambient noise levels (for both day and night times) were below the National Ambient Noise levels well as one-hour values of EHS guidelines i.e., 55 dB(A) and 45 dB(A) during daytime and night-time levels at all the monitored locations. The measured ambient noise levels could not be compared with IFC EHS Guidelines, as it does not specify the values for industrial category.

Table 4-10: Ambient Noise Levels within Bodhjungnagar IE (Core Zone)

Sl. No.	Monitoring Location	Category	Ambient Noise Levels Leq dB (A)		
			Daytime	Night-time	
1	Bodhjungnagar-1-NQ-01	Industrial	56.73	62.94	
2	Bodhjungnagar-2-NQ-02	Industrial	62.71	69.52	
3	Bodhjungnagar-3-NQ-03	Industrial	52.85	55.30	
4	Bodhjungnagar-4-NQ-04	Industrial	49.92	54.31	
5	Bodhjungnagar-4-NQ-05	Industrial	50.47	54.18	
6	Bodhjungnagar-4-NQ-06	Industrial	57.04	64.90	
7	Bodhjungnagar-4-NQ-07	Industrial	51.14	54.37	
8	Bodhjungnagar-4-NQ-08	Industrial	50.46	54.03	
9	Bodhjungnagar-4-NQ-09	Industrial	54.01	57.18	
10	Bodhjungnagar-4-NQ-10	Industrial	52.28	54.53	
11	Bodhjungnagar-4-NQ-11	Industrial	50.56	53.76	
	National Ambient Noise Levels Leq dB(A)		Industrial (I)	75	70
			Residential (R)	55	45
			Commercial (C)	65	55
	IFC EHS Guideline Values (One Hour Leq dB(A))		Residential (R)	55	45

4.2.17 Surface and Ground Water Quality

134. The water quality within the core zone i.e. Bodhjungnagar IE was tested at 9 locations covering both surface water (4 locations) and ground water (3 locations) sources. The test results of physical, chemical and bacteriological parameters are given in **Table 4-11 & 4-12** and laboratory test reports are given in Appendix-4.

135. A comparison of tested water quality parameters with the respective acceptable and permissible limits indicates that the tested parameters for ground water sources does not

critically exceed the respective limits for Drinking Water. Similarly, the tested parameters for the surface water sources are within the Designated Best Use Water Quality criteria for surface waters and primary water quality criteria for outdoor bathing water, notified by CPCB, MoEF & CC (Table 4-13 & 4-14)

Table 4-11: Ground Water Quality within Bodhjunnagar IE (Core Zone)

Sl. No.	Parameters	Unit	GW-1	GW-2	GW-3	GW-4	GW-5	Drinking water Standards as per BIS 10500:2012	
								Acceptable Limit	Permissible Limit
1	Alkalinity (as CaCo3)	mg/l	73	89	81	52	56	-	-
2	Ammonia	mg/L	<0.1	<0.1	<0.1	<0.1	<0.1	-	-
3	Arsenic (as As)	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	0.05
4	Boron (as B)	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	1
5	Cadmium Cd	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	No Relaxation
6	Calcium as Ca	mg/L	22.97	24.55	22.18	17.42	19.8	75	200
7	Chlorides as Cl	mg/L	23	25	17	19	21	250	1000
8	Chromium as Cr	Mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	-	-
9	Colour	CU	<5.0	<5.0	<5.0	<5.0	<5.0	5	16
10	Copper as Cu	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	1.5
11	Dissolved Iron	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	-	-
12	Electric conductivity	mg/L	249	270	255	192	201	-	-
13	Fluorides as F ⁻	mg/L	0.42	0.54	0.28	0.36	0.32	1	1.5
14	Lead as Pb	mg/L	<0.005	<0.005	<0.005	<0.005	<0.005	0.01	No Relaxation
15	Magnesium as Mg	mg/L	8.55	10.45	9.98	9.03	9.98	30	100
16	Manganese as Mn	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	0.1	0.3
17	Mercury	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	No Relaxation
18	Nitrate as NO ₃	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	45	No relaxation
19	Odour	--	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
20	Phenol	mg/L	<0.001	<0.001	<0.001	<0.001	<0.001	-	-
21	Phosphate as (PO ₄)	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	-	-
22	Potassium as K	mg/L	3.1	3.5	2.9	2.3	2.5	-	-
23	Salinity	mg/L	0.13	0.14	0.13	0.1	0.1	-	-
24	Sodium as Na	mg/L	9.1	9.3	9.9	6.3	6.8	-	-
25	Sulphates as SO ₄ ⁻²	mg/L	15.4	16.2	15.8	14.6	15	200	400
26	Total Dissolved Solids	mg/L	149	162	154	115	121	500	2000
27	Total Hardness as CaCO ₃	mg/L	93.06	104.94	97.02	81.18	91.08	200	600
28	Turbidity	NTU	1.3	1.7	1.5	1.2	1.3	1	5
29	Zinc as Zn	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	5	15
30	pH Value at 25°C	mg/L	7.32 at 25 Deg C	7.26 at 25 Deg C	7.47 at 25 Deg C	7.52 at 25 Deg C	7.36 at 25 Deg C	-	-

Table 4-12: Surface Water Quality within Bodhjunnagar IE (Core Zone)

Sl. No	Parameters	Unit	SW-1	SW-2	SW-3	SW-4
1	Ammonia	mg/L	0.12	30	102	33
2	Arsenic (as As)	mg/L	<0.005	<0.005	<0.005	<0.005
3	Biochemical Oxygen Demand	mg/L	3.2	4.1	19	14
4	Boron (as B)	mg/L	<0.5	<0.5	<0.5	<0.5

Sl. No	Parameters	Unit	SW-1	SW-2	SW-3	SW-4
5	Cadmium Cd	mg/L	<0.001	<0.001	<0.001	<0.001
6	Calcium as Ca	mg/L	15	20	29	32
7	Chemical Oxygen Demand	mg/L	11	13	71	56
8	Chlorides as Cl	mg/L	7.7	50	143	187
9	Chromium as Cr	Mg/l	<0.01	<0.01	<0.01	<0.01
10	Colour	CU	<0.01	<0.01	<0.01	<0.01
11	Copper as Cu	mg/L	<0.02	<0.02	<0.02	<0.02
12	Dissolved Oxygen	mg/L	5.4	5.8	5.5	5.6
13	Dissolved Iron	mg/L	0.50	0.16	0.52	0.64
14	Electric conductivity	mg/L	249	1020	1776	1098
15	Fluorides as F ⁻	mg/L	<0.1	0.31	0.30	0.25
16	Lead as Pb	mg/L	<0.005	<0.005	<0.005	<0.005
17	Magnesium as Mg	mg/L	3.3	11	15	12
18	Manganese as Mn	mg/L	<0.02	<0.02	<0.02	<0.02
19	Mercury	mg/L	<0.001	<0.001	<0.001	<0.001
20	Nitrate as NO ₃	mg/L	0.52	<0.5	<0.5	<0.5
21	Odour	--	Unobjec	Unobjec.	Unobjec.	Unobjec.
22	Phenol	mg/L	<0.001	<0.001	<0.001	<0.001
23	Phosphate as (PO ₄)	mg/L	<0.05	<0.05	0.54	0.63
24	Potassium as K	mg/L	3.6	21	115	38
25	Salinity	mg/L	0.13	0.54	0.96	0.58
26	Sodium as Na	mg/L	1.9	19	51	5.3
27	Sulphates as SO ₄ ⁻²	mg/L	7.3	27	34	17
28	Surfactants	mg/L	<0.02	<0.02	<0.02	<0.02
29	Temperature	Deg.C	25	25	25	25
30	Total Alkalinity	mg/L	28	77	286	202
31	Total Dissolved Solids	mg/L	149	612	1065	659
32	Total Hardness as CaCO ₃	mg/L	51	95	135	129
33	Total Suspended Solid	mg/L	<2.5	<2.5	41	49
34	Turbidity	NTU	<1.0	<1.0	14	28
35	Zinc as Zn	mg/L	<0.02	<0.02	<0.02	<0.02
36	pH Value	mg/L	6.91 at 25°C	7.5 at 25°C	7.13 at 25°C	6.91 at 25°C
37	Faecal coliform	mnp/100ml	<1.8	<1.8	11	11
38	Phytoplankton	Per liter	Present	Absent	Present	Present
39	Total coliform bacteria	mnp/100ml	<1.8	<1.8	26	22

Table 4-13: Designated Best Use Water Quality Criteria

Designated Best Use	Class of Water	Criteria
Drinking water source without conventional treatment but after disinfection	A	Total Coliforms Organism MPN/100ml shall be 50 or less
		pH between 6.5 and 8.5
		Dissolved Oxygen 6mg/l or more
		Biochemical Oxygen Demand 5 days 20°C- 2mg/l or less
Outdoor bathing (organised)	B	Total Coliforms 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°C 3mg/l or less
Drinking Water Source after conventional treatment and disinfection	C	Total Coliforms MPN/100 ml shall be 5000 or less
		pH between 6 to 9 Dissolved Oxygen 4mg/ 1 or more
		Dissolved Oxygen 4mg/ 1 or more
		Biochemical Oxygen Demand 5 days 20°C 3 mg/1 or less
Propagation of Wildlife and Fisheries	D	pH between 6.5 to 8.5
		Dissolved Oxygen 4 mg/l or more
		Free Ammonia (as N) 1.2 mg/l or less

Designated Best Use	Class of Water	Criteria
Irrigation, Industrial Cooling, Controlled Waste Disposal	E	pH between 6.0 to 8.5
		Electrical Conductivity at 25°C micro mhos/cm Max 2250
		Sodium absorption ratio Max. 26
		Boron, Max. 2 mg/l

Source: - CPCB, MoEFCC

Table 4-14: Primary Water Quality Criteria for Bathing
(Water used for organized outdoor bathing)

Sl. No.	Criteria	Rationale
1.	Faecal Coliform MPN/100 ml 500 (desirable) 2500 (Maximum Permissible)	To ensure low sewage contamination Faecal coliform and faecal streptococci are considered as they reflect the bacterial pathogenicity
2.	Faecal Streptococci MPN/100 ml 100 (desirable) 500 (Maximum Permissible)	The desirable and permissible limits are suggested to allow for fluctuation in environmental conditions such as seasonal change, changes in flow conditions etc.
3.	pH Between 6.5 to 8.5	The range provides protection to the skin and delicate organs like eyes, nose, ears etc. which are directly exposed during outdoor bathing
4.	Dissolved Oxygen 5 mg/1 or more	The minimum dissolved oxygen concentration of 5 mg/1 ensures reasonable freedom from oxygen consuming organic pollution immediately upstream which is necessary for preventing production of anaerobic gases (obnoxious gases) from sediment.
5.	Biochemical Oxygen Demand (3 days at 27°C) 3 mg/1 or less	The Biochemical Oxygen Demand of 3 mg/1 or less of the water ensures reasonable freedom from oxygen demanding pollutants and prevent production of obnoxious gases

Source: - CPCB, MoEFCC

4.2.18 Soil Quality

136. The soil quality within Bodhjunnagar IE was tested at 2 locations and test values are given in **Table 4-15**. The laboratory test reports, and test methods followed are given in Appendix-4.

Table 4-15: Soil Quality within Bodhjunnagar IE (Core Zone)

Sl. No	Test Parameters	Units	SQ-01	SQ-02
1	Bulk Density	gm/cc	1.39	1.37
2	Electric Conductivity at 25°C	µS/cm	92	189
3	Iron (as Fe)	mg/kg	5.1	5.7
4	Lead (as Pb)	mg/kg	9.2	7.9
5	Moisture Retention Capacity	%	32	31
6	Organic Matter	%	0.50	0.64
7	Phosphorus	mg/kg	3.4	4.0
8	Porosity	%	44	45
9	Potassium	mg/kg	30	61
10	Clay	%	12	12
11	Sand	%	72	75
12	Silt	%	16	13
13	Texture	-	Sandy Loam	Sandy Loam

Sl. No	Test Parameters	Units	SQ-01	SQ-02
14	Total Nitrogen as N	mg/kg	342	509
15	Total Organic Carbon	%	0.29	0.37
16	Infiltration Rate	Mm/hr.	21	23
17	pH Value	-	5.54	5.36

4.2.19 Hazard and Vulnerability

137. Tripura state as a whole is vulnerable to earthquakes, floods, landslides, cyclones, extended dry spells and other natural and human induced disasters. Among these, the state is very highly vulnerable to earthquakes as it is situated in Seismic Zone-V and has a higher probability of occurrence of big earthquakes measuring 8 and above on Richter scale.

138. The state witnessed the worst earthquakes in 1897 and 1950 measuring 8 and above on the Richter scale. In recent years, the state has witnessed a moderate earthquake of magnitude of 5.7 on the Richter Scale with epicenter in Dhalai district on 3rd Jan. 2017.

139. Floods are recurrent and have potential for disaster in the State. They occur every year during the normal monsoon season and cause temporary floods in valleys and plain land areas as well as urban flooding in Agartala and other towns. Due to the climate change risks in recent years, floods are occurring even during non-monsoon season. The last devastating floods occurred in the state was in 2018, wherein almost all districts were affected.

140. In case of cyclone vulnerability, wind speed in the state can go up to even 55m/s (198km/h) causing loss of lives and property. Tripura is vulnerable to landslides during monsoon season, particularly on heavy rainfall days. Tripura is also vulnerable to lightning, thunder strikes, and cloud burst occurrences, causing heavy loss of lives and property.

141. The core and buffer zones i.e. West Tripura district are also vulnerable to natural disasters on the same lines of the state. The hazard and vulnerability of the core and buffer zones along with probable months of occurrence is given in **Table 4-16 & 4-17**.

142. Among these, the core zone is least vulnerable to flood and cyclone due to its geographical location i.e. far away from known flood hazard and coastal areas (ref. **Figure 4-10**).

Table 4-16: Probability of Seasonal Hazards of West Tripura District (Buffer Zone)

Hazard	Probable Months											
	Jan	Feb	Mar	April	May	June	July	August	Sept	Oct	Nov	Dec
Flood												
Cyclone												
Drought												
Forest Fire												
Earthquake												

Source: Tripura District Disaster Management Plan

Table 4-17: Hazard and Vulnerability Status of West Tripura District (Buffer Zone)

Sub-division	Earthquake	Flood	Cyclone	Landslide	Fire	Dry Spell	Thunder
Sadar	Very high	Very high	High	High	Medium	Low	Low
Jirania	Very high	Very high	High	High	Medium	Low	Low
Mohanpur	Very high	Very high	High	High	Medium	Low	Low

Source: Tripura District Disaster Management Plan



Figure 4-10: Drainage and Flood Prone Map of West Tripura District (Buffer Zone)

(Source: - Water Resources Department, Govt. of Tripura)

4.3 Ecological Resources

4.3.1 Forest Area within Buffer Zone

143. The buffer zone, which entirely constitutes West Tripura District has a forest cover of 214.58 sq km, which is 25.37% of total district's forest area and 3.4% of state's forest area. The extent of the forest areas within the West Tripura District i.e. buffer zone is given in **Table 4-18** and mainly comprise tropical evergreen, semi-evergreen and moist deciduous type.

Table 4-18: Forest Cover of West Tripura District (Buffer Zone)

Forest Circle/ division	Geographical area	Forest area (in sq km)					
		RF	PRF	UGF	PF	Total	% Total
Sadar	196.85	1.587	0.000	0.000	0.000	1.587	0.0
Mohanpur	397.09	69.928	0.161	3.780	0.000	73.869	1.2
Jirania	239.74	86.016	0.369	52.741	0.000	139.126	2.2
District Total	833.68	157.531	0.530	56.521	0.000	214.582	3.4
State Total	10491.69	3588.183	587.633	2116.874	1.597	6294.287	100.0

* RF-Reserve Forest, PRF-Proposed Reserve Forest, UGF-Unclassified Govt. Forest, PF-Protected Forest

Source; <https://forest.tripura.gov.in/forest-of-tripura>

4.3.2 Forest Areas within Core Zone

144. The land within the Bodhjunnagar IE has been owned by DoIC/ TIDCL for more than two decades and all the proposed infrastructure development is limited to the existing boundary of the industrial estate, with no further land requirement or acquisition. The core zone extending up to 500-metre beyond the boundary of the industrial estate does not have forest areas of any type/ category. The map prepared by Tripura Forest Department, confirming the absence of forest areas surrounding the Bodhjunnagar IE is given in **Figure 4-11**.

4.3.3 Protected Areas within Buffer Zone

145. Tripura state has four wildlife sanctuaries and two national parks as given in **Table 4-19**. The buffer zone of the Bodhjunnagar IE i.e. West Tripura District does not have any protected areas.

146. The Sepahijala Wildlife Sanctuary (WLS) and its notified eco-sensitive zone is the nearest protected area, which is in the adjoining Sepahijala district, at a distance of 21.64 km from the Bodhjunnagar IE and shown in **Figure 4-12**. The eco-sensitive zone of Sepahijala WLS is limited to a mere 10m on the eastern side and maximum of 50m on the western side (ref. **Figure 4-13**) and thus, the Bodhjunnagar IE is 21.64 km from the eco-sensitive boundary of Sepahijala WLS.

Table 4-19: Protected Areas of Tripura State

Sl. No.	Name of Protected Area	Location/ District	Notification Date	Area in Km ²
1	Sepahijala WLS	Sepahijala District	02.02.1987	13.46
2	Trishna WLS	South Tripura District	19.11.1988	163.08
3	Gomati WLS	Dhalai District	01.12.1988	389.54
4	Rowa WLS	North Tripura District	07.05.2009	0.86
5	Clouded Leopard National Park and Sepahijala Zoological Park	Sepahijala WLS, Sepahijala District	24.01.2008	5.08
6	Bison National Park	Trishna WLS, South Tripura District	06.12.2007	31.63

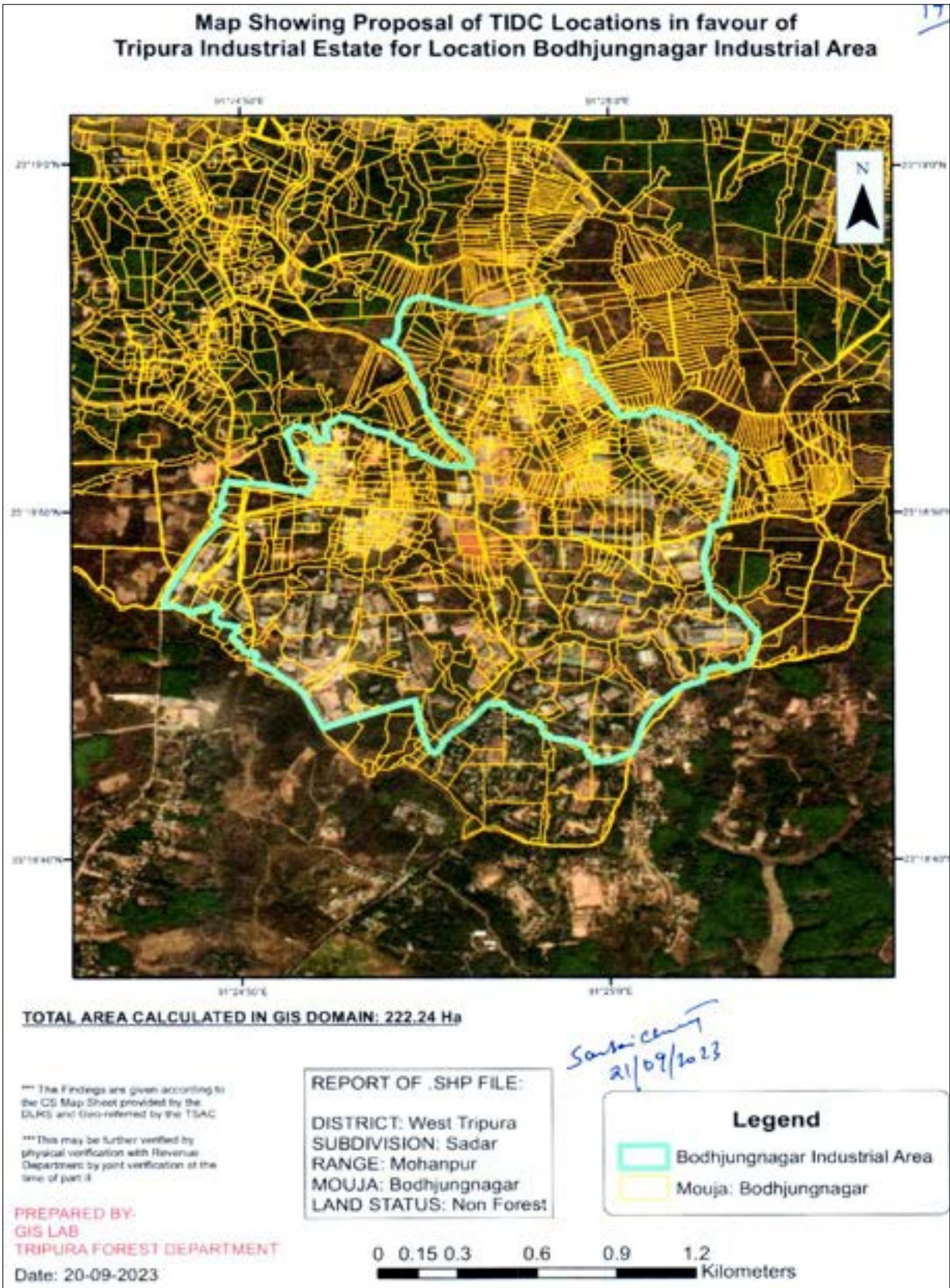


Figure 4-11: Map Confirming Non-Forest Areas within Core Zone

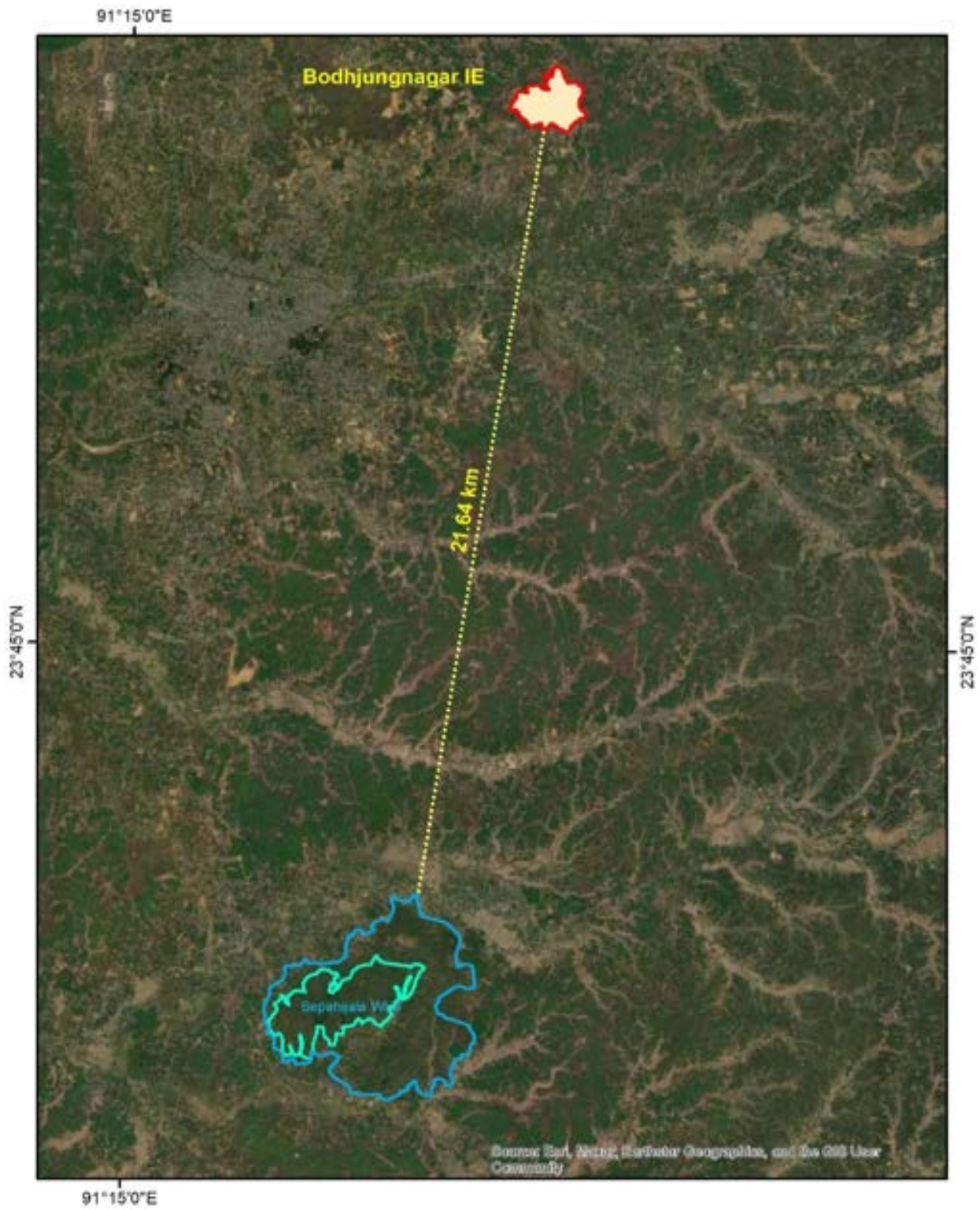


Figure 4-12: Distance of Protected Areas from Bodhjungnagar IE (Core Zone)

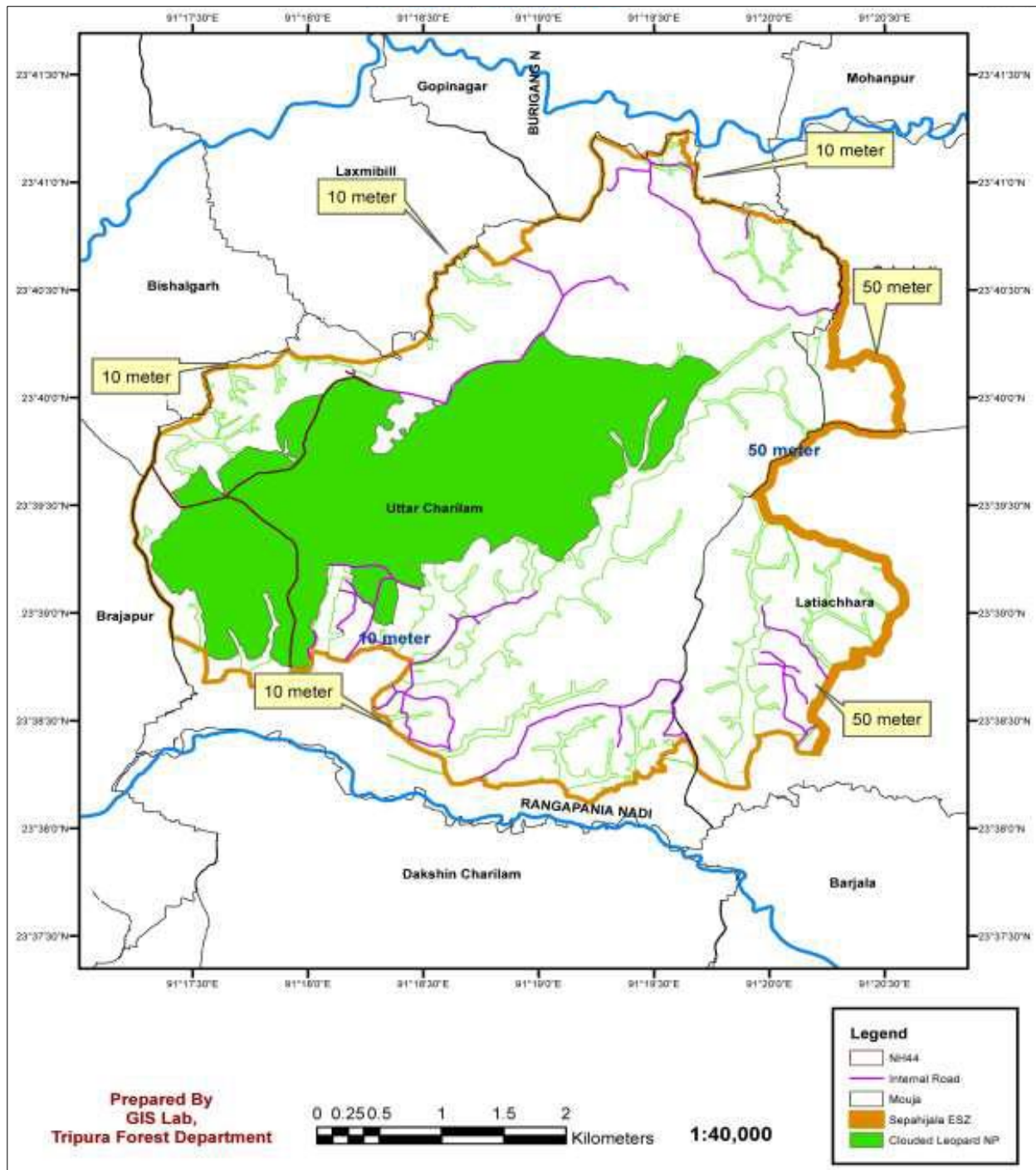


Figure 4-13: Eco-Sensitive Zone Boundary of Sepahijala WLS

4.3.4 Biodiversity

147. Tripura state is extremely rich in biodiversity¹¹, situated within the Indian sub-region of Oriental Zoo-geographic region and flora & fauna of the state bear a very close affinity and resemblance with floral and faunal components of Indo-Malayan and Indo-Chinese sub-regions.

¹¹ Source: <https://forest.tripura.gov.in/forest-of-tripura>

Flora of State

148. The flora of the state comprises 379 species of trees, 320 shrubs, 581 herbs, 165 climbers, 16 climbing shrubs, 35 ferns, 45 epiphytes and 4 parasites. Out of these, 7 are endemic, 18 are rare and 50 species are restricted to Tripura and neighboring States. *Angiopteris evecta*, a fern and *Gnetum montanum*, a giant climber belonging to Gymnosperm are two rare species but occur abundantly in Trishna WLS in South District. Similarly, tree ferns (*Cyathia* spp.), which are also primitive and endangered, are found in South Tripura.

149. The state has 24 species of orchids, out of which *Dendrobium* spp. has the highest species diversity whereas, Blue vanda (*Vanda caerulea*) and Red vanda (*Renunthera imschootiana*) are in the endangered category. The state also has 266 species of medicinal plants (68 trees, 39 shrubs, 71 herbs and 88 climbers) with maximum value of Shannon-Weiner index of 5.23.

Flora of Core and Buffer Zones-IBAT

150. As part of the IEE, a comprehensive biodiversity studies were carried out through an Integrated Biodiversity Assessment Tool (I-BAT), which is a software tool that provide access to a wide range of global, national, regional and state level biodiversity & conservation information. The I-BAT is designed to support decision-making process and to aid in assessing baseline biodiversity information during project planning and development. The I-BAT has considered 500-meter peripheral area surrounding the Bodhjungnagar IE as the core zone (IBAT) (ref. **Figure 4-14**) and up to 50 km radius as the buffer zone (IBAT). The objective of the study was to assess the major habitat types, critical species and evaluate threats and conservation opportunities.



Figure 4-14: Core Zone for Biodiversity Studies using I-BAT

151. The I-BAT has cataloged 84 flora and 195 fauna groups within 500m core zone including Bodhjungnagar IE, as compared to the 195 flora and 197 fauna groups in the buffer zone. This abridgement/ curtailment can be attributed to the hustle of industrial operations and consequent environmental stressors within the IE. The flora and fauna groups and richness within the core and buffer zones assessed through IBAT are given in **Tables 4-20 & 4-21**.

152. Contrastingly, the buffer zone i.e. beyond core zone up to 50 km, is characterized by forest patches with less intensive human activity, showcase more robust biodiversity with 195 identified species. The forested areas act as ecological buffers and corridors, facilitating gene flow and providing refuge for wildlife, thus enhancing species richness. Trees (79 species), shrubs (38 species), and herbs (64 species) in these forest patches contribute to ecological resilience, offering a spectrum of habitats and food sources. Abundant birds (119 species) and butterflies (36 species) have been observed, indicating a healthier ecosystem with minimal human interference. The complete ecological investigation (I-BAT) report is given in **Appendix-5**.

153. Out of the 35 known biodiversity hotspots¹² of the state, none are located within the buffer and/or core zone of the Bodhjunganar IE.

Table 4-20: Flora and Fauna Groups Found in Core and Buffer Zone of IBAT

Groups	Buffer Zone-IBAT	Core Zone-IBAT
Flora		
Tree	79	32
Shrub	38	17
Herb	64	28
Climber	9	5
Fern	5	2
Total	195	84
Fauna		
Aves	119	117
Insect-Butterfly	36	36
Insect-Odonata	5	5
Other-Insects	25	25
Mammal	2	2
Reptile	6	6
Amphibian	4	4
Total	197	195

Table 4-21: Species Richness in Core and Buffer Zones of I-BAT

Radius range	Flora richness	Fauna richness	Quadrates sampled	Location sampled	Location names
0km	53	80	10	1	Core zone within industrial estate
0-500m	66	147	8	1	Core zone up to 500m periphery of industrial estate
5km	81	149	16	4	Oxygen park, Fatikcherra, Baidhya Kobra, Khayerpur
10km	88	146	16	4	Ranjit nagar, Bamutia, Purba Noagaon, Jogendranagar
15km	43	132	12	3	Mohanpur, Kathiram bari, Prabhapur
20km	68	164	20	5	Jirania, Dakshin Champamura, Paschim takarjala, Tuichamankuri, ICnagar

4.3.5 Endemic & RET Species within Core Zone

154. The plant species identified during the biodiversity studies using I-BAT were assessed for their conservation status by cross checking with red data book of Indian plants (Nayar and

¹² Source: Rapid assessment of Herpetofaunal and invertebrate diversity in Tripura state, September - November 2014 by National Centre for Biological Sciences and the Rufford Foundation.

Sastry, 1987-1990) for their rare, endangered and threatened (RET) status. Two tree species, namely of Agar (*Aquilaria malaccensis*) & Jalpai (*Elaocarpus prunifolia*) identified during within the core zone i.e. Bodhjungnagar IE were found under RET category. The recorded plant species were also assessed for their endemism and none of the species was recorded as endemic to the core zone. The list of endangered and threatened with extinction flora within the state, listed by the Tripura Forest Department is given in **Table 4-22**.

Table 4-22: Endangered Flora within the State Listed by Tripura Forest Department

Sl. No.	Scientific Name	Local Name	Type
1	Duabanga grandiflora	Ramdala	Tree
2	Adina sessifolia	Haludehaki	Tree
3	Michelia montana	Champa sundi	Tree
4	Magnolia pterocarpa	Duli champa	Tree
5	Lochio spermum	Halde simul	Tree
6	Canarium Stricum	Dhup	Tree
7	Aquilaria malaccensis	Agar	Tree
8	Pterocarpus santalinus	Rakta chandan	Tree
9	Santalum album	Chandan	Tree
10	Rauvolfia serpentina	Sarpgandha	Herb
11	Dischidia raflosiana	Lantana kalasi	Climber
12	Drosera burmanni	Surja sisir	Herb
13	Elaocarpus prunifolia	Ban jalpai	Tree
14	Mangifera sylvatica	Laxmi aam	Tree
15	Entada phaseolides	Gila	Climber
16	Angiopteris evecata	Paku Gajah	Fern
17	Cyathea gigantea	-	Tree
18	Holmiathostachys zeylanica	Kamraj	Fern
19	Podocarpus aerlifolius	-	Tree
20	Xantolis assamica	-	Tree

Source: Tripura Forest Department

4.3.6 Tree Felling Requirement

155. The proposed development works will require felling of 286 trees, which includes 47 Agar trees (*Aquilaria malaccensis*) and 4 Jalpai trees (*Elaeocarpus serratu*) and rest of trees are commonly found in the region (ref. **Table 4-23**). The Agar and Jalpai trees are listed as endangered and threatened species by Tripura state forest department (ref. Table 4-22).

156. A joint verification survey with the Forest Department concerned has been completed for extraction (felling) of all the 286 trees (ref. **Appendix-6**) but yet to receive the permissions for felling of these trees from the State Forest Department. The cutting of trees would be initiated only after obtaining the requisite tree cutting permission from the forest department.

157. Among the trees to be felled, only Agar has medicinal value and extensively used as raw material in aromatic/ perfumery industry as well as for religious rituals in several states across India. Agar (*Aquilaria malaccensis*) is widely found in Tripura State and is listed in Appendix-II as potentially threatened species by the Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora as well as critically endangered in the IUCN Red List. Consultation with the Tripura Forest Department indicates that Agar is placed under the endangered species list (ref. Table 4-22) as a conservation measure and to prevent illegal trade and movement. Due to its medicinal and economical value, the Govt. of Tripura

has notified Agar Wood Policy 2021, to promote the development of Agar tree plantation within the Tripura State¹³.

Table 4-23: Trees to be felled for Improvement Works within Bodhjungnagar IE

Sl. No	Local Name	Scientific Name	Trees to be felled	Species sensitivity as per Tripura State Forest department
1	Aam	<i>Mangifera indica</i>	5	None
2	Acacia	<i>Trema orientalis (L) BL</i>	24	None
3	Agar	<i>Aquilaria malaccensis</i>	47	Endangered category
4	Amloki	<i>Phyllanthus emblica</i>	2	None
5	Arjun	<i>Saraca indica</i>	27	None
6	Ashok	<i>Saraca indica</i>	1	None
7	Bahera	<i>Terminalia bellirica</i>	2	None
8	Bakul	<i>Mimusops elengi</i>	13	None
9	Barai	<i>Syzygium cumini</i>	1	None
10	Bat	<i>Ficus religiosa</i>	1	None
11	Chalta	<i>Dillenia indica</i>	2	None
12	Champa	<i>Michelia champaca</i>	11	None
13	Garjan	<i>Dipterocarpus turbinatus</i>	1	None
14	Guava	<i>Psidium guajava</i>	3	Free from felling
15	Jalpai	<i>Elaeocarpus serratus</i>	4	Endangered category
16	Jam	<i>Syzygium cumini</i>	8	None
17	Jarul	<i>Lagerstroemia speciosa</i>	1	None
18	Kadam	<i>Neolamarckia cadamba</i>	1	None
19	Kathal	<i>Artocarpus heterophyllus</i>	19	None
20	Krishnachura	<i>Delonix regia</i>	5	None
21	Mehagoni	<i>Swietenia mahagoni</i>	15	None
22	Nageswar	<i>Mesua ferrea</i>	2	None
23	Neem	<i>Azadirachta indica</i>	21	None
24	Ordinary	-	21	None
25	Pungamia	<i>Pongamia pinnata</i>	27	None
26	Plum	<i>Arecaceae, or Palmae</i>	16	None
27	Radhachura	<i>Caesalpinia pulcherrima</i>	1	None
28	Rangi	<i>Mimusops elengi</i>	3	None
29	Teak	<i>Tectona grandis</i>	1	None
30	Tetul	<i>Tamarindus indica</i>	1	None
Total number of trees to be cut (a)			286	

4.3.7 Fauna

158. Tripura reportedly has 90 mammal species¹⁴ from 65 genera and 10 orders. Seven primate species have been documented in Tripura, out of 15 found across India. Of these primates, slow loris and stumped tailed macaques have become rare species. Phayre's langur (locally known as 'Chashma Banar'), has a very restricted distribution in India, and is found in Tripura. Hoolock gibbon is the only ape and found in India and is also found in Tripura, though, its population is on decline in Tripura. The rare and threatened fauna of Tripura is given in **Table 4-24**.

¹³ Source: <https://nce.gov.in/Tripura%20Agarwood%20Policy%202021%20Final.pdf>

¹⁴ Source: <https://forest.tripura.gov.in/forest-of-tripura>

159. The ecological investigations as well as consultations with the concerned forest department officials and local community within core zone has not indicated presence/sighting of any wildlife and/or any animal-human conflicts during the past 10 years.

Table 4-24: Rare and Threatened Fauna of Tripura

Sl. No.	Common Name	Scientific Name	Schedule-I WL(P) Act	Appendix-I CITES
1	Slow Loris	Nycticebus coucang	+	-
2	Phayre's Leaf Monkey	Presbytis phayrei	+	-
3	Capped Langur	Presbytis pileatus	+	+
4	Hoolock Gibbon	Hylobates hoolock	+	+
5	Leopard	Panthera pardus	+	+
6	Marbled Cat	Felis marmorata	+	+
7	Leopard Cat	Felis bengalensis	+	+
8	Golden Cat	Felis temmincki	+	+
9	Common Otter	Lutra lutra	-	+
10	Indian Elephant	Elephas maximus	+	+
11	Indian Bison	Bos gaurus	-	+
12	Chinese Pangolin	Manis pentadactyla	+	-

Source: Tripura Forest Department

4.3.8 Avian Fauna

160. Tripura has reported 342 birds (Ornithofauna), of which about 58 are migratory species and one bird i.e., darter is reported to be nearly a threatened species. The state has high diversity of prey birds, frugivorous birds, marsh birds and flower peckers. The aquatic ecosystem of the state reportedly has 14 species of fish, of which 2 are endangered (*Anguilla bengalensis* and *Psuedoatoptus alterinoides*) and 12 are in the vulnerable category. Some of the main reasons which are sighted decline in the marsh birds and fishes is due to silting of riverbeds and filling up of wetlands in various parts of the state.

161. Although, Tripura has important bird areas (IBAs) within Gumti WLS and Trishna WLS, but these are located at 33 kms and 51 kms respectively from the core zone of the Bodhjungnagar IE.

4.3.9 Reptilian Fauna

162. The reptilian fauna of Tripura comprises of 32 species under 28 genera and 11 families. These include 3 species of turtles and tortoise, 13 species of lizards, and 15 species of snakes. At least three species of reptiles are listed as endangered under Indian Wildlife (Protection) Act., 1972. (Sanyal, D.P. et.al. Reptilia, Fauna of Tripura, Vol.-1, Zoological Survey of India, In Press).

163. The faunal surveys carried out within the core zone of Bodhjungnagar IE did not sight any reptilian fauna. However, the presence of reptilian fauna within the core zone cannot be ruled out.

4.3.10 Aquatic Ecosystem of Core Zone

164. The core zone does not have any wetlands, although the state has 408 freshwater wetlands as given in **Table 4-25**. Of these, Rudrasagar Lake is the only RAMSAR site within the buffer zone i.e. West Tripura district, which is at about 40 km aerial distance from the Bodhjungnagar IE.

165. The core zone i.e. Bodhjungnagar IE and its 500m periphery does not have any surface water bodies or wetlands.

Table 4-25: Wetlands Areas of Tripura State

Sl. No.	Type of Wetland	No of wetlands	Area (Sq. Km.)
1	Lakes/ponds	74	25.04
2	Oxbow lakes	84	3.60
3	Waterlogged(seasonal)	222	15.43
4	Reservoirs	5	53.22
5	Tanks	19	1.36
6	Waterlogged	4	0.30
	Total	408	98.95

Source: Tripura Forest Department

4.4 Social and Cultural Resources

4.4.1 Demography

166. The buffer zone i.e. West Tripura district has its district headquarters at Agartala, which is also the capital of the State. The demographic features of the buffer zone i.e. West Tripura district is given in **Table 4-26**.

Table 4-26: Demographic Features of West Tripura District (Buffer Zone)

Sl. No.	Particulars	Remarks		
1	Area	983.63 sq.km		
2	Number of Sub-divisions	3		
3	Number of Rural development Blocks	9		
4	Municipal Corporation	1		
5	Municipal Council & Nagar Panchayat	2 Nos Municipal Council and 1 Nagar Panchayat		
6	Gram Panchayat & ADC Villages	172 Nos		
7	Population (As per census 2011)	Male	Female	Total
		879,428	846,311	1,725,739
8	Density of Population	933 per sq.km		
9	Literacy rate (%)	88.69 overall	92.50 (Male)	84.75 (Female)
10	Sex ratio	962		
11	Colleges/Universities	13 Nos.		
12	Police Stations	16 Nos. (including 2 women PS)		
13	Fire Stations	10 Nos.		
14	Sub- Centre	176 nos.		
	Primary Health Centre	14 nos.		
	State Hospital	02 nos.		
	Army Hospital	01 nos.		
	Assam Rifles Hospital	01 nos.		
	BSF Hospital	01 nos.		
	CRPF Hospital	01 nos.		
15	Rail Stations	3 Nos.		

4.4.2 Agriculture and Land Use

167. The rural part of West Tripura District (buffer zone) is mainly dependent on agriculture and allied activities with paddy cultivation has the main agricultural activity. The district is ideal for diverse patterns of cultivation, for the cultivation of cereals, pulses and other food crops, of plantation crops, and of a rich range of agricultural and horticultural crops. The district has 19 tea estates which makes it the largest producer of tea in the state of Tripura.

4.4.3 Culture and Tourism

168. Likewise, the state, West Tripura (buffer zone) has several diverse ethno-linguistic groups, which has given rise to a composite culture. The dominant cultures are Bengali, Manipuri, Tripuris, Jamatia, Reang, Naitong, Koloj, Murasing, Chakma, Halam, Garo, Hajong, Kuki, Mizo, Mogh, Munda, Oraon, Santhal, and Uchoi.

169. The main tourist attractions of the district are Ujjayanta Palace State Museum, Tribal Museum, Sukanta Academy, M.B.B. College, Laxminarayan Temple, Uma Maheswar Temple, Jagannath Temple, Benuban Vihar, Gedu Mian Mosque, Malancha Niwas, Rabindra Kanan, Heritage Park, Purbasha, Handicrafts Designing Centre, Fourteen Goddess Temple, Portuguese Church etc.

4.4.4 Commerce, Industry and Agriculture

170. Agriculture forms a primary sector of the economy of Tripura. More than 75% of the district's economic total workforce is dependent on agriculture for their subsistence. In fact, about 24.3 % of the state's net area is reserved for agricultural purposes of which, about 2.5 lakh hectares fall under the net cultivated area. Paddy is the principal crop that is reaped in Tripura. Besides paddy, jute, sugarcane, wheat, oil seeds, coconut and turmeric are also grown in plenitude in the northeast Indian state. The state takes elaborate measures to spruce up the agricultural infrastructure. New technologies, fertilizers, improved seeds and protective chemicals have been implemented to keep the state's agriculture in top shape.

171. The major flagship Industrial area is the Industrial Growth Centre complex at Bodhjungnagar and R.K. Nagar at Khayerpur in West Tripura District. The industrial estates have food Park, Rubber Park, Export Promotion Industrial Park, Bamboo Park, apart from Tool Room and Training center.

4.4.5 Health and Educational Facilities

172. The health care infrastructure is divided into three tiers – the primary health care network, a secondary care system comprising district and sub-divisional hospitals and tertiary hospitals providing specialty and super specialty care. As of 2013–14, there are 84 Primary Health Centers, 18 Community Health Centers, 13 Sub Divisional Hospitals, 3 District Hospitals and 6 State Hospitals.

173. The West Tripura District has 13 educational institutes viz. B.B. Evening College, Agartala, Government College of Education, Agartala, Tripura Government Law College, Agartala and other institutes.

4.4.6 Archaeological and Historical Monuments

174. Tripura has eight archeological and/or historical monuments protected under the Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010 and amendments thereof. However, there are no protected archaeological or historical monuments within 300m radius (in all directions) of the core zone of Bodhjungnagar IE.

175. The present regulations of Government of India prohibit any construction activity within 100 meters and regulate construction activity within 200m, beyond the first 100 meters of prohibited area of any protected monument under the Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010 and amendments thereof.

4.4.7 Physical Cultural Resources

176. The core zone of Bodhjunnagar IE including its surrounding 500m peripheral area has no movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance.

5.0 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

5.1 Magnitude and Significance of Impacts

177. Based on the assessment of baseline environment of both core and buffer zones *vis-à-vis* the proposed infrastructure development works within Bodhjunnagar industrial estate, the IEE has not identified any significant and irreversible environmental impacts.

178. The IEE has considered the environmental features within 15 meters on either side as corridor of direct impact (COI) for all linear components (roads, stormwater drainage, HT/LT cable etc.) and a 500m radius for all area-based components (building and common facilities) within Bodhjunnagar IE. The environmental sensitivity of all proposed components is documented and provided in **Appendix-7** and the anticipated impacts are summarized in **Table 5-1**. The environmental impacts and the respective risk level are given in **Table 5-2**.

179. The impacts due to the proposed infrastructure development works/ components are short-term, confined to the corridor of direct impact and limited to the construction stage. The impacts are not anticipated to be long term on environmental attributes such as geology, hydrogeology, soil, flora, fauna etc. of the industrial estate and its surrounding core & buffer zones.

Table 5-1: Anticipated Impacts due to Proposed Infrastructure Development Works

Sl. No.	Development Components	Corridor of Direct Impact	Anticipated Impacts
1	Additional industrial plots: 42 plots, spread over 20.83 ha	Respective plot and its 500 m peripheral area	<ul style="list-style-type: none"> Demarcating plot boundary may have minimal impacts limited due to clearance of shrubs/ vegetation. No tree felling anticipated
2	All peripheral roads are proposed as rigid pavement having carriageway 7.0 m, 5.5 m, 5m, 3.75 m with RoW 16 m, 15 m, 14.0 m, 12.0 m and 9.0m. All roads are proposed as bi-camber except 3.75 m with RoW 9.0 m which is uni-camber. Proposed development of existing and new road 16.260 km.	15 meters on either side of the existing road alignment	Likely impacts are: <ul style="list-style-type: none"> Site clearance (shrubs/ vegetation), Felling of 178 trees for linear components & 108 trees for aerial components. Increase in air pollution (mainly dust) & noise levels due to excavation and road construction works. Inconvenience to existing road users due to traffic diversions. Workers/ community safety On site drainage, disposal of construction debris. As per preliminary site visit, utility shifting is required (Electric Pole, OFC Cable etc.). 20 nos of culverts existed within the proposed project boundary. One existing fire station which located at ~50-200m from proposed site.
3	Construction of Roadside drains on both sides of road except 9 m RoW where Single side drain provided; Total length of proposed SWD is about 31.03 km length and the minimum clear width of the drain is 0.3m; Total no of proposed Culverts is 49 and 4 minor bridge)		
4	Construction of 32.540 km long utility corridor along the roads for HT/ LT/ SCADA cables/ OFC, pipelines of water, effluent, natural gas pipeline . Green belt over the pond pathways for 12,845.77 sqm 500 KW solar power panels at 9 locations within IE		

Sl. No.	Development Components	Corridor of Direct Impact	Anticipated Impacts
5	10 nos raw water sums, 7 new tube wells, 4.6 MLD water treatment plant, 3 overhead tanks, 1 underground reservoir with pumping facilities, laying of pipelines: 16.089 km.	Respective site and its 500m & 15m radius of Both aerial and linear components.	<ul style="list-style-type: none"> • Site clearance (shrubs/ vegetation), • Increase in air pollution (mainly dust) & noise levels due to excavation and construction works • Workers/ community safety • On site drainage, disposal of construction debris • One natural drainage channel is located at ~150 m from the proposed site.
6	Refurbishment of 500 KLD CETP and associated components	Respective site and its 500-meter peripheral area	<ul style="list-style-type: none"> • Site clearance (shrubs/ vegetation), • Workers/ community safety • On site drainage, disposal of construction debris.
6	Infrastructure and buildings for common facilities spread over approx. 30,000 sqm plot area and 16,000 sqm of built up area-comprising: common facilitation center (administrative office, creche facility, dispensary, canteen), misc. utility centers, other common facilities (food kiosk, fire station, industrial shed, truck parking, weigh bridge, bus stop, recreational area, public toilet), 3 nos of gates, 0.5 km of retaining boundary wall, safety & security systems	Respective site and its 500m peripheral area	<ul style="list-style-type: none"> • Site clearance (shrubs/ vegetation), • Increase in air pollution (mainly dust) & noise levels due to excavation and road construction works. • Inconvenience to existing road users due to traffic diversions. • Workers/ community safety • One water body (Pond) located at ~ 50m from proposed infrastructure. • On site drainage, disposal of construction debris

Table 5-2: Environmental Impacts and Risk Level for Bodhjunnagar IE

Sl. No.	Environmental Attributes	Risk-Construction Phase		Risk-Operation Phase	
		Linear Components	Area Components	Linear Components	Area Components
1	Geology	Low	Low	Low	Low
2	Hydrogeology	Low to moderate	Low to moderate	Low	Low to moderate
3	Physiography	Low	Low	Low	Low
4	Topography	Low	Low	Low	Low
5	Drainage	Low	Low	Low	Low
6	Land Use	Low	Moderate	Low	Low
7	Surface Water Use	Low	Low	Low	Low
8	Ground Water Use	Moderate	Moderate	Low	Moderate
9	Agriculture & Soils	Low	Low	Low	Low
10	Climate & Rainfall	Low	Low	Low	Low
11	Dust & Visibility	Low to moderate	Low to moderate	Low	Low
12	Ambient Air Quality	Low to moderate	Low to moderate	Low	Moderate
13	Ambient Noise	Low to moderate	Low to moderate	Low	Low
14	Trees & Vegetation Clearance	Moderate	Moderate	Low	Low
15	Flora & Fauna	Low	Low	Low	Low
16	Flood Hazard	Low	Low	Low	Low
17	Earthquake	Very High	Very High	Very High	Very High
18	Wind Speed/ Cyclone	Low	Low	Low	Low
19	Thunderstorms	Low	Low	Low	Low
20	Landslide & Fire	Low	Low	Low	Low

Sl. No.	Environmental Attributes	Risk-Construction Phase		Risk-Operation Phase	
		Linear Components	Area Components	Linear Components	Area Components
21	Campsite/ Workforce Camps	Low to moderate	Low to moderate	Low	Low
22	Occupational Health & Safety	Low to moderate	Low to moderate	Low	Low
23	Community Health	Low	Low	Low	Low
<i>Keynote: Impact of low or non-existent significance (rated as High, Moderate, Low to Moderate and Low)</i>					

180. The construction stage impacts like vegetation clearance, dust and noise levels, air pollution due to vehicular emissions, worker's health & safety, construction site management, construction material management including debris disposal on and off-site sanitation management works are largely reversible, transitory in nature and confined to the existing IE boundary.

181. All such short-term impacts have been assessed and described in the following sections along with suitable mitigation measures. The construction stage impacts can be mitigated through generic measures, most of which are similar to Good International Industry Practices (GIIPs) and considered incidental to works.

182. The impacts arising due to laying of various utilities like water and effluent pipelines, electric cables (11/33 KV), natural gas pipelines and OFC cables are avoided through the provision of a utility corridor. Moreover, specialized works like laying of electrical cables, OFC and natural gas pipelines are governed by the respective regulations and code of practices which stipulates all technical and safety requirements during erection, testing and commissioning stages.

5.2 Geology

Impacts-Construction Phase

183. The construction works for the infrastructure development will not have any impact on geology, since the core and buffer zones do not have any reserves of rock/stone aggregates (ref. Section 4.2.1). Thus, no new project specific quarries/ crushers or sand mining are to be established for the development works. The existing quarries/crushers and sand mining operations at respective source locations are deemed to have all statutory/ regulatory compliances of state pollution control board(s) and regulated for prevention of air, noise and water pollution under the EPA Act (ref. Table 2-1). The estimated quantities of construction materials and lead distance are given in **Table 5-3**.

Table 5-3: Estimated Construction Materials and Lead Distances

Sl. No.	Material	Unit	Quantity	Location	Lead distance (km)
1	Sand	Cum	69380.91	Mohanpur	18
2	Bitumen	KG	-	Dharmanagar	150
3	Stone Aggregates	Cum	126208.91	Churaibari	170
4	Cement	MT	42529.84	Agartala	14
5	Steel	MT	5699.97	Agartala	14
6	Bricks	Nos	829146	Jirania	14
7	DI/CI Pipe	meter	2517	Agartala	14
8	HDPE pipe	meter	19694.80	Agartala	14

184. The construction works within the Bodhjungle IE will not warrant any deep excavation and maximum depth of excavation will not ordinarily exceed 3 meters from existing road/natural ground level (ref. Section 3 for proposed development components). All such

excavated areas will be back filled and restored to their previous levels after construction works.

185. Therefore, the construction works for the proposed infrastructure development within Bodhjungnagar IE are not anticipated to cause any long- or short-term impacts on geology of the area.

Mitigation Measures

- Project design has been considered to minimize the construction footprint as well as resource efficiency in all the proposed works, to conserve finite natural resources, which is under stress due to ever increasing demand.
- No specific mitigation measures are warranted to minimize the impacts on geology of the area. However, measures required for limiting the impacts during construction activities are described under the environmental management plan (EMP) (ref. Table 9-1 to 9-4).
- The EMP also specifies the responsibility for planning and execution of such measures along with mechanism for supervision & monitoring throughout the construction and operation stages.

Impacts-Operation Phase

186. During the operation stage, the construction materials would not be required under the project, hence, the proposed infrastructure development works will not involve any impact on construction materials.

Mitigation Measures

- Operation phase does not warrant any mitigation measures to minimize impacts on geology of the core and buffer zones.

5.3 Hydrogeology

Impacts-Construction Phase

187. The proposed infrastructure development works at Bodhjungnagar IE will require water for various construction activities including dust suppression measures during different stages of project implementation. In addition, water will also be required for providing sanitation facilities at the construction campsite and workforce camps. The daily construction water demand for development works is estimated at 70.07 KL, which is intended to be met through existing tube well (ref. **Table 5-4**). The core and buffer zones do not have any surface water bodies/ sources (ref. Section 4.2.4).

188. At present, there are five existing tube wells, and seven more tube wells are proposed to be constructed to meet future water demand of the IE. Thus, both existing and proposed tube wells, each with an average yield of 125 cum/hr. will be adequate to meet the construction water demand. As per the assessment carried out by the CGWB, Bodhjungnagar IE has adequate ground water resources (ref. Section 4.2.2 for available ground water resources).

Table 5-4: Construction Water Requirement for works at Bodhjungnagar IE

Sl. No	Activity	Water Requirement (KL)
1	Consolidation of Earth and Compaction	29,537.66
2	Mixing and Curing of Concrete	484.287
3	Dust suppression and Camp site management	147.166
4	Sanitation & Drinking water at workforce camps	294.332

Sl. No	Activity	Water Requirement (KL)
	Water Requirement in Kilo Liters (KL)	30,463.45
	Add 15% for wastage and contingency	4,569.5
	Total Water Requirement (KL)	35,032.97
	Avg. Daily Water Requirement for 500 workdays in Kilo Liters per Day (KLD)	70.07

Mitigation Measures

189. The following measures are considered to offset the impacts due to groundwater utilization at Bodhjungnagar IE:

- Construction of rainwater percolation wells for recharging groundwater have been considered at 23 locations, selected based on in-situ percolation rate within the core zone i.e. Bodhjungnagar IE. The percolation wells will be constructed as per the guidelines Central Ground Water Authority (CGWA) and/or Central Public Works Department, Govt. of India.
- 20.22 ha within Bodhjungnagar IE is being developed as green belt area i.e. parks and open areas, which is also expected to replenish groundwater, which works out to 38.8% of total 52.14 ha, considered for the present development (ref. Section 4.2.9 for rainfall data in West Tripura district).
- Construction of storm water holding/ retention ponds at 5 locations within IE, with a cumulative holding capacity 73.25 million liters by impounding the existing valley/ local depression(s), with an outlet weir for discharge of excess/overflow (ref. Section 4.2.9 for rainfall data in West Tripura district). The stormwater holding ponds will serve as a supplementary water source, which can serve up to 8-10 days of water requirement for the industrial estate, after requisite treatment and will reduce the withdrawal of groundwater for industrial use (ref. **Figure 5-1**).
- As part of the corrective action plan for the existing CETP within Bodhjungnagar IE (ref. Section 3.12), refurbishing the existing 500 KLD CETP to make it fully functional will enable us to re-use the treated water for industrial purposes. Accordingly, the treated effluent from the CETP will be collected in two existing ponds with an estimated cumulative capacity of 10 million liters, which can serve up to 25 days of water requirement of existing rubber industries, which is major consumer of water (ref. **Figures 5-2 and 5-3**).
- Reuse of the treated effluent will also reduce the withdrawal of groundwater for industrial use as well as the dependence on groundwater in the coming years and will help to achieve the project objective in a sustainable way.
- Development of 12,845.77 sqm of green belt by reusing excavated earth to increase the green belt area.
- DoIC/ TIDCL will encourage all industrial units (upcoming) within the Bodhjungnagar IE, to install roof water harvesting and groundwater recharging structures within individual industrial plots, to promote replenishment of groundwater resources.

Impacts-Operation Phase

190. The projected water demand for the operation phase will be met through the existing and newly proposed tube wells and supplemented by stored water from stormwater holding/ retention ponds along with reuse of treated water from the CETP, stored in collecting ponds. All of these will be adequate to meet operation phase demand as well, given the prevailing groundwater resources of the core and buffer zones (ref. Section 4.2.2).

191. Thus, the operation phase of the Bodhjunnagar IE is not likely to cause any long- or short-term impacts on hydrogeology/ groundwater resources of the region.

Mitigation Measures

192. The following measures are required to further offset the residual impacts during the operation phase:

- Routine maintenance and cleaning of all the rainwater percolation wells for recharging groundwater during pre and post monsoon seasons and ensure its effective functional status.
- Routine maintenance and cleaning of storm water holding/ retention ponds as well as treated effluent collecting ponds during pre and post monsoon seasons and ensure regular reuse of stored water to offset the withdrawal of groundwater for industrial use.
- Routine maintenance and upkeeping of the green belt area i.e. parks and open areas, which is also expected to replenish groundwater.
- DoIC/ TIDCL shall continue to encourage and promote all industrial units (both existing and upcoming) within the Bodhjunnagar IE, to install roof water harvesting and groundwater recharging structures within their respective individual industrial plots for replenishment of groundwater resources.



Figure 5-1: Stormwater Holding Retention Ponds



Figure 5-2: Location of Treated Effluent Holding Retention Ponds for Reuse

5.4 Physiography and Elevation

Impacts-Construction Phase

193. The proposed infrastructure development works at Bodhjunnagar IE do not involve any major construction or deep excavation works, which alters the existing physiography and elevation profile of the area. The proposed works like development of additional industrial plots, widening of roads, stormwater drains etc. follow the existing physiography and terrain (ref. 4.2.3 and 4.2.5 under Section 4).

194. Therefore, no significant or long-term impacts are foreseen on the alteration of physiography and terrain due to proposed works. On the contrary, the proposed works will augment industrial growth and consequently socio-economic benefits to the state.

Mitigation Measures

195. No specific mitigation measures are required for managing the impacts on physiography. However, several GIIPs (good international industry practices) for mitigating incidental impacts arising due to construction activities like establishment of camp sites/ work force camps, removal of topsoil, contamination of ground water/ soil due to leakage/ spillage during handling of fuels/ lubes are included in the environmental management plan (EMP).

Impacts-Operation Phase

196. The establishment of new industries will be limited to the allocated plots within the Bodhjungnagar IE, which is not likely to alter the physiography and elevation profile/ topography within the core zone.

197. Thus, the operation phase of the Bodhjungnagar IE is not likely to cause any long- or short-term impacts (cumulative/ residual) on physiography and elevation profile/ topography of the core zone.

Mitigation Measures

198. No specific mitigation measures are required for managing the impacts on physiography and elevation profile/ topography during operation phase.

5.5 Hydrology and Drainage

Impacts-Construction Phase

199. The project design considers 31.03 km long stormwater drains along with 49 culverts and 4 minor bridges, covering the entire IE. The stormwater outfalls will connect to the nearest natural drainage channels within the core zone. In addition, the project design has validated the discharge capacity of the stormwater drains considering the maximum/ peak daily intensity of rainfall reported in the last 50 years (or as available) and accounting for additional discharge capacity due to the excess rainfall/ change in the weather pattern induced by climate change¹⁵.

200. Thus, the construction works will not impact the natural drainage system within the core zone i.e. Bodhjungnagar IE and its peripheral area.

201. Since, core zone i.e. Bodhjungnagar IE and surrounding areas do not have any natural surface water bodies (ref. Section 4.2.4), there will be no impact on surface water resources of core and buffer zones as a consequence of this project construction.

Mitigation Measures

202. The development works within IE include construction of storm water holding ponds at 5 locations within IE, with a cumulative holding capacity 73.25 million liters by impounding the existing valley/ local depression(s), with an outlet weir for discharge of excess/overflow (ref. Section 4.2.9 for rainfall data). The stormwater holding ponds will serve as a supplementary water source, which can serve up to 8-10 days of water requirement for the industrial estate, after requisite treatment and will reduce the withdrawal of groundwater for industrial use (ref. Figure 5-1).

203. As part of the corrective action plan for the existing CETP within Bodhjungnagar IE (ref. Section 3.12), refurbishing the existing 500 KLD CETP to make it fully functional will enable us to re-use the treated water for industrial purposes. Accordingly, the treated effluent from the CETP will be collected in two existing ponds with an estimated cumulative capacity of 10 million liters, which can serve up to 25 days of water requirement of existing rubber industries, which is major consumer of water (ref. Section 5.3).

¹⁵ Climate Risk and Adaptation Assessment (CRA) and Climate Resilience Framework Report, prepared as part of the detailed project report.

204. Reuse of the treated effluent will also reduce the withdrawal of groundwater for industrial use as well as the dependence on groundwater in the coming years and will help to achieve the project objective in a sustainable way.

205. In addition, specific mitigation measures, which are required to minimize the impacts on hydrology and drainage area during construction stage are described in the EMP (ref. Table 9-1 to 9-4).

Impacts-Operation Phase

206. No specific mitigation measures are required for managing the impacts on hydrology and drainage, except for the routine maintenance and cleaning of all the stormwater drains as well as outfalls connecting to the natural drainage channels within core zone during pre and post monsoon seasons.

207. Thus, the operation phase of the Bodhjunnagar IE is not likely to cause any long- or short-term impacts on hydrology and drainage of the core and buffer zones.

Mitigation Measures

208. The measures which are required to further offset the residual impacts, if any on hydrology and drainage during the operation phase, are already described under Section 5.3 and the same shall apply.

5.6 Geomorphology and Soils

Impacts-Construction Phase

209. The project design has evaluated alternatives and considered measures to limit the excavation quantities as well as to reuse of excavated materials in the construction works, particularly leveling and re-grading of the industrial plots, to minimize or avoid disposal of excess excavated earth. The estimated excavation and reuse of excavated earth for the development works is given in **Table 5-5**.

210. Therefore, the construction phase will not have any significant or long-term impacts on the geomorphology and soils of the core zone.

Table 5-5: Estimated Earth Work Excavation and Reuse Quantities

Sl. No	Item	Unit	Quantity in cum
A	Quantity from excavation		
1	Earth Work Excavation for roads, utility corridors, Stormwater drains, culverts and all other utility buildings, etc.	Cum	205,052.43
	Total A		205,052.43
B	Reuse of excavated materials		
1	Back filling of earth works in utility corridor, Stormwater drains, all utility buildings, etc.	Cum	291,250.95
2	Required filling earth work for storm water drain, road & building work and Re-grading the industrial plots	Cum	-86,198.52
	Total B		205,052.43

Mitigation Measures

211. Specific mitigation measures required for segregated collection and preservation of topsoil (up to 30cm depth), prior to site clearance of any construction activities are described in the EMP (ref. Table 9-1 to 9-4).

212. The reuse of the excavated earth for landscaping and green belt development will however require correction of pH by addition of calcium oxide or calcium carbonate, which in turn increases the availability of nitrogen, phosphorus, calcium and magnesium in acidic soils and thus enables growth of vegetation (ref. Section 4.2.6). The EMP (ref. Table 9-1 to 9-4) specifies reuse of preserved topsoil for land escaping and green belt development, within the IE.

Impacts-Operation Phase

213. The operation phase of the proposed infrastructure development works will not involve any deep excavation and related activities, which has potential to generate excavated earth and/or construction debris. Thus, operation phase is not anticipated to cause any long- or short-term impacts (cumulative/ residual) on geomorphology and soils.

Mitigation Measures

214. No specific mitigation measures are required for managing the impacts on geomorphology and soils during operation phase.

5.7 Land use

Impacts-Construction Phase

215. The proposed works within Bodhjunnagar IE are limited to 52.14 ha. i.e. merely 25.1% of 207.64 ha of total area. The works comprise plot development and other allied infrastructure to meet the future demand as given in **Table 5-6** (ref. Table 3-4 for more details).

216. All the proposed development works are within the existing industrial estate and no fresh land is being acquired or diverted for industrial use. Thus, the impacts are short term and will be limited to the boundary of the industrial estate.

Table 5-6: Land Use of Proposed Development at Bodhjunnagar IE

Sl. No.	Land Use	Proposed Area (in ha)	In % Percentage
1	Industrial Area Plotted development, Industrial Sheds and Flatted industries	20.83	39.9%
2	Transportation Roads, Junction, parking etc.	5.27	10.1%
3	Residential Workers Housing	1.98	3.8%
4	Facilities <u>Public and Semi-Public:</u> Fire station, health care centre, educational institutes, warehouse, and administration etc. <u>Utilities:</u> Electric sub-Station, CETPs, Pumping Stations, Underground Reservoirs / Fire Fighting Tanks and other utilities, etc.	3.84	7.4%
5	Open Space Parks, green area & open areas around it, steep slopes	20.22	38.8%
	Total	52.14	

Mitigation Measures

217. The following measures are considered to further minimize the impacts due to change in land use.

- 20.22 ha (38.8% of 52,14 ha) within Bodhjunnagar IE is being allocated for development of parks and open areas, in order to offset the impacts due to change in the land use viz. industrial plot and infrastructure development.
- Topsoil from site clearance activity shall be preserved and reused in green belt and landscaped area development. The reuse of the topsoil/ excavated earth will require correction of pH and soil nutrients (N, P & K) to enable vegetation growth (ref. Section 4.2.6).
- Further, contractor's campsites, material stack yards, hot mix plant, concrete batch plant and workforce camps are to be established in vacant industrial plots within Bodhjunnagar IE. No fresh land outside the IE shall be considered for any of these establishments.
- Measures to minimize the impacts due to construction activities like vegetation clearance, dust and noise levels, air pollution due to vehicular emissions, worker's safety, construction site management, construction material management including debris disposal, on and off-site sanitation management are described in the EMP (ref. Table 9-1 to 9-4).
- The EMP also specifies the responsibility for planning and execution of such measures along with mechanism for supervision & monitoring throughout the construction stage.

Impacts-Operation Phase

218. The operation phase of the Bodhjunnagar IE will not involve any changes in the land use and all developable vacant land has been considered/ utilized in the presently proposed works (ref. Table 3-4).

219. Thus, the operation phase is not anticipated to cause any long- or short-term impacts on land use.

Mitigation Measures

220. Upon demobilization of the contractor, all the campsites, material stack yards, hot mix plant, concrete batch plant and workforce camps etc. are to be restored to their previous stage. All the construction remanent materials/ debris shall be cleared and disposed of at approved disposal sites.

221. Other than this, no specific mitigation measures are required for managing the impacts on land use during operation phase.

5.8 Agriculture

Impacts-Construction Phase

222. The development works within Bodhjunnagar IE will not have any direct impact on the present agriculture or cropping pattern either in core or buffer zones.

Mitigation Measures

223. No specific mitigation measures are required to minimize the impacts on agriculture.

224. In the unlikely event of supplying excess excavated earth from private agriculture lands, care shall be taken to inform the beneficiaries about the requirement for pH correction and addition of soil nutrients to improve the crop yield (ref. Section 4.2.6).

Impacts-Operation Phase

225. The operation phase will also not have any direct impact (short or long term) on the agriculture or cropping pattern either in core or buffer zones.

226. On the contrary, development works may attract more agriculture-based industries to Bodhjungnagar IE, which in turn can promote certain agriculture/ cropping patterns in the region (ref. Section 4.2.8).

Mitigation Measures

227. No specific mitigation measures are required to minimize the impacts on agriculture/ cropping pattern.

5.9 Forest and Protected Areas

Impacts-Construction Phase

228. The construction works at Bodhjungnagar IE does not warrant/ involve diversion of forest land. Further, no forest areas are within the core zone i.e. 500m peripheral area of the IE. Therefore, no impacts are foreseen on the forest areas (ref. Section 4.3.1 & 4.3.2).

229. Similarly, the construction works at Bodhjungnagar IE will not have any impacts (short or long term) on the protected areas (wildlife sanctuaries and national parks). The nearest wildlife sanctuary and or its notified eco-sensitive zone is 21.64 km from the IE (ref. Section 4.3.3).

Mitigation Measures

230. Since there is no impact on forest and protected areas, no specific mitigation measures are warranted.

Impacts-Operation Phase

231. The operation phase also will not have any direct impact on the forest and protected areas in the core or buffer zones.

Mitigation Measures

232. Since there is no impact on forest and protected areas, no specific mitigation measures are warranted during the operation phase.

5.10 Flora

Impacts-Construction Phase

233. The site clearance activity for infrastructure development components (linear and area based) will involve clearance for vegetation clearance as well as felling of 286 trees, which includes 47 Agar trees (*Aquilaria malaccensis*) and 4 Jalpai trees (*Elaeocarpus serratu*) and rest of trees are commonly found in the region (ref. Table 4-23).

234. Among the trees to be felled, Agar has medicinal value and extensively used as raw material in aromatic/ perfumery industry as well as for religious rituals in several states across India. Agar (*Aquilaria malaccensis*) is widely found in Tripura State and is listed in Appendix-II as potentially threatened species by the Convention on International Trade in Endangered Species (CITES) of Wild Fauna and Flora as well as critically endangered in the IUCN Red List. Similarly, Jalpai also has timber value and is used for various purposes. Consultation with the Tripura Forest Department indicates that Agar and Jalpai are placed under the endangered species list (ref. Table 4-22) as a conservation measure and to prevent illegal trade and

movement. Due to its medicinal and economical value, the Govt. of Tripura has notified Agar Wood Policy 2021, to promote the development of Agar tree plantation within the Tripura State (ref. Section 4.3.4 to 4.3.6).

Mitigation Measures

235. The following measures are considered to minimize or reclaim the impacts on flora due to construction works.

- The loss due to tree felling for construction works within the IE will be recovered through compensatory tree plantation (1:5). The Tripura Forest Department has laid down procedures for issuing tree felling permissions.
- A joint verification survey with the Forest Department concerned has been completed for extraction (felling) of all 286 trees (ref. Appendix-6) but yet to receive the permissions for felling of these trees from the State Forest Department. The cutting of trees would be initiated only after obtaining the requisite tree cutting permission from the forest department.
- The selection of species for compensatory plantation will be done in consultation with the Tripura Forest Department and locally prevalent species including those which have been felled will be given preference and/ or duly considered.
- In order to compensate the trees felled for the construction works, about 1430 saplings (5 saplings for every tree felled) will be planted along the roads, and other open areas within the IE.
- The planted saplings will be provided with bamboo guards and will be maintained for 3 years and ensure a minimum survivability of 70%. The EMP includes specific budgetary provision for the compensatory plantation.
- Compensatory plantation including maintenance up to 3 years with 70% survivability will enable to offset the net loss and ensure net gain from 3rd year onwards.
- In addition, specific mitigation measures required to minimize the impacts on flora of the area during construction activities as well as to ensure survivability of the saplings are described under EMP (ref. Table 9-1 to 9-4).

Impacts-Operation Phase

236. The operation phase also will not have any direct impact on the flora of the core or buffer zones. On the contrary, the development of the green belt area and mitigation measures like compensatory tree plantation (1:5) are likely to offset the short term impacts due to construction activities like site/ vegetation clearance and tree felling, among others.

Mitigation Measures

237. The following measures are to be considered to minimize or reclaim the impacts on flora during the operation phase.

- Ensure a routine maintenance and upkeep of all the compensatory saplings with minimum survivability of 70% including replanting the dead saplings and replacement of damaged tree guards, if any for a minimum period of 3 years to offset the net loss and ensure net gain from 3rd year onwards. The EMP provides budgetary provisions for 3-year maintenance period.

5.11 Fauna

Impacts-Construction Phase

238. The ecological investigations as well as consultations with the local community has not indicated presence or sighting of any wildlife and/or any animal-human conflicts during the past 10 years within the core zone of Bodhjunnagar IE (ref. 4.3.7 under Section 4).

239. The nearest wildlife sanctuary and national parks (Sepahijala WLS, Clouded Leopard National Park and Sepahijala Zoological Park) is at a distance of 21.64 km. Therefore, the infrastructure development works from the Bodhjunnagar IE is not likely to have any impacts on fauna within the core or buffer zones.

Mitigation Measures

240. No specific mitigation measures are required to avoid impacts on fauna of the core and buffer zones. However, instructions which are to be followed by the construction workforce in the unlikely event of sighting of any wildlife fauna during construction activities are given under EMP (Table 9-1 to 9-4).

Impacts-Operation Phase

241. Likewise, the operation phase also will not have any impact on the fauna of the core or buffer zones.

Mitigation Measures

242. No specific mitigation measures are required to avoid impacts on fauna of the core or buffer zones during the operation phase.

5.12 Weather and Climate

Impacts-Construction Phase

243. The construction works within Bodhjunnagar IE, in itself will not cause any emissions that can impact local weather and climate in the long term. The baseline air, noise and water quality are within the stipulated national standards and do not critically exceed the respective acceptable and permissible limits (ref. Section 4.2.9 to 4.2.13).

Mitigation Measures

244. Measures to minimize the impacts during construction activities like dust suppression, regulating noise levels, restricting vehicular emissions, ensuring worker's health & safety are described under EMP (Table 9-1 to 9-4).

Impacts-Operation Phase

245. No major industries are likely to come up within the Bodhjunnagar IE, which can release significant gaseous emissions due to its small size. In any case, all the upcoming industries during the operation phase will be regulated for emissions through consent management (CTE and CTO) under the air, noise and water (Prevention and Control of Pollution) Acts (ref. Table 2-1 under Section 2).

246. Thus, no short and/ or long-term impacts are foreseen on the weather and climate during the operation phase.

Mitigation Measures

247. No specific mitigation measures are required to avoid impacts on air quality of the core zone during the operation phase.

5.13 Ancient Monuments/Archaeological Sites

Impacts-Construction Phase

248. The core zone i.e. Bodhjunnagar IE and surrounding peripheral area up to 500m does not have any ancient monuments and/or archaeological site(s) protected under the Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010 and The Tripura Ancient Monuments and Archaeological Sites and Remains Act, 1997 (ref. Section 4.4.6).

249. The present regulations of Government of India prohibit any construction activity within 100 meters and regulate construction activity within 200m, beyond the first 100 meters of prohibited area of any protected monument under the Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010 and amendments thereof.

250. Therefore, there will be no impacts on ancient monuments and archaeological sites due to the construction works at Bodhjunnagar IE.

Mitigation Measures

251. No specific mitigation measures are required to avoid impacts on any ancient monuments and/or archaeological site(s).

252. However, in the unlikely event or scenario of sighting of “remnants” or “chance finds” of archaeological or historical importance, the instructions/ management measures which are to be followed by the construction workforce are given in the EMP (ref. Table 9-1 to 9-4).

Impacts-Operation Phase

253. Likewise, the operation phase also will not have any impact on the ancient monuments and archaeological sites of the core or buffer zones.

Mitigation Measures

254. No specific mitigation measures are required during the operation phase to avoid impacts on any ancient monuments and/or archaeological site(s).

5.14 Physical Cultural Resources

Impacts-Construction Phase

255. The core zone i.e. Bodhjunnagar IE and its surrounding 500m peripheral area has no movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance (ref. Section 4.4.7).

256. Therefore, there will be no impacts on physical cultural resources due to the construction works within core zone i.e. Bodhjunnagar IE.

Mitigation Measures

257. No specific mitigation measures are required to avoid impacts on physical cultural resources.

258. However, in the unlikely event or scenario of sighting of “remnants” or “chance finds” of physical cultural resources during the construction phase, instructions/ management measures which are to be followed by the construction workforce are given in EMP (ref. Table 9-1 to 9-4).

Impacts-Operation Phase

259. The operation phase will also not have any impact on physical cultural resources within core zone i.e. Bodhjungnagar IE

Mitigation Measures

No specific mitigation measures are required during the operation phase to avoid impacts on any physical cultural resource(s).

5.15 Surface & Ground Water Pollution

Impacts-Construction Phase

260. Estimated daily generation of sewage & sullage/sanitary waste at camps site offices and work force camps during the construction stage is given in **Table 5-7**. The untreated sullage/sewerage from such areas will have potential to cause surface & groundwater pollution.

Table 5-7: Estimated Daily Sanitary waste generation during Construction Stage

Sl. No.	Category	User Nos	LPD ¹⁶	Quantity in Liters Per Day
1	Supervision staff at camp site office	41	90	3690
2	Non-local /migrant labor at workforce camps	515	90	46350
			Sub-total	50,040
			Add 15% for wastage and Contingency	7,506
			Daily Water Requirement for Sanitation and Ablution (rounded off to)	57,546
			Estimated Quantity of Sewage generation @ 80% of Water Consumption as per Govt. of India Norms	46,037

261. Bodhjungnagar IE, at present has a 500 KLD common effluent treatment plant (CETP), specifically intended to serve the rubber industries. However, the CETP is not fully functional and untreated/ partially treated effluents are being discharged into the low-lying areas, which have formed stagnating effluent pond(s) within the IE (ref. **Figure 5-3** and Appendix-3).

262. The stagnating effluent pond(s) within the IE often emit odor, particularly in summer months, cause aesthetic nuisance and has the potential to cause groundwater contamination as well as ecological concern, with cascading effects on species richness, particularly affecting those dependent on aquatic ecosystems, such as amphibians and certain insects, and also indirectly impacting birds and mammals through the food chain.

¹⁶ LPD refers to liters per day consumption or discharge as per the Government of India Norms



Figure 5-3: Stagnating Partially Treated Effluent Pond(s) within Bodhjungnagar IE

Mitigation Measures

263. The construction stage impacts on surface and groundwater pollution can be mitigated through provision of septic tank along with soak pit arrangements of adequate capacity at all toilets and wash areas within camp site and work force camps. The sizes of the septic tank and soak pits for different user capacity in accordance with the guidelines of CPHEEO, Ministry of Housing and Urban Affairs, Govt. of India as well as typical details of oil interceptors are given in EMP (ref. Table 9-1 to 9-4).

264. As a corrective action plan for the CETP, the project design has considered to refurbish/ replace all dysfunctional/ damaged units including all equipment, instrumentation and control, to ensure a fully functional CETP, capable of treating the influent wastewater to the stipulated effluent standards by CPCB/ TSPCB.

265. The refurbishment of the CETP will open an option to reuse treated effluent for industrial use and partially reduce the dependence on groundwater for industrial use in the coming years. Accordingly, the corrective action plan includes a provision for collecting treated effluent from CETP in two existing ponds with an estimated cumulative capacity of 10 million liters, which can serve up to 25 days of water requirement of existing rubber industries, which is major consumer of water (ref. Figures 5-1 and 5-2). The EMP includes cost provision for the corrective action plan of the CETP.

Impacts-Operation Phase

266. The operation phase of the Bodhjungnagar IE is not likely to cause any long- or short-term impacts on surface and ground water pollution.

Mitigation Measures

267. Ensure routine maintenance and periodical cleaning/ desludging of all septic tank and soak pit combines by the allocated industries within Bodhjungnagar IE and disposed of at approved municipal sites.

268. In addition, the corrective action plan for the CETP includes several measures for the operation and maintenance, to ensure compliance requirements of the CPCB/ TSPCB as well as the reuse of the treated effluent. Further, measures required for the routine maintenance of the treated effluent holding ponds as well as stormwater holding/ retention ponds are given under Section 5.2.

269. Other than this, no specific mitigation measures are required for managing the impacts on surface and ground water pollution during the operation phase.

5.16 Air Quality

Impacts-Construction Phase

270. The baseline ambient air quality for all monitored parameters (PM₁₀, PM_{2.5}, SO₂, NO₂, CO) within Bodhjungnagar IE (ref. Table 4-9 of 4.2.15 under Section 4) were below the NAAQS, which can be attributed to present low vehicular traffic and absence of major industrial emission sources.

271. The construction works within Bodhjungnagar IE may contribute to increase dust levels due to activities like site clearance/preparation, earth work excavation, back filling, construction material handling, among others. Similarly, gaseous emissions can be due to operation of vehicles and construction machinery like compactors, rollers, concrete batching plant, hot mix plant and wet mix macadam plants, which may emit carbon monoxide, Sulphur dioxide, and oxides of nitrogen. Thus, impact on the air quality is transitory in nature and limited to construction stage.

Mitigation Measures

272. Key avoidance and mitigation measures, which can avoid or reduce dust levels and vehicular emissions during construction stage are included in the EMP (Table 9-1 to 9-4).

273. Periodical environmental monitoring through an NABET accredited agency/ laboratory will be carried out during the construction phase to ensure the effective implementation of EMP measures. Adequate budgetary provisions are included in the EMP for periodical environmental monitoring.

Impacts-Operation Phase

274. No major industries are likely to come up within the Bodhjungnagar IE, which can release gaseous emissions due to its small size. Thus, the operation phase will not have any impact on air quality.

Mitigation Measures

275. All the upcoming industries during the operation phase will be regulated for emissions through consent management (CTE and CTO) under the air, noise and water (Prevention and Control of Pollution) Acts (ref. Table 2-1 under Section 2).

276. No specific mitigation measures are required for managing the impacts on air quality during the operation phase.

277. Periodical environmental monitoring through an NABET accredited agency/ laboratory will be carried out during the first year of the operation phase. Adequate budgetary provisions are included in the EMP for the same.

5.17 GHG Emissions and Climate Change Concerns

Impacts-Construction Phase

278. The green initiative and concern for reducing the carbon footprint, solar power generation units with a cumulative capacity of 500 KW are also considered at 9 locations within IE under the proposed development works, which will offset energy demand from fossil fuel (ref. Section 3.16).

279. The solar panels are proposed to be installed at open and vacant places, which will involve very minimum construction activities for the foundation and anchoring support for the panels on ground and does not warrant any significant levelling and/or major excavation works. Thus, the impacts are very limited and short term in nature.

Mitigation Measures

280. No specific mitigation measures are required for managing the GHG emission and climate change concerns, except for routine maintenance and cleaning of all solar panels to ensure optimum green power generation within Bodhjunnagar IE.

Impacts-Operation Phase

281. The operation phase of the Bodhjunnagar IE is not likely to have any long- or short-term impacts on GHG emissions. However, it is anticipated that the Bodhjunnagar IE may be provided with a natural gas pipe connectivity in the near future (depending upon the industries need and viability), which can offset the energy demand from fossil fuel and enable reduction of GHG emissions/ carbon footprint and also address climate change concern.

Mitigation Measures

282. Ensure routine cleaning of all solar panels to ensure optimum green power generation within Bodhjunnagar IE, to ensure optimum power generation and to offset GHG emissions.

283. All the damaged and dis-functional solar panel, if any, are to be disposed of in accordance with Solar E-waste Management Rules (ref. Table 2-1).

5.18 Noise & Vibration

Impacts-Noise-Construction Phase

284. The baseline ambient noise levels within Bodhjunnagar IE were below the standards, which can be attributed to rural expense, present low vehicular traffic and absence of major noise emitting industrial activities. The principal source of noise during construction works would be from operation of equipment, machinery and vehicles deployed for construction activities (ref. Table 4-10 of 4.2.16 under Section 4).

285. The earth-moving machineries e.g., excavators, graders and vibratory rollers have potential to generate high noise levels of more than 70 dB (A) and can cause disturbance to the settlements, adjacent areas up to 100 m from the worksite. The noise levels of construction machinery typically used in construction works and permissible noise exposure levels as per OSHA (Occupational Safety and Health Administration), USA is given in **Tables 5-8** and **5-9**.

Table 5-8: Typical Machinery used in Construction Works

Sl. No.	Equipment Type and Capacity	Noise Level (dBA)	Sl. No.	Equipment Type and Capacity	Noise Level (dBA)
1	Dozer 200 Cum/hr Cap.	85	13	Backhoe and Front-end loader	80-85
2	Motor Grader – output above 150 KW Cap.	85-94	14	Bulldozer	85
3	Long arm Hydraulic Excavator	85	15	Compactor	82
4	Vibratory Roller (2 Tandem + 1 Vibro) – Minimum 8-10T static Weight	94	16	Compressor	81
5	Pneumatic Road Roller (200-300KN Cap.)	85	17	Concrete Mixer	85

Sl. No.	Equipment Type and Capacity	Noise Level (dBA)	Sl. No.	Equipment Type and Capacity	Noise Level (dBA)
6	Smooth Wheeled Roller – 8-10T Cap.	85	18	Concrete Pump	82
7	Tipper Truck – 5.5 Cum Cap.	85-88	19	Crane, Derrick/ Mobile	83
8	Rock Excavator – 60 Cum/hr Cap.	95	20	Pavement Breaker	88
9	Paver Finisher Hydrostatic with sensor control – 100 TPH Cap.	89	21	Paver	89
10	Paver Finisher Mechanical for WMM Work – 100 TPH Cap.	89	22	Pile Driver, Impact	101
11	Transit Mixer – 3-4.5 cum per hr Cap.	81	23	Pneumatic chip hammer/ Jackhammer	102-113
12	Cranes 60-80 T – capacities, with telescopic arm of Min 25 m length	85	24	Hammer	87-95

Table 5-9: Permissible Noise Exposures (OSHA Standards)

Sl. No.	Duration per day, hours	Sound Level dBA slow response
1	8	90
2	6	92
3	4	95
4	3	97
5	2	100
6	1 ½	102
7	1	105
8	½	110
9	¼ or less	115

Source: OSHA (Occupational Safety and Health Administration), USA

286. The noise generated during the construction would cause short term inconvenience to the population in nearby areas (up to 100m), beyond which it would get drastically attenuated to acceptable levels. Since the areas within the Bodhjungnagar IE is not densely populated, the severity of the impact due to increased noise levels is not expected to be significant and transitory in nature.

Mitigation Measures

287. The mitigation measures to limit the ambient noise levels by the construction vehicles, equipment and machinery are given in the EMP (Table 9-1 to 9-4).

288. In addition, periodical environmental monitoring through an NABET accredited agency/ laboratory will be carried out during the construction phase to ensure the effective implementation of EMP measures. Adequate budgetary provisions are included in the EMP for periodical environmental monitoring.

Impacts – Noise-Operation Phase

289. No major industries are likely to come up within the Bodhjungnagar IE, which can contribute to increased ambient noise levels due to its small size. In any case, all the upcoming industries during the operation phase will be regulated for noise levels under the Noise Pollution (Regulation and Control Act), 1990 (ref. Table 2-1 under Section 2). Thus, the operation phase is not anticipated to have any impact on ambient noise levels.

Mitigation Measures

290. No specific mitigation measures to limit the ambient noise levels are required during the operation phase. Periodical noise level monitoring through an NABET accredited agency/

laboratory will be carried out during the first year of operation phase. Adequate budgetary provisions are included in the EMP for environmental monitoring during the operational phase.

Impacts–Vibration-Construction Phase

291. Vibrations arising from construction activities like earth work excavation, compaction, paving and movement of construction vehicles/machinery are generally ground-borne.

292. The vibration velocity levels in rural settlement areas or low-density settings like Bodhjungnagar IE is usually 50 VdB (vibration decibels) or even lower, which is well below the threshold of perception for humans, deemed to be around 65 VdB¹⁷.

293. Typical outdoor sources of perceptible ground-borne vibrations like earth work excavation, compaction, paving and movement of construction vehicles/machinery, buses and trucks rarely create vibration that exceed 70 VdB, unless the riding surface/condition of pavement is very poor. If the pavement/road conditions are reasonably satisfactory, ground borne vibration from traffic is rarely perceptible.

294. Most perceptible indoor vibrations due to ground-borne vibration include perceivable movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception even by a small margin, although the vibration levels that cause annoyance will be well below the damage threshold for normal buildings.

Mitigation Measures

295. The roads within the IE, even during the construction stage will be paved and maintained¹⁸ by the contractor to ensure smooth traffic movement and hence riding quality of pavement is expected to be satisfactory, thus not likely to contribute to ground borne vibration, beyond threshold levels.

296. The residual impacts of vibration during construction stage, although short term in nature, is not likely to be significant and can be further controlled by measures like regulating construction activities to limited day hours, ensuring normal pace of construction activity with frequent breaks. Such measures can reduce impacts of ground borne vibrations due to project construction activities.

Impact-Operation Phase

297. The operation phase of the Bodhjungnagar IE is not likely to cause any long- or short-term vibration impacts.

Mitigation Measures

298. During operation phase, ensure that all the upcoming industries with major machineries have appropriate/ suitable isolated machine foundations and control measures, to limit vibration beyond threshold levels. In addition, also ensure routine maintenance and upkeep of the internal roads.

¹⁷ Source: Guidelines for Noise and Vibrations for Metro Rail Transit System by Research Designs and Standards Organization, Ministry of Railways, Government of India

¹⁸ Contractors will be obligated to maintain the present road even during the construction phase through periodic pavement renewals and ensure riding quality and smooth traffic movement for present road users.

299. Such measures can reduce impacts of ground borne vibrations during the operation phase.

5.19 Slope Stability and Landslide Hazards

Impacts-Construction Phase

300. Landslide is one of the most significant, unpredictable occurrences, which often leads to road blockages, accidents and even could lead to loss of life at times. The construction activities related to infrastructure development within IE in itself do not involve significant hill cutting operations. However, site clearance operations as well as excavation operations for construction of structures could trigger mud slips or localized landslides, particularly during or just after monsoon months.

Mitigation Measures

301. The recommended slope cuts during earth work excavation which shall be adopted for minimizing mud slips/ landslides and ensuring slope stability during the excavation are given **Table 5-10** and included in EMP.

Table 5-10: Recommended Slope cuts for Slope Stability

Sl. No	Type of Material	Recommended Slope cuts
1	Loose Soil and Vulnerable Slopes	2V: 1H
2	Compacted Soil with Slope towards Road	4V: 1H
3	Hard Soil/ Soft Rock	6V: 1H

302. Further, project design has considered nature-based solutions/measures (bioengineering) at six selected locations within IE to improve the slope stability and minimize erosion during or after monsoon season or heavy rainfall months (ref. **Figure 5-4**). The species which may be considered for the bio-engineering solutions as well as for green belt development/ landscaping areas are given in **Appendix-8**.

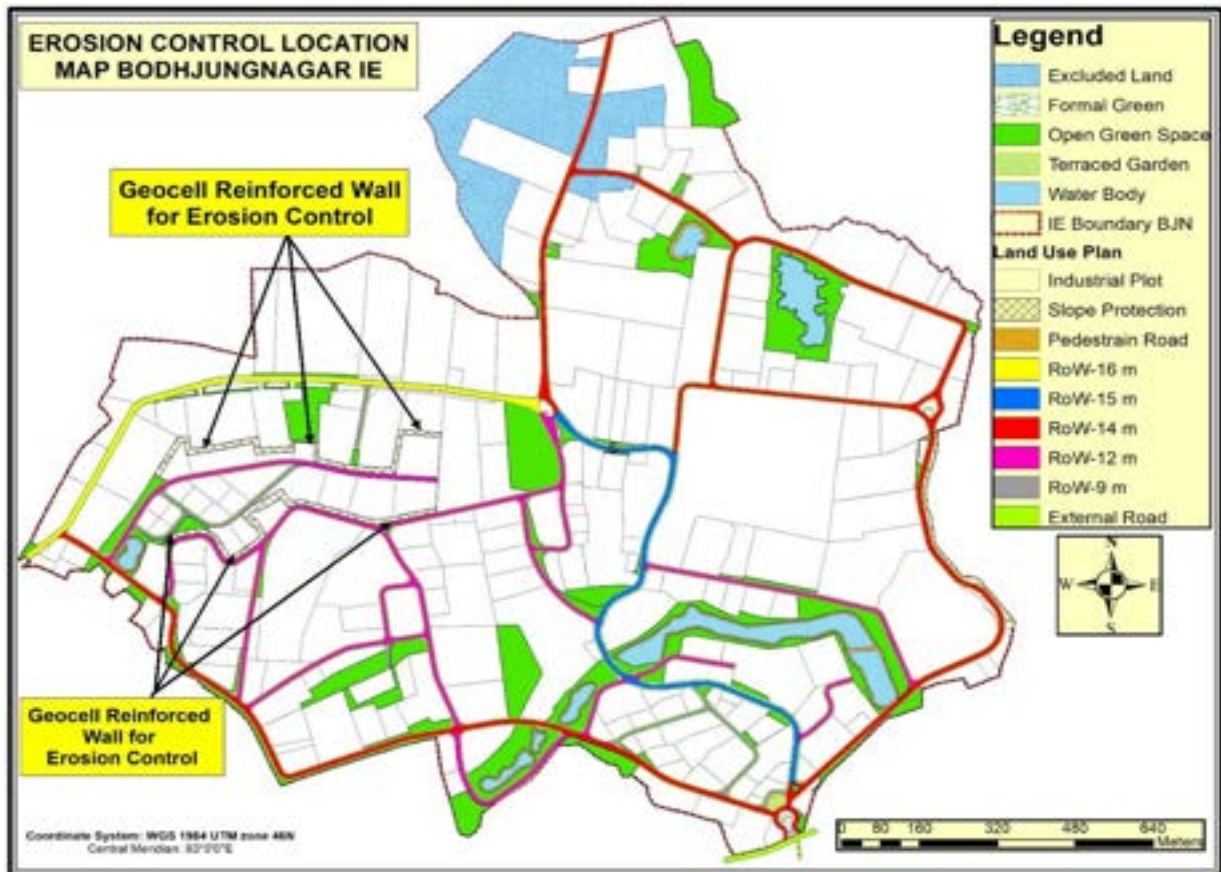


Figure 5-4: Nature Based Bio-engineering Provisions for Erosion Control

5.20 Hazardous and Non-Hazardous Wastes

Impacts-Hazardous Wastes-Construction Phase

303. The construction works at Bodhjunnagar IE are not anticipated to generate hazardous waste and therefore, no impacts are foreseen.

Impacts-Non-Hazardous Wastes-Construction Phase

304. Large construction works related pollution risks include accidental spill of fuel, used oil or and contamination from poor waste management practices that can affect soil, surface and groundwater at operational sites and/ or establishment camp sites like concrete batching plants, hot mix plants, vehicle parking/ service area, oil/ lube storage areas among others.

305. The construction within Bodhjunnagar IE activities will generate non-hazardous waste throughout the construction phase. The anticipated non-hazardous waste types include excavated surplus material, construction debris, municipal solid waste, sanitary sullage and sewage generation from construction camp sites and workforce camps. While, hazardous waste may include used oil, lube/grease/cotton waste materials from service areas of construction machinery, empty drums or dis-used/replaced spares of vehicles/machinery, used batteries, not used chemicals for concreting like admixtures etc.

306. Thus, the impacts due to the hazardous waste generation during project construction can be mitigated through safe handling and disposal of waste by adoption of good international industrial practices (GIIP). Also, the site specific EMP (C-EMP) will be prepared by the

contractor, which will cover the mitigation measures for storage and handling of non-hazardous waste during the implementation of the project.

307. During the construction stage, the municipal solid waste generation from construction camp site offices and workforce camps is estimated as 141.05 kg per day as shown in **Table 5-11**, which is to be safely handled and stored prior to its disposal at approved places by district administration.

Table 5-11: Estimated Municipal Solid Waste Generation during Construction Stage

Category	Nos	Kg per day	Total Quantity of Solid Waste (kg/ day)
Supervision staff at camp site office	41	0.300	12.30
Non-local /migrant labor at workforce camps	515	0.250	128.75
Total Municipal Solid Waste generation in Kg/day			141.05
Organic Waste Generation @ 40%			56.42
In organic Waste Generation @ 60%			84.63

Mitigation Measures-Hazardous & Non-Hazardous Wastes

308. The site specific EMP (C-EMP) will be prepared by the contractor, which will cover the mitigation measures for storage and handling of both hazardous and non-hazardous waste, as may be required/ warranted during the implementation of the project.

309. The impacts due to the municipal solid waste during construction phase can be mitigated through safe handling and disposal of waste at district administration approved sites.

310. The used oil/ lubes generated at camp sites is to be collected in HDPE drums and placed under segregated roofed area for periodic disposal at approved waste disposal facilities by the Tripura State Pollution Control Board.

311. The organic waste generated can be composted at respective campsites/work force camps through construction of compost pits for treating organic waste and provision of color-coded separate bins for collecting the organic and inorganic waste.

312. The solid waste management from all campsites, workforce camps and all other operational sites shall be collected periodically and disposed of through the waste collection trucks operated by the Agartala Municipal Council (AMC) and transported to their solid waste management facility for further treatment and disposal.

313. The sanitary/ sullage/ sewage generated at campsites, work force camps and other operational sites are to be disposed of through septic tanks and soak pit disposal arrangements, details of which are given in EMP (ref. Table 9-1 to 9-4).

314. Key avoidance and mitigation measures for waste minimization and management/ handling of non-hazardous waste during the construction stage are given in the EMP (ref. Table 9-1 to 9-4).

Impacts-Operation Phase-Hazardous/ Non-hazardous Waste

315. The operation phase of the Bodhjunnagar IE is not likely to cause any long or short term hazardous and non-hazardous impacts.

Mitigation Measures

316. All the upcoming industries, which may generate both hazardous and non-hazardous waste during the operation phase is deemed to be covered under respective regulations for waste management and disposal (ref. Table 2-1).

317. Other than this, no specific mitigation measures are required for handling the hazardous and non-hazardous waste during the operation phase.

5.21 Work Zone Safety and Community Safety Risks

Impacts-Construction Phase

318. The construction works within Bodhjungnagar IE will have potential work zone safety risks for the deployed workforce as well as community safety risks i.e. for workers of the existing industries.

Mitigation measures

319. The work zone safety arrangements for deployed workforce, measures for ensuring community safety during construction activities and traffic diversion arrangements among others are given in the EMP (ref. Table 9-1 to 9-4).

Impacts-Operation Phase

320. The operation phase is not likely to cause any work zone safety and community safety risks within Bodhjungnagar IE.

Mitigation measures

321. All the upcoming industries within the IE are deemed to be covered under The Occupational Safety, Health and Working Conditions Code, 2020 (ref. Table 2-1) which covers work zone safety arrangements for their deployed workforce within the industrial premises.

322. Other than this no specific measures are required for ensuring work zone and community safety during operation phase.

5.22 Natural Disasters/ Calamity and Hazard Vulnerability

Impacts-Construction Phase

323. Given the fact that the Bodhjungnagar IE is in earthquake Zone V, which carries highest risk, construction work poses risk and safety hazard to workforce and community, in the event of natural disasters like earthquake and/or landslides triggered during tremors of high intensity earthquake.

324. Such events may strand the workforce or even worse, they may get trapped at project construction and establishment camp sites.

Mitigation Measures

325. The construction sites shall have a “onsite emergency response plan (ERP) (prepared by the contractor)” in an event of natural disasters and/or any other natural calamities in line with the district disaster management plan and same shall be cleared by the PMSC/PIU working under the Project. Further, the onsite emergency response plan will be updated (if

required) covering the implementation challenges encountered/not covered in the plan during execution of the Project.

326. As part of the emergency response plan, the construction site in charge shall establish and maintain regular coordination with the designated officers for Disaster Management at district/sub-division/ district levels. Maintaining regular coordination will enable us to seek quick response, in the event of natural disaster and/or any other natural calamity.

327. All work force, irrespective of levels, are to be provided with training to respond in an emergency and periodic mock drill shall be conducted to ensure the preparedness to respond any emergency situations.

328. All project operations shall be planned and coordinated in tandem with the daily/weekly weather predictions/alerts issued by competent authorities as relevant for the district and all such alerts shall be duly considered and review the scheduled work programs on a daily basis.

329. At project level, the construction site in charge shall designate an Incident Controller (IC), Emergency Controller (EC), Assembly Coordinator (AC) and other required personnel for the emergency response mechanism in an event of natural disaster/ calamity in line with the ERP.

330. A template for Disaster Management and Emergency Response Plan for the construction phase at Bodhjunnagar IE has been given in **Appendix-9** to dovetail with the West Tripura district disaster management plan and suiting to requirements of contractor's scale of establishment after the mobilization.

Impacts-Operation Phase

331. The operation phase, likewise, also carries highest risk due to earthquake for the workforce engaged within the Bodhjunnagar IE.

Mitigation Measures

332. The mitigation measures for addressing natural disasters/ calamity and hazard vulnerability during the operation phase shall comprise:

- The IE shall have a “onsite emergency response plan (ERP) in an event of natural disasters and/or any other natural calamities in line with the district disaster management plan.
- As part of the emergency response plan, the IE in charge shall establish and maintain regular coordination with the designated officers for Disaster Management at district/sub-division/ district levels. Maintaining regular coordination will enable us to seek quick response, in the event of natural disaster and/or any other natural calamity.
- All work force irrespective of level and various industries within IE, are to be provided with training to respond in an. emergency and periodic mock drill shall be conducted to ensure the preparedness to respond to any emergency situations.
- All project operations shall be planned and coordinated in tandem with the daily/weekly weather predictions/alerts issued by competent authorities as relevant for the district and all such alerts shall be duly considered and review the scheduled work programs daily.
- IE shall have designated Incident Controller (IC), Emergency Controller (EC), Assembly Coordinator (AC) and other required personnel, drawn from various

industries for the emergency response mechanism in an event of natural disaster/ calamity in line with the ERP.

- A template for Disaster Management and Emergency Response Plan has been given in Appendix-9, which is to be dovetailed with the West Tripura district disaster management plan and suiting to requirements of the operation phase.

5.23 Labour and Working Conditions

Impacts-Construction Phase

333. The infrastructure development at Bodhjunnagar will require an estimated 2132 construction workforce at all levels. It is anticipated that nearly 70-75% of skilled and unskilled labour (approx. 1,600) are likely to be to be migrant workers from other states and the rest are likely to be sourced from nearby villages and settlements areas (ref. Section 3.18).

334. Potential labor risks associated with construction workers/labors are:

- Lack of training/awareness/ orientation amongst workforce and sensitization for safety at work, Safe working at heights/ depths and working around moving equipment/machineries
- Lack/Inadequate or inappropriate personnel protective gear and or safety accessories for workforce.
- Injuries/fatalities leading to disability and/or even death, while at work during normal course, either due to negligence at work and/or inadequate experience/training or accidents
- Inadequate first-aid facilities at work sites and lack of emergency response mechanism for shifting injured to hospitals and care thereof.
- Inadequate accommodation, sanitation, and health facilities at work force camps,
- Non-payment, disparity of wages and/ or denial of benefits (compensation, bonus, maternity benefits etc.)
- Discrimination in employment (e.g., abrupt termination of employment, working conditions, wages or benefits etc.)
- Engagement of child labour and trafficking of labour.
- Safety, security of women workforce at work sites and within workforce camps
- Inadequate facilities for pregnant women and lactating mothers and children at camp sites
- Sexual harassment and Gender based violence issues within workforce camps or at work sites.
- Health risks of labour relating to HIV/AIDS and other sexually transmitted diseases
- Conflicts with local community at Potential Gender Based Violence (GBV) hotspots.
- Absence of a grievance mechanism for labor to seek redressal of their grievances/issues.
- Absence or inadequate or non-responsive emergency response mechanism for rescue of workforce, during caving in/mud slips, disasters due to earthquake etc. at operational sites

Mitigation Measures

335. The workforce management plan including guidelines to avoid or handle risks associated with the labor/ workforce during the construction stage are given in the EMP (ref. Table 9-1 to 9-4).

Impacts-Operation Phase

336. The operation phase is not likely to cause any risk related to labour and working conditions within Bodhjungnagar IE.

Mitigation Measures

337. All industrial workforce who may be engaged by the upcoming industries are deemed to be covered under National Labour Act, 1970, The Child Labour (Prohibition and Regulation) Amendment Act, 2016, The Child Labour (Prohibition And Regulation) Act, 1986 and The Occupational Safety, Health and Working Conditions Code, 2020 (ref. Table 2-1).

338. Other than these no specific mitigation measures are required to avoid or handle risks associated with the labor/ workforce during the operation phase.

5.24 Gender Based Violence (GBV) Risks

Impacts-Construction Phase

339. The presence of construction workers (migrant and local) at construction sites and the women workforce of the existing industries may trigger issues arising out of eve-teasing, stalking, harassment at potential GBV hotspots either within or outside the IE.

340. Also, migrant women workforce may also be vulnerable, if adequate safety and security measures are not available at work sites and/or workforce camps established within Bodhjungnagar IE. Suitable working environment for women's participation include gender-equal wage rates, safety & security issues, childcare facilities, health and sanitary requirements, separate toilets for women, temporary housing for families of workforce during the construction work with adequate water and sanitation facilities, among others.

Mitigation Measures

341. The GBV risk mitigation plan to avoid or handle GBV and related issues during the construction stage is given in EMP (ref. Table 9-1 to 9-4).

Impacts-Operation Phase

342. The operation phase is not likely to cause any risk related to gender-based violence for the industrial workforce.

Mitigation Measures

343. All industrial workforce who may be engaged by the upcoming industries are deemed to be covered under the Prevention of Sexual Harassment (POSH) Act, 2013, which address risks related to gender-based violence, in the unlikely event.

6.0 ANALYSIS OF ALTERNATIVES

6.1 Considerations for Alternatives

344. Conducting analysis of alternative at the early stages of project design as well as IEE helps to minimize, reduce, or mitigate potential negative impacts and enable to enhance positive impacts, sustainability and development benefits. This section summarizes the various alternatives evaluated through mitigation hierarchy for management of risks. The analysis of alternatives has enabled additional enhancement measures to the project design from the environmental perspective as well.

6.2 Alternative Analysis Option – No project scenario

345. The Department of Industries & Commerce (DoIC), Government of Tripura has embarked upon an ambitious program for industrial promotion, entrepreneurship development, and overall employment generation, which concurrently can promote the industrial growth and economy of the state. Bodhjunnagar IE is one of the Nine prioritized industrial estates identified for development with Best-in-Class Infrastructure development.

346. Bodhjunnagar IE, existing since 1998 and spread over 207.64 ha, presently requires an immediate replacement of the worn-out infrastructure and its upgradation for the industrial growth of the state. Unless the infrastructure development works are taken up, it will not attract prospective industrialists for establishing their industries and contribute to the state industrial growth and economy and rather discourage any further investments.

347. Therefore, the infrastructure development works at Bodhjunnagar IE are essential to sustain the industrial growth and economy of the state. The proposed works include development of vacant land within the IE into additional industrial plots for setting of new industries, improvement of internal roads, storm water drainage, augmentation of water supply, developed utility corridor, augmentation of power system, social infrastructure amenities like common facilitation center, shops & business center, residential housing, refurbishment of existing common effluent treatment plant, development of parks and open areas among others. Moreover, while planning, care has been taken to follow existing alignments and avoid opening up of new areas for laying the infrastructure works, for minimization of impacts.

348. Thus, 'no project scenario' is not a desirable alternative option, which can be exercised for the industrial growth and economy of the state.

6.3 Alternative Analysis Option

349. Project design considered several alternatives through mitigation hierarchy for management of risks, while finalizing the infrastructure at the Bodhjunnagar IE.

350. Some of the important considerations are summarized hereunder:

- Utilization of all vacant lands and avoiding diversion of fresh land for the development works
- Assessing and retaining the existing infrastructure, which can serve the design period of proposed development.
- Considering the risks associated with climate change for the next 50 years in the design of the project components.

- Balancing of cut and fill quantities has required to excess earth excavated (86198.52 cum) for green belt development and landscaping of open areas (20.22 ha) within the IE boundary. Thus, avoiding opening of new areas for debris disposal. The area under green belt and landscape development works out to 38.8% of total 52.14 ha, considered for the present development.
- Construction of 23 rainwater percolation wells at suitable locations within IE, selected based on in-situ percolation rate for recharging groundwater and to compensate withdrawal of groundwater for industrial use.
- Construction of storm water holding ponds at 5 locations within IE, with a cumulative holding capacity 73.25 million liters by impounding the existing valley/ local depression(s), with an outlet weir for discharge of excess/overflow. The stormwater holding ponds will serve as a supplementary water source, which can serve up to 8-10 days of water requirement for the industrial estate, after requisite treatment and will reduce the withdrawal of groundwater for industrial use (ref. Figure 5-1).
- The corrective action plan is proposed to make the CETP completely functional and effectively treat the wastewater confirming to the stipulated standards. The corrective action plan also includes reuse of treated effluent from the CETP by collecting it in two existing ponds with an estimated cumulative capacity of 10 million liters which can serve up to 25 days of water requirement of existing rubber industries, which is major consumer of water (ref. Figure 5-2 & 5-3).
- Reuse of the treated effluent will reduce the withdrawal of groundwater for industrial use as well as the dependence on groundwater in the coming years and will help to achieve the project objective in a sustainable way.
- Development of 12,845.77 sqm of green belt over the pond pathways by reusing excavated earth to increase the green belt area.

7.0 PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

7.1 Public Consultations

351. The public consultations were carried out within the core zone i.e. Bodhjunnagar IE and its peripheral area of 500 meters. The generic issues, which surfaced during the consultations and their consideration in the project design are summarized in this section.

352. The key stakeholders consulted during IEE as well as project design include:

- Officials of TIDCL at Bodhjunnagar IE
- Representatives of the existing industries
- Workforce and visitors to the existing industries within IE
- Officials of Tripura State Pollution Control Board
- Civil society organizations active in buffer zone

353. During the consultation, the following information was disseminated to participants:

- Objectives of DoIC/ TIDCL for developing the industrial estates in Tripura
- Features/ components of the infrastructure development works considered for Bodhjunnagar IE
- Likely beneficial impacts arising due to development like increased employment and business opportunities.

354. The consultations were carried out during December 2022 and February 2023 to elicit viewpoints and/or suggestions of the participants were captured as an input to the project design to the extent feasible and /or warranted. The summary/ generic outcome of the consultations along with suggestion considered in project design are given in **Table 7-1**. The photographs taken during consultations are given in **Table 7-2**.

Table 7-1: Summary of Issues & Generic Outcome of Public Consultations

Summary and Generic Outcome of Consultations	Outcome of Consultations in Project Design
<ul style="list-style-type: none"> • Participants were happy to know that development of IE is being taken up by DoIC/ TIDCL, Govt. of Tripura. Participants requested to focus on: • widening of roads with footpath for pedestrian safety within IE • stagnation of stormwater and drainage issue along some roads within IE during rainy season. • There is no proper outlet system for the drainage of water in that area. • Construction of proper culverts and covered drains to avoid smell wherever required. • Improve streetlights along the roads within IE and surrounding areas. • Extreme bad smell from stagnant water ponds located within the IE and requested to address it as top priority. 	<ul style="list-style-type: none"> • The project design has considered 31.03 km of stormwater drains for the entire IE. 49 CD structures/ culverts and 04 minor bridge along the roads are being reconstructed to improve cross drainage and avoid water stagnation. • Footpaths and streetlights have been considered for pedestrian safety. • The existing water supply within the IE has been augmented with additional tube wells, storage reservoirs, overhead tanks and distribution system to ensure equitable water supply for the entire IE. • The project design considers widening of about 16.260km of roads from single lane to intermediate/ two lane along with improvement of major and minor intersections/ junctions with adequate lighting facilities as per requirement. • Project design considers public toilets at selected locations within IE.

Summary and Generic Outcome of Consultations	Outcome of Consultations in Project Design
<ul style="list-style-type: none"> • Some residents of households within IE who are considered as encroachers by DoIC/ TIDCL have complained about difficulty accessing safe drinking water and sanitization. They also expect employment opportunities within IE. • These families most of them are tribal people speaking Kokborok and Bengali and using open areas within IE are residing in about 9.68 ha. of land and rear about 250 cattle and expect employment opportunities for women & youth during construction & also to work within the industries of the IE. 	<ul style="list-style-type: none"> • Project design considers refurbishing the existing dis-functional effluent treatment plant along with relaying of effluent collection system, so that inundation of low-lying areas causing bad smell could be mitigated. • The project design also considers reuse of the treated effluent for partially meeting industrial water demand. • Project design considers development of green areas including parks and open areas, including site remediation works of presently inundated ponds emanating bad smell. • Project design excludes 9.68 ha. of land, which has such settlement area, thus net planning area is limited to 207.64 ha.

Table 7-2: Photographs taken during Public Consultations





7.2 Gender Based Violence (GBV) Consultations

355. The influx or presence of migrant construction workers during the project construction stage has a potential to aggravate Gender Based Violence (GBV) risks within the communities surrounding the IE. Some of the hotspots for the GBV could be nearby settlements areas, rented accommodation for workforce in the nearby areas, liquor shops, market areas among others. Some of the probable GBV risks are:

- Adolescent girls are vulnerable to the incidents of harassment, stalking and eve-teasing while commuting to schools, colleges, and vocational centers.
- Women are vulnerable for GBV risks near marketplaces and liquor vends(hotspots), although no such known presently hotspots exist in and around Bodhjunnagar IE.
- Women workforce of the existing industries of Bodhjunnagar IE are at potential risk for eve teasing, stalking, harassment including sexual exploitation and abuse by the migrant construction workers.

356. Migrant women laborers may also be vulnerable, if adequate safety and security measures are not undertaken at work sites and within workforce camps. Suitable work conditions for women's participation includes gender-equal wage rates, safety & security issues with GRM mechanism, childcare facilities, health and sanitary requirements, separate toilets for women, temporary housing for families of workforce during the construction work with adequate water and sanitation facilities. Strict adherence to welfare of women workforce and compliance to child labor norms should be followed during construction stage (ref. EMP for details on GBV risk mitigation actions by contractor).

7.3 Information Disclosure

357. The TIDCL, DoIC, Govt, of Tripura and ADB will disclose the IEE report on their website. Further, the executive summary of IEE report in English and translated version (in local language) shall be disclosure (after mobilization of the contractor and before commencement of works) by the TIDCL to accessible place (such as PMU, PIUs, and construction site) for all the stakeholders including local community within Project area. The IEE report needs to be updated by the TIDCL (covering the associated environmental impact and mitigation measures), if there is any change of location, alignment, design, addition of new component/sub-components and shall be submitted to ADB for review and clearance. The TIDCL needs to ensure that works are not commenced for any change of location,

alignment, design, addition of new component/sub-components identified during implementation under the Project, unless the updated/addendum to IEE report is cleared by ADB. Further, the ADB-cleared updated/addendum to IEE report shall be disclosed on TIDCL and ADB website.

358. In addition to providing safeguard updates in the quarterly progress report (QPR) from loan effectiveness, the PMU must submit semi-annual environment monitoring reports (EMR) to ADB for review, clearance, and disclosure, since the loan effectiveness. These EMRs are to be submitted semi-annually during construction phase reverting to annually during operation phase, until the issuance of the project completion report (PCR) by ADB. The EMRs will be due within 15 days of the reporting period's end i.e., 15 July and 15 January each year. The PMU will be responsible for responding to ADB's comments on their EMRs and resubmitting an updated version if required in a timely manner. Once the EMRs have been cleared by ADB, the PMU and ADB will disclose each EMR on their websites. In the event of any breaches of performance standards or other non-compliances recorded by ADB, PMU, PIUs, PMSC and/or their contractors, a time bound, and budgeted, corrective action plan will be provided and followed up for its timely implementation.

359. For each reporting period, SEMR will document covering all sectors/components: (i) all planning and management activities related to environmental safeguards; (ii) progress on EMP implementation (environmental performance) based on PMU and PMSC's respective supervision activities, including any feedback provided to the contractor and action taken; (iii) the results of quantitative monitoring required by the EMP; (iv) records of training activities, emergency drills, awareness raising activities, etc.; (v) details of ongoing consultations with project beneficiaries and affected persons, as and when needed; (vi) project-related environmental grievances received during reporting period and their resolution including for grievances received in previous reporting periods; (vii) compliance with the EMP and progress towards the desired outcomes with compliance statements supported with evidence; and (viii) the identification of corrective and preventative actions with time-bound, budgeted corrective action plans, as applicable, for any breaches of performance standards or other non-compliances recorded.

8.0 GRIEVANCE REDRESSAL MECHANISM

360. The project will have a common grievance redress mechanism (GRM) to receive, evaluate, and facilitate the resolution of social, environmental, or any other relevant project-related grievances. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the Project. The GRM has been developed in consultation with stakeholders. The public awareness campaign will generate awareness of the Project and its grievance redress procedures. The campaign will ensure that the poor, vulnerable, and others know about the GRM.

361. The GRM will provide an accessible, inclusive, gender-sensitive, and culturally appropriate platform for receiving and facilitating the resolution of affected persons grievances related to the Project. The multi-channel and multi-tier GRM for the Project is outlined below, with each tier having time-bound schedules and responsible persons identified to facilitate and address grievances at each stage.

362. Affected persons will have the flexibility of conveying grievances and/or suggestions by dropping grievance redress/suggestion forms in complaint/suggestion boxes that will be installed by project implementation units (PIU) or by e-mail, by post, or by writing in complaints register or by sending a WhatsApp message on the dedicated number, e-mail to the PIU or telephonically contacting the project management unit (PMU)/PIU.

363. Besides the project's grievance redress mechanism, the Government of Tripura (GOT) has a centralized public grievance redress monitoring system (CPGRMS) where the public can file grievances through a dedicated web portal (grievance.tripura.gov.in). The General Administrative (Administrative Reforms) department is the nodal agency, and an officer of the rank of Joint Secretary is responsible for its functioning. Each department of the state has nominated officers to receive the grievances. The Department of Industries and Commerce (DOIC) has nominated officers of the rank of Deputy Director as nodal officers, whose names and contact details are provided on its website. The affected persons can also lodge their complaints through this online portal. Moreover, a Grievance Box is in place at DOIC and TIDCL to convey grievances and/or suggestions.

364. **Information to the stakeholders about the GRM:** The stakeholders, including affected persons, beneficiaries and citizens, and workers engaged during construction activities under the loan, will be informed about the GRM under the project and of the state through public consultations, disclosures, and distribution of public information booklets (PIB). In the case of illiterate persons, the information will be provided verbally during meetings with them.

365. **Who can complain:** A complaint can be registered by stakeholders directly or indirectly affected by the project. A representative can register a complaint on behalf of the affected person or group, provided that the affected person or group identifies the representative and submits evidence of the authority to act on their behalf.

366. **What the Grievance/Complaint should contain:** Any comments, complaints, queries, and suggestions pertaining to safeguard compliance - environment, involuntary resettlement, indigenous people, design/construction-related issues, compensation, service delivery, or any other issues or concerns related to the Project. The complaint must contain the complainant's name, date, address/contact details, location of the problem area, and the problem. A sample grievance registration form is provided in **Appendix-10**.

367. **Where and how to file a Complaint:** The complaint can be filed online and offline. The people can submit their complaints at the contractor's site office or at the PIU/PMU office. In addition, they can also have grievances/suggestions/queries submitted through phone or e-mails or, the state grievance portal, or social media (on a dedicated WhatsApp number). The information about the GRM will also be displayed on the TIDCL website. Contact numbers and names of the staff and contractors concerned will be posted and displayed at all construction sites.

368. **Grievance redress /Problem solving through participatory Process:** The PMU and PIUs will make efforts to resolve the problems and conflicts amicably through a participatory process with the community. In case of immediate and urgent grievances in the complainant's perception, the contractor and supervision personnel from the PIU will provide the most easily accessible or first level of contact to resolve grievances quickly.

369. **Grievance Redressal Committee:** The GOT will establish the Grievance Redressal Committees (GRC) at the site, PIUs, and PMU levels to provide a mechanism to resolve conflict and disputes concerning compensation payments, environmental safeguards-related issues and cut down on lengthy litigation. The General Manager of the District Industries Centre under DOIC will head the GRC at the PIU level¹⁹. Similarly, the Director of DOIC will head the GRC at the PMU level. The following will be the composition of the GRCs. The composition of the GRCs at all three levels is provided in **Table 8-1**.

Table 8-1: Composition of Grievance Redressal Committees

Site Level GRC (Level 1)	District level GRC (Level 2)	PMU level GRC (Level 3)
1. Assistant Engineer of concerned Industrial Estate (IE)-TIDCL	1. General Manager (GM), District Industries Centre (DIC)	1. Director, DOIC, GoT
2. Junior Engineer, TIDCL	2. Safeguards Specialist (social and gender), TIDCL/ I&C	2. Joint Secretary, Revenue Department, GoT
3. Field Engineer of PMSC	3. Environmental Safeguard Expert, TIDCL/ PMSC	3. Addl. Director (Projects), I&C, GoT
4. Social, and gender support staff, PMSC	4. Executive Engineer-TIDCL	4. OSD/ GM, TIDCL
5. Environmental Safeguard Expert, PMSC/PIU level	5. Assistant Engineer-TIDCL.	5. Superintending Engineer, TIDCL
6. Two entrepreneur members from the concerned Industrial Estate, with at least one of them a woman (if any) or and a representative from the affected community (as and when required)	6. Team Leader, PMSC	6. Executive Engineer TIDCL
7. Executive Engineer of the concerned PIU ²⁰ .	7. Social and/or Environment Safeguards Consultant, PMSC	7. Safeguards Specialist (social and gender), TIDCL/ I&C
	8. Two entrepreneur members from industrial Estate, with at least one of them a woman (if any) or and a representative from the affected community (as and when required)	8. Environmental (Safeguard cum Climate Change) Expert, TIDCL/ PMSC
		9. Nominated representatives from the line departments (ULB, PWD, or any other department, as required)
		10. Two entrepreneur members from industrial Estate, with at least one of them a woman (if any)

¹⁹ DOIC, Government of Tripura (GOT) is the executing agency under the loan.

²⁰ The Executive Engineer will be involved in case of grievances are not related to the contractor's scope/ work activities, but under the project within the industrial estate (IE).

370. **Site level GRC (First Level):** In case of grievances that are immediate and urgent in the perception of the complainant, the Assistant Engineer of the PIU, in coordination with the Junior Engineer of PIU and field engineer of PMSC and the Contractor's on-site personnel (concerned engineer and EHS cum social supervisor) will provide the most easily accessible or first level of contact for quick resolution of grievances. If the grievance is not under the contractor's scope, but under the project, the Executive Engineer of the concerned PIU will resolve this issue. All the grievances should be resolved within seven days of receipt of the complaint/grievance. Contact phone numbers and names of the concerned officers/representatives will be posted at all construction sites at visible locations. The designated persons will be responsible for seeing through the process of redressal of each grievance. The contractor's site engineer and EHS cum social supervisor will jointly support in meetings, consultations, and site-level grievance resolution. The effort will be made to resolve issues on-site, in consultation with each other, and within 7 days of receipt of a complaint/grievance.

371. **District level GRC (Second Level):** All grievances that cannot be redressed within 7 days at the first field level will be brought to the notice of the GRC headed by the General Manager (GM)- District Industries Centre (DIC). The Grievance Officer, i.e. GM DIC, may consult/seek the assistance of the District Level GRC consisting of the Environmental Safeguard Expert, TIDCL/ PMSC, Safeguards (Social and Gender), PMU TIDCL, Executive Engineer-TIDCL, Asst. Engineer-TIDCL, Team Leader-PMSC. Social and/or Environment Safeguards Consultant, PMSC, two entrepreneur members from industrial Estate, with at least one of them a woman (if any) or/and a representative from the affected community (as and when required). The GRC will review the grievance and act appropriately to resolve it within 10 days of receipt at this level. The committee may co-opt any other member to resolve grievances.

372. **PMU Level GRC (Third Level):** In case the grievances are not addressed at the district level within 10 days of receipt, the same shall be brought to the notice of the PMU-level GRC. The PMU-level GRC will comprise the Director, DOIC, GoT, who will be the chairperson, and the Joint Secretary of the Revenue Department, Addl. Director (Projects)- DOIC, OSD/GM-TIDCL, Superintending Engineer-TIDCL, Executive Engineer TIDCL, Environmental (Safeguard cum Climate Change) Expert, TIDCL/ PMSC, Safeguards (Social and Gender), PMU, TIDCL. A representative from the line department (ULB, PWD) and two members from the industrial estate, with at least one of them a woman. GRC will resolve grievances within 15 days. The committee may co-opt any other member to resolve grievances.

373. The project GRM, notwithstanding, an aggrieved person shall have access to the country's legal system at any stage, and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative/positive outcome of the GRM. In case of grievance related to land acquisition, the affected persons will have to approach a legal body/court specially proposed under the RFCTLARRA, 2013.²¹ GRM will continue to be in place throughout the duration of the project. The grievance redress process is shown in **Figure 8-1**.

²¹ The authority admits grievance only with reference to the land acquisition, resettlement and rehabilitation issues under the RFCTLARRA, 2013.

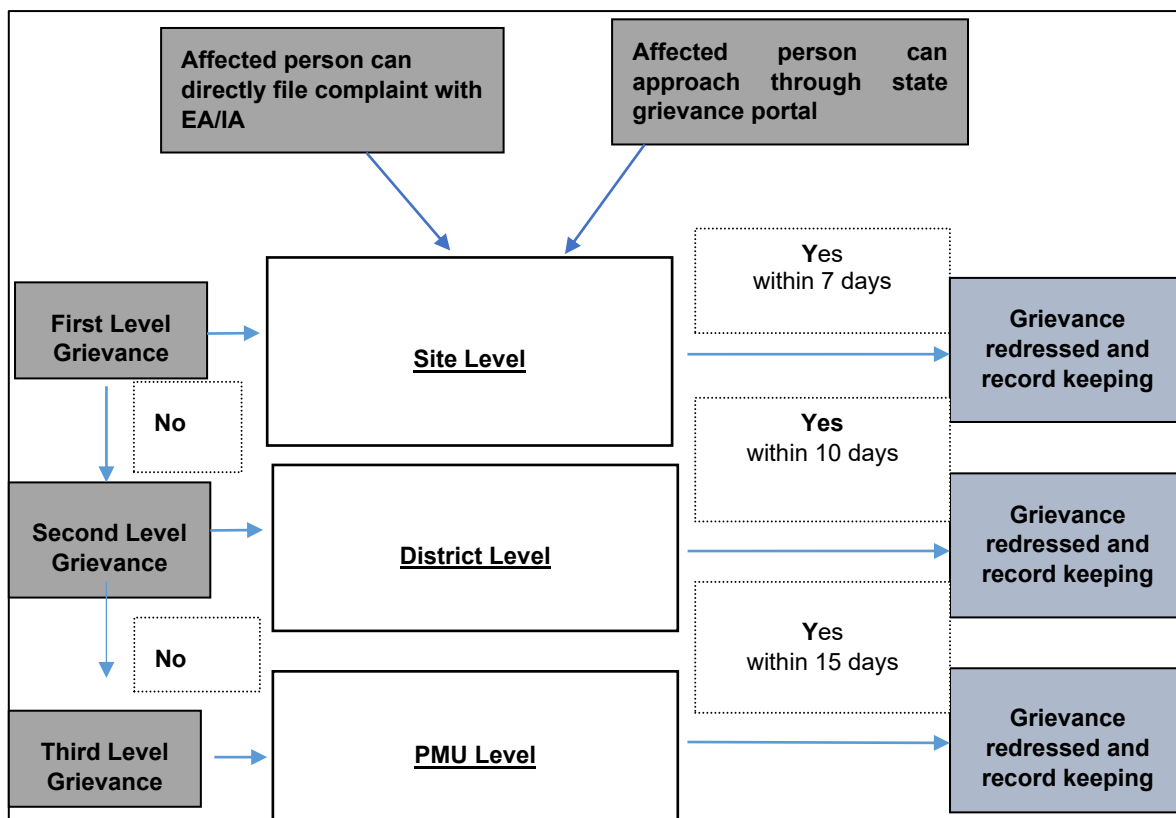


Figure 8-1: Grievance Redressal Mechanism

374. **ADB Accountability Mechanism:** The Accountability Mechanism provides an independent forum and process whereby people adversely affected by ADB-assisted projects can voice, and seek a resolution of their problems, as well as report alleged violations of ADB’s operational policies and procedures. In the event that the established GRM is not in a position to resolve the issue, the affected person also can use the ADB Accountability Mechanism through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters. Before submitting a complaint to the Accountability Mechanism, affected people should try in good faith to solve their problems by working with the concerned ADB operations department (ADB India Resident Mission - INRM in this case). The complaint can be submitted in any of the official languages of ADB’s developing member countries. The ADB Accountability Mechanism information²² will be included in the project-relevant information to be distributed to the affected communities as part of the project GRM.

375. **Documentation:** PMU, with the support of PIUs, will be responsible for the timely registration of grievances, related disclosure, and communication with the aggrieved party. PMU will also ensure that all the details from submission to resolution are well recorded and documented. The environmental and social safeguard specialists of PMU will be responsible for maintaining the records and coordinating with the affected persons regarding complaints related to their respective domain areas. The chair of each GRC will be responsible for

²² <http://www.adb.org/Accountability-Mechanism/default.asp>

informing the complainant in writing about the resolution of their complaint or the decision of the GRC.

376. **Record keeping:** PIUs will keep records of grievances received, including contact details of the complainant, the date the complaint was received, the nature of the grievance, agreed corrective actions, the date these were affected, and the outcome. The number of grievances recorded and resolved, and the outcomes will be displayed/disclosed in the PMU and PIU offices and reported in monitoring reports submitted to ADB on a semi-annual basis.

377. **Perioding review and documentation of lessons learned:** The Project Coordinator, PMU, will periodically review the functioning of the GRM in each site and record information on the effectiveness of the mechanism, especially on the project's ability to prevent and address grievances.

378. **Cost:** All costs related to the resolution of grievances (meetings, consultations, communication, and reporting/ information dissemination, as well as costs incurred by affected persons to attend GRC meetings, if any) will be borne by PMU.

9.0 ENVIRONMENTAL MANAGEMENT PLAN

9.1 General

379. The proposed infrastructure development works are not anticipated to have long term impacts on environmental attributes such as geology, hydrogeology, soil, flora, fauna etc. of the core and buffer zones of Bodhjunnagar IE.

380. The construction stage impacts like vegetation clearance, dust and noise levels, air pollution due to vehicular emissions, worker's safety, construction site management, construction material management including debris disposal, on and off-site sanitation management works are largely reversible, transitory in nature and confined to the existing IE boundary. The impacts arising due to laying of various utilities like water and effluent pipelines, electric cables (11/33 KV), natural gas pipelines are completely avoided through the provision of a utility corridor. Moreover, specialized works like laying of electrical cables and natural gas pipelines are governed by the respective regulations and code of practices, which stipulates all technical and safety requirements during erection, testing and commissioning stages.

381. An Environmental Management Plan (EMP) - sector/ component wise has been developed to provide mitigation measures to reduce construction stage adverse impacts, wherever anticipated to an acceptable level are given in **Table 9-1 to 9-4**. Further, the site specific EMP will be prepared by the contractor (C-ESMP), which will cover the mitigation measures for the respective construction sites during implementation of the project. The institutional responsibilities for planning, implementation, and monitoring of the EMP are also given in Table 9-1 to 9-4.

382. The purpose of the environmental management plan (EMP) is to ensure that the activities are undertaken in a responsible, non-detrimental manner with the core objective of undertaking all specific measures deemed necessary in mitigating the environmental impact(s) due to the proposed infrastructure development works and ensuring all safety considerations are adhered to.

383. The EMP shall be binding on all contractors operating on the site and will be included in the bid/contractor's contract agreement. The EMP largely includes mitigation management measures, most of which are akin to Good International Industry Practice (GIIP), considered incidental to works and deemed to be included in the quoted bid price(s) by the contractor. Non-compliance with, or any deviation from the conditions set out in this EMP constitutes a failure in compliance.

384. In addition, Environment, Health and Safety (EHS) performance requirements by the contractor will be specified and incorporated as special conditions and performance requirements in the contract. The contractor will appoint a full-time qualified EHS officer from commencement to closure of the Project. The contractor is expected to be fully aware of the construction stage EMP and EHS performance requirements at the bidding stage itself and deemed to have priced requirements at the bidding stage itself.

Table 9-1: Environment Management Plan – Roads & Storm water drains

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility	
				Planning and Execution	Supervision/ Monitoring
Pre-Construction/Design Stage					
1.	Permission for Tree Felling	Loss of 286 numbers of trees due to proposed components.	<ul style="list-style-type: none"> The application for tree permissions shall be made well in advance and no site clearance or pre-construction activities shall be initiated in stretches/ areas, which involve tree felling. Requisite tree cutting permissions (including Two endangered tree species) shall be obtained from Tripura Forest Department Coordinate and ensure timely felling of trees through the Forest Department, including removal of all stumps and clearance of site. Implement any stipulations imposed by the Department of Forests, while issuing the tree felling permissions including compensatory plantation among others Ensure the safety arrangements while cutting of trees along roads/utility corridor/ and storm water drainage. Prioritize the stretches/ areas for handing over to the contractor for commencement of construction 	PDMC (Design Consultant) and TIDCL	DoIC/ TIDCL (Environmental Safeguards team)
Construction Stage					
2.	Consent to Establish (CTE) and Consent to Operate (CTO) from TSPCB	Non-compliance to regulatory requirements under Water and Air Pollution Acts and possibility for water and air pollution	<ul style="list-style-type: none"> Contractor must prepare a SEMP including (i) proposed sites/locations for construction work camps, stack/ storage areas, workforce camps, hot mix plants, batch mix plants for WMM and Concrete, crushers (if required) and get it approved from PIU and ESG Cell under PMU. Contractor must obtain CTE and CTO from TSPCB for establishing crushers (if required), construction camp site, material stack yards, hot mix plants, batch mix plants for WMM and Concrete, Workforce Camps Locations within IE No work shall commence without prior approval of SEMP from PIU and ESG Cell under PMU and consent from TSPCB. Copy of consents shall be submitted to the PIU and ESG Cell under PMU 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
3.	Permissions for using ground water (existing/new tube wells) for construction	Non-compliance to regulatory requirements and possibility for depletion of water resources	<ul style="list-style-type: none"> Contractor shall obtain prior permissions from designated department of state government and/ or from regional officer of central ground water authority Copy of the permission shall be submitted to the PIU and ESG Cell under PMU same to ESG Cell. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
4.	Orientation of EMP for contractor	Orientation will sensitize contractor to minimize construction impacts and implement EMP requirements in a better way during project implementation phase	<p>The ESG Cell will orient the contractor with the EMP stipulations and EHS requirements under the contract. This shall include but not limited to the following</p> <ul style="list-style-type: none"> Contractual Obligations of Contractor to submit Contractor's Site Environmental Management Plan (C-SEMP). C-SEMP prepared by Contractor shall be reviewed and approved by the ESG Cell, prior to commencement of construction works. Implementation of various plans required under C-SEMP related to Occupation Health & Safety (OHS), traffic diversion and road safety, hazardous and non-hazardous waste management plan, camp site management, water and waste management plan, workforce influx management plan, worker's camp management plan, emergency response plan (ERP) including conducting periodic mock drills, opening up of borrow area and muck disposal and including their restoration plan etc. Regulatory compliance requirements like obtaining CTE and CTO from State Pollution Control Board Workforce/Labour Management Procedures in line with Govt. of India and State Govt. norms Procedures for Worker's safety at all operational sites Implementation of GBV risk mitigation strategy plan at workforce camps, operational sites and at other hotspots likely to be frequented by workers after work hours/leisure and/or on weekly off days. Contractor to appoint one full time, qualified Environmental, Health and Safety Officer, who shall be solely responsible for implementation of all the SEMP stipulations and EHS requirements under the contract in close co-ordination/consultation with Environment Specialist under ESG Cell and TIDCL. Establishing GRM (Grievance Redress Mechanism) for Contractors' workforce as well as for existing industries/ workforce/ community for issues arising due to construction activities. Some of the GRM dissemination avenues for construction workers are. During Induction training for new workers and toolbox meet/briefings by work supervisors During periodic tail gate sessions, to review and refresh site protocols on safety procedures at work. Through pictorial illustrations and posters in local language installed at prominent places like entry/exit points, canteen, entertainment areas, health camps sites etc. During awareness campaigns for safety at work and response to Emergency Response Plans 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
5.	EHS Performance Requirements	Will sensitize contractor to understand the requirements and implement EHS requirements in a better way during project implementation phase	<ul style="list-style-type: none"> The EHS (Environment, Social, Health and Safety) performance requirements by the contractor under contract have been specified and incorporated as special conditions and performance requirements in bid documents of contract packages. The EHS performance requirements incorporated in the bid documents, obligate the contractor, upon mobilization, to prepare a Contractor's SEMP (C-SEMP), which shall include impacts mitigation and management plan, environmental enhancement plan, Occupational Health and Safety (OHS) Plan, labor management plan, workers' campsite management plan, grievance redressal mechanism (GRM) for workforce, traffic diversion and management plan, COVID-19 considerations, GBV risks mitigation and among others in accordance with the GoI, Govt. of Tripura and ADB requirements. The C-SEMP submitted by the contractor shall be reviewed and approved by the ESG Cell, prior to commencement of construction works. The approved C-SEMP also be reviewed periodically (as and when required but at least once in three (3) months) by ESG Cell and updated in a timely manner, to address changed requirements, if any during project implementation. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility	
				Planning and Execution	Supervision/ Monitoring
6.	Disaster Management & Emergency Response Plan	Will enable contractor(s) preparedness and response to any emergency situation during project implementation phase	<ul style="list-style-type: none"> The overall vulnerability of West Tripura district including Bodhjungnagar IE is categorized as High for earthquakes and thunderstorms. In order to ensure safety of work force during any kind of natural calamity like earthquake a Disaster Management and Emergency Response Plan for Bodhjungnagar IE must be prepared by contractor as part of C-SEMP, suiting to contractor's scale of establishment, which shall be approved by ESG Cell. All work force, irrespective of level, are to be provided with training to respond in an emergency and periodic mock drill shall be conducted to ensure the preparedness to respond any emergency situations. All project operations shall be planned and coordinated in tandem with the daily/weekly weather predictions/alerts issued by competent authorities as relevant for the district and all such alerts shall be duly considered and review the scheduled work programs on a daily basis. At project level, contractor shall designate an Incident Controller (IC), Emergency Controller (EC), Assembly Coordinator (AC) and other required personnel for the emergency response mechanism in an event of natural disaster/ calamity in line with the ERP. As part of the ERP, the contractor shall establish and maintain regular coordination with the designated officers for Disaster Management at district/sub-division/ district levels. Maintaining regular coordination will enable us to seek quick response, in the event of natural disaster and/or any other natural calamity. West Tripura district has a Disaster Management Plan at district and subdivision levels, which provide the institutional arrangements, designated officers, emergency response systems, infrastructure facilities like hospitals, fire stations, police station at tehsil, sub-division and village levels. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
7.	Work Zone Safety Requirements	Will enable contractor to ensure safety requirements at work zones during project implementation phase	<ul style="list-style-type: none"> Prior to commencement of construction, the contractor will prepare and submit Contractor's SEMP (C-SEMP), which will include contractor's management plan for (i) Work Management; (ii) traffic and work zone safety management plan for the prioritized encumbrance free stretches/ areas, in accordance with approved implementation schedule. In addition, the contractor will be contractually obligated to implement work zone safety arrangements confirming to the requirements of IRC: 67 and IRC: SP: 55: 2014, which include provision of PPEs, fixed/ mobile barricades between work area and pedestrian/ traffic and required measures for ensuring community safety during construction activities. The requirements also include site specific traffic management plan for all types of work along with a work zone safety check list. The responsibility of the contractor to manage these risks is clearly reflected as the contractual obligations of the Civil Works Contractor with appropriate mechanisms for addressing non-compliance. Commencement of any activity by contractor without prior approval of these requirements will be treated as "non-compliance to contract obligations". 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
8.	COVID - 19 Requirements for Construction Workers	Will enable contractor to ensure preparedness and respond to any emergency situation arising due to eruption of Covid variants during project implementation phase	<ul style="list-style-type: none"> In respect of COVID situation, Standard Operating Procedures (SOPs) and Guidelines for Construction Sites for COVID-19 Outbreak issued by Central Public Works Department, Government of India, May 2020 and Tripura State Govt. as & when notified. Contractor shall mandatorily adhere to these Govt. of Tripura and GoI COVID-19 SOPs at all construction sites, which shall cover all contract workers, particularly migrant construction workers during the mobilization and subsequent phases of construction by the contractor: <ul style="list-style-type: none"> Induction of new batch of migrant workers, possibly some of them could be symptomatic or asymptomatic COVID carrier(s) Migrant workers returning to work after visiting native places and/or hometowns, possibly asymptomatic COVID carriers and could have got infected either on way home or on way back to project site. Any worker, who could have got infected from local community during visit to local market areas for purchase of some daily needs Contractor shall adopt Labour Management Procedure and approved by ESG Cell, which shall include the following: <ol style="list-style-type: none"> Conducting pre-employment health checks Controlling entry and exit from site/workplace. General hygiene, cleaning, and waste disposal at all operational sites Maintaining social distance of minimum 1.5 meter at work sites as well as at workforce camps Provision of PPEs for covering of face with masks/cotton cloths, use of sanitizers, frequent washing of hands Creating awareness and prohibiting spitting in public, avoid use of chewing gum, tobacco in all forms, Instruct/encourage reporting of flu-like-illness symptoms and creation of isolation/quarantine rooms for any workers reporting/showing COVID symptoms until shifting to designated COVID hospitals. Adjusting work practices from COVID consideration reviewing accommodation arrangements maintain social distancing norms. reviewing accommodation arrangements, to see if they are adequate and designed to reduce contact with the community. reviewing contract durations, to reduce the frequency of workers entering/exiting the site. rearranging work tasks or reducing numbers on the worksite to allow social/physical distancing, or rotating workers through a 24-hour schedule providing appropriate forms of personal protective equipment (PPE) putting in place alternatives to direct contact, like tele-medicine appointments and a live stream of instructions. Instances of spread of virus. Training and communication with workers Communication and contact with community. Provision of medical insurance covering treatment for COVID-19, sick pay for workers who either contract the virus or are required to self-isolate due to close contact with infected workers and compensation payment in the event of death. Designating/appointing a COVID-19 focal point officer with responsibility for monitoring and reporting on COVID-19 issues and liaising with competent authorities designated by district administration or the State Government. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility	
				Planning and Execution	Supervision/ Monitoring
			<ul style="list-style-type: none"> Contractor to convene regular meetings with the project health and safety specialists and medical staff (and where appropriate with local health authorities), and to take their advice in designing and implementing the agreed measures. Identify a senior person as a focal officer with responsibility for monitoring and reporting on COVID-19 issues and liaising with competent authorities designated by the district administration or State Government authorities point. Contractor's coordination arrangements, particularly at site where there are a few contractors and therefore (in effect) different work forces (ESG Cell could request the main contractor to put in place a protocol for regular meetings of the different contractors) Contractors to ensure regular checks on whether the workers are informed/encouraged to use the existing project grievance mechanism to report concerns relating to COVID-19 		
9.	Establishing Construction Camp Site, Material Stack Yards, Hot Mix Plants, Batch Mix Plants for WMM and Concrete, Workforce Camps Locations	Air, noise, water pollution and sanitation	<ul style="list-style-type: none"> All establishments/facilities by the contractor shall be set up at existing vacant plots within the IE and sufficiently away from existing industries and approved by ESG Cell. The Contractor shall submit a detailed layout plan for all such site establishments and prior approval of ESG Cell shall be necessary. Site specific protection measures required at such location are to be considered to minimize associated environmental risk, if the site selection is in rolling terrain. Arrangements to control dust pollution through provision of wind Screens, water sprinklers through pressurized fine spray nozzles shall be provided for dust suppression at all such operational sites, to ensure that there are no visible dust levels. The crushers, hot mix plants and batching plants shall conform the emission norms as well as noise level limits stipulated by CPCB and/or Tripura State Pollution Control Board (TSPCB) Consent to Establish (CTE) and Consent to Operate (CTO) shall be obtained from TSPCB by the Contractor prior to establishing or operation of any such facilities under this contract. A copy of permissions/consents should be submitted to ESG Cell. All stipulated consent conditions shall be strictly adhered to and complied with by the contractor. All establishment sites shall be access controlled with fixed entry and exit points. The contractor shall carry out periodical environmental monitoring at each of these locations/ operational sites as per Monitoring Program approved by ESG Cell and shall also carry out necessary servicing/ repair/ maintenance of machineries and equipment to comply with permissible emission standards for air and noise of GoI and TSPCB. The contractor shall be responsible to provide any mitigation and management measures to prevent induced impacts from such establishment sites due to wastewater, solid waste, landslide, erosion, clogging of streams, soil and water contamination, spoil dumping etc. Any impacts arising due to contractor actions shall be addressed in amicable way at their own cost. The work camp sites shall mandatorily have designated paved areas with shades/roof for storage of used oils/lubes in plastic/HDPE drums, prior to their final disposal in TSPCB approved disposal locations. All construction sites shall have a provision of one mobile toilet of 2-seater capacity (1 men and 1 woman with separate entrances), stationed at a suitable place within 100 meters from each operational area. The mobile toilet shall have at least 1000 liters of overhead water storage, well always maintained and in usable condition. The bottom tanks shall be regularly cleaned, and the overhead tank replenished as per requirement. The work force shall be oriented to using mobile toilets and avoid using public toilets and/or nearby open places/parks. Every operational area shall be provided with one mobile drinking water kiosk having a storage of 300 liters and placed at a suitable place within 100 meters from work site. All work force shall be provided with suitable type of accommodation, if required and local labour or can return to their normal places of residence. Pooled transportation facilities, as may be required, shall be provided by the contractor. If establishing workforce camps becomes utmost necessary, then some shall be established at least 500m away from the settlement areas and away from bridge sites and or any other water body. The workforce camps shall be provided with all basic facilities like water supply, cooking gas facility, sanitation facilities including provision of mobile toilet (of adequate seating capacity for men and women separately) shall be stationed within the workforce camp. The mobile toilet shall be periodically replenished with fresh water for ablution purposes and wastewater shall be emptied through suction tankers and carried to the nearest municipal sewage treatment facilities. Alternatively, septic tank cum soak pit arrangements of adequate capacity shall be provided as per requirements. No wastewater from the camp/work force site shall be discharged directly without any treatment into any surface water channels or drain, which eventually join surface water bodies. The establishment sites shall be cleared from all remnants of construction and debris and restored to their previous state or as approved by PIU/ ESG Cell under PMU. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
10.	Management of Crusher sites and its operations	Air and noise pollution due to crusher operations and deployed vehicles, equipment and machinery	<ul style="list-style-type: none"> Since, West Tripura district does not have any stone aggregate resources which can be quarried, the contractor shall submit a due diligence/ safeguard compliance report of material sourcing locations with respect to applicable statutory requirements, identify and measures to offset risk to the project, if any required. The existing quarry or material sourcing locations shall have to conform to emission norms as well as noise level limits stipulated by CPCB and/or Tripura State Pollution Control Board (TSPCB). If the contractor chooses to establish crusher operations of the stone boulders sourced from elsewhere, the contractor in such cases shall obtain the Consent to Establish (CTE) and Consent to Operate (CTO) from TSPCB before establishment and operation of crushers, A copy of permissions should be submitted to the ESG Cell. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility	
				Planning and Execution	Supervision/ Monitoring
			<ul style="list-style-type: none"> The crushers shall have site specific management plan for dust/ noise control during transportation and at stock piling, waste management, wastewater and sanitary waster from workers camps, storage of fuel, stockpile management and any other anticipated risks. 		
11.	Arrangement for Construction Water	Reduction/ depletion of ground water resources	<ul style="list-style-type: none"> The contractor shall be responsible for arranging construction water demand in compliance with requisite statutory requirements. In doing so, the contractor shall assess water source availability and shall prepare a construction water demand and management plan for approval of ESG Cell. Construction water requirements are to be met from only existing tube wells, with prior approval of ESG Cell and competent authorities. Contractors shall preferably have more than one source to avoid over dependence on a single source and affect pre-existing users. Contractors shall obtain prior approvals from the ground water department and/ or other designated department of state government, wherever required and submit a copy of the same to ESG Cell. West Tripura district is under the safe category and therefore contractors can even construct new tube wells specially for the construction water requirements, if required, with requisite prior permissions/ approvals from competent authorities. Contractor shall exercise all measures to minimize water consumption and wastage during all phase of construction works 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
12.	Labour/ Workforce Management	Protection of labour rights privileges including equal/ rightful wages	<ul style="list-style-type: none"> Contractor shall comply with all labour regulations of Govt. of Tripura, Government of India and The Occupational Safety, Health and Working Conditions Code, 2020 Contractor shall prefer skilled/ unskilled local labour drawn from nearby places/ region wherever feasible/extent possible, to benefit local community. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
13.	Clearing, Grubbing, Stacking/ preservation and reuse of topsoil for green belt/ landscape areas	Loss of vegetation, topsoil and probable impacts on herpetofauna	<ul style="list-style-type: none"> All construction sites shall be clearly demarcated with hazard tape or barricaded with access control as may be required at each specific site. All works shall be carried out such that the damage or disruption to vegetation/ flora other than those identified for minimum cutting/ clearing. All identified vegetation for clearing shall be removed from the construction zone before commencement of construction. The Contractor, under NO circumstances shall cut or damage trees. The topsoil from all areas shall be stripped off to a specified or a minimum depth of 150 mm and stored in stockpiles. The locations for stock piling shall be pre-identified in consultation and with approval ESG Cell. The reuse of the excavated earth for landscaping and green belt development will require correction of pH by addition of calcium oxide or calcium carbonate, which in turn increases the availability of nitrogen, phosphorus, calcium and magnesium in acidic soils and thus enables growth of vegetation. The contractor shall take measures to prevent generation of dust from such stockpile areas by covering them with jute cloth or tarpaulin. Such stockpiled topsoil shall be utilized for – <ul style="list-style-type: none"> To prepare surface for green belt development and landscape areas. To prepare surface for bioengineering measures. Covering all disturbed areas including low lying areas within IE Dressing of slopes of road embankment within IE 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
14.	Earth Excavation and handling of Excavated Earth/ Construction Debris	Loss of vegetation, topsoil and disposal of excess earth and construction waste as debris Air and noise pollution due to deployed vehicles, equipment and machinery	<ul style="list-style-type: none"> The site clearance and/or excavation activities shall be opened only in segments of 250 m stretch or specified zones at a time and no new stretches/ zones shall be opened up unless the clearance and/or excavation activities in previous stretches or zones been satisfactorily completed and clearance given for the opening of next stretch or zone by ESG Cell. Prior to undertaking any site clearance and/or excavation activities, particularly hill side cut and excavation activities in any working stretch, the contractor shall mandatorily prepare an excavation plan with site specific measures/plans. The contractor shall submit 'excavation plan' to ESG Cell for approval in advance before opening of new work zone/ area. The blasting and use of explosives in any form shall not be used by the contractor under any circumstances. All excavation/ hill cutting operations shall be carried out using the rock driller/ hammer attachments with the excavators. Prior to commencement of any such excavation operations, contractors shall inspect the site to assess the potential for any disturbance to the adjoining industries and undertake the works in slow pace with prior intimation to such property owners. The contractor's handling and management of surplus excavation material shall be reviewed and approved by ESG Cell and shall be mandatory for opening and commencement of excavation at new work zone or stretch. Prior to disposal, the excavated material shall be screened/ scavenged for recovery of good soil, which can be used in the construction of sub grade, shoulders, back filling of retaining/breast/toe walls and or any other construction works. The use of recovered material is subject to conforming to technical specification and standards prescribed and approval by the ESG Cell. The noise levels during excavation shall be reduced/limited through deployment of well- maintained construction vehicles/equipment/machinery. All excavation activities shall be undertaken during daytime and at normal work pace, particularly in areas close to existing industries. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
15.	Planning for Traffic Diversions and Disruption in access and services to	Inconvenience to existing industries and other road users within IE	<ul style="list-style-type: none"> Traffic Control Plans shall be prepared by the Contractor and submitted to ESG Cell for approval prior to commencement of works on any section of road. Temporary diversions shall be constructed with the approval of the ESG Cell, and local/ district admin authorities as required. The traffic control plans shall include details of temporary diversions, traffic safety arrangements for construction under traffic, details of traffic arrangement after cessation of work each day, safety measures for night-time traffic with LED lighting facility and barricading as may be required, among others. The Contractor shall ensure that the diversion/detour is always maintained in good and easily usable condition, particularly during the monsoon to avoid disruption to traffic flow. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility	
				Planning and Execution	Supervision/ Monitoring
	existing industries	Safety issues for road users particularly during nighttime Air and noise pollution due to deployed vehicles, equipment, and machinery	<ul style="list-style-type: none"> The Contractor shall also inform all stakeholders/local community of changes to traffic routes, conditions and pedestrian access arrangements under intimation to ESG Cell. The temporary traffic detours shall be kept free of dust by sprinkling water as required under specific conditions. Ensure traffic diversions are in place, to minimize the inconvenience to the existing road users during the road construction phase. Wherever required, adequate number of uniformed traffic wardens with reflective batons shall be deployed to manage the traffic for the entire construction phase. Dust suppression measures like regular sprinkling of water through pressurized fine spray nozzles shall be carried out to ensure dust levels are kept to minimum. Normally 3-4 times of water sprinkling per day shall suffice). The Contractor shall provide, erect, and maintain informatory /safety signs, hoardings written in English and local language, wherever required or approved by ESG Cell. All works shall be adequately planned and swiftly completed so as to minimize the inconvenience to the existing industries (inward and outward movement of vehicles and workforce) After completion of the work, disrupted/damaged diversion roads shall be restored by the Contractor. Advance information (7 days) wherever required, shall be served through poster and leaflet or through personal communication (as may be required) to the existing industries within the IE who may get affected due to temporary loss of access due to construction works. Make alternate arrangements for disrupted access if it is likely to be more than 4 hours. Restore the services with minimum down time and provide alternative source of supply for intervening period (if more than 2 hours). 		
16.	Transporting Construction Materials and Haul Road Management	Inconvenience and safety issues for existing road users. Air and noise pollution due to movement of vehicles, clearance of spills during transportation	<ul style="list-style-type: none"> Contractor shall maintain all roads (within IE), which are used to be for transporting construction materials, equipment and machinery. All vehicles delivering fine materials to the site shall be covered with tarpaulin to avoid spillage of materials. All roads used by vehicles of the Contractor or any of his sub-contractor or suppliers of materials and similarly roads, which are part of the project construction works, shall be kept clear of all dust/utility corridor/spillage or extraneous materials dropped by such vehicles. The contractor shall arrange for regular water sprinkling through pressurized fine spray nozzles for dust suppression of all such roads and surfaces. If roads along existing industries are to be used as haul roads, then drivers and other involved workers shall be sensitized about "How to avoid conflicts". Existing industries shall be consulted by the Contractor to fix the timings of road usage and should avoid peak hours, if any to avoid/minimize inconvenience to existing industries/ local community. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
17.	Occupational Safety, Health, First Aid Facilities and Documenting Safety at all Construction and Operation sites	Will enable contractor to ensure safety requirements at work zones during project implementation phase	<ul style="list-style-type: none"> All workforce/ labour shall be provided with safety instructions daily, depending upon the work, for which they are likely to be deployed for the day/shift. Labour shall be provided with PPEs at no cost and ensure that the same is always being used by the work force, while at work. In case of damaged or lost PPEs, some shall be replaced without any cost to labour. All labour shall be instructed and encouraged to report, irrespective of small or major or fatal injury to the supervisory staff and all such incidents shall be documented, and ensure such incidents are not repeated by taking adequate precautions. All Supervisory staff shall be provided with mobile phones for better communication across all operational areas, in case of emergency or otherwise. The contractor shall establish a small first aid room/ mini clinic at the campsite and make available a standby vehicle for emergency purposes for transportation in case of accident with serious injuries at site. Any accident with fatalities shall be reported promptly to ESG Cell and shall take measures to compensate the affected person in accordance with existing regulation. First aid facilities and free emergency care shall be provided to all workforce, irrespective of their rank/level and no cost shall be recovered from them on this account. The contractor shall deploy a medical practitioner periodically at the camp site to attend to health issues/first aid and shall conduct regular health check-ups of all staff and workers employed on the project. Further, no wages shall be cut for a period of absence because of injury – The contractor shall mandatorily have Contractor All Risk (CAR) policy to cover workers of the main contractor as well as all sub-contractors and third party. All work site(s) shall have first aid kits and details of major/nearby hospitals displayed prominently in local language, in case of emergency and/fatalities to work force and/or public, because of operations. The supervisory staff shall be provided with a wireless communication system (mobile telephones for better communication in the operational area and with other operational areas, in case of emergency or otherwise. The Contractor shall comply with all the precautions as required for ensuring the safety of the workmen as per the Government of India norms/regulations All workforce deployed shall be governed by Laboure management procedures of TIDCL and Tripura Building and Other Construction Workers Welfare Board with regards to safety and welfare measures (including equal wages for men and women) for workers employed at building and other construction sites. The Contractor shall make sure that during the construction work all relevant provisions are adhered to. The Contractor shall not employ any person below the age of 18 years for any construction work and no woman shall be employed for hazardous work, unless and otherwise she is trained to carry put such work. The Contractor shall mark 'hard hat' and 'no smoking' and other 'high risk' areas and enforce compliance to use of PPE with zero tolerance. These shall be reflected in the Construction Safety Plan to be prepared by the Contractor during mobilization and shall be approved by ESG Cell To promote and encourage a Safety culture, senior engineers in Contractors and consultants' teams shall wear helmets and safety jackets at all operational sites. Visitors/officials to work sites are to be provided with PPEs (hard hats and safety shoes) and shall be briefed on ongoing operations at that specific time and related safety requirement at work site including safe distances to keep during the site visit. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility																																																					
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			<ul style="list-style-type: none"> The work force shall be subjected only to standard work shifts/hours. Overtime allowances, if applicable/warranted shall be paid with ceiling limits. Working beyond such ceiling limits shall be discouraged, even if, so desired workforce or contractor. 																																																						
18.	Water Pollution	Surface and ground water pollution at all operational sites, camp offices and workforce camps	<ul style="list-style-type: none"> The Contractor shall provide oil interceptor and take pre-cautionary measures to ensure that no water pollution occurs through surface runoff from construction vehicle parking areas, fuel/lubricants storage sites, vehicle, and machinery/equipment maintenance sites. The contractor shall ensure that all vehicle/machinery and equipment maintenance and refueling shall be carried out in such a manner that spillage of fuel and lubricants do not contaminate soil and groundwater. All other off-site operational areas like camp site, work force camp sites, which are likely to have potential for pollution, are to be provided with on-site mobile sanitary facilities, the effluents/waste discharges of which shall be transported to nearest sewage treatment plants through mobile tankers. The oil/lube storage shall be under roofed areas with impermeable cement concrete surfaces. Thus, the project operations shall not have any significant scope for soil or surface and/or ground water contamination. Thus, road construction projects shall not impact ground water sources. The water usage pattern within the construction camps can be minimized by adopting following best practices: <ul style="list-style-type: none"> Use buckets for washing purposes instead of using running water. Use of auto shut off taps (without sensors) in labour accommodation. Install water meters with main supply pipes/water tanks/bore well to assess quantity of consumed water. Create awareness among the camp site, work force camp sites at all levels. Areas used for handling of fuel and lubricants, wherever applicable shall be impermeable surfaces and under roof to prevent groundwater and soil contamination in the event of accidental spills. All other off-site operational areas like camp site, work force camp sites, which are likely to have potential for pollution, are to be provided with on-site mobile sanitary facilities, the effluents/waste discharges of which shall be transported to nearest sewage treatment plants through mobile tankers. The camp site and work force camp sites shall be provided with septic tank with soak pit arrangement of adequate capacity and numbers as required. All toilets and wash areas within the camp site and work force camps shall be provided with septic tanks and soak pit arrangements of adequate capacity. No wastewater from the camp/work force site shall be discharged directly into any surface water channels or drain, without any treatment, which eventually joins surface water bodies. Typically, each 5m Length, 2m Breadth and 1.5 m Clear depth with 0.3 free board with soak pit arrangement, which can serve up to 50 users at peak level as per CPWD specifications. CPHEEO, Ministry of Housing and Urban Affairs, GoI recommended sizes of septic tank (as per BIS 2470 part I) up to 300 users are given in the following table. The number of septic tanks required at the workforce camps and camp sites can developed demanding up to the number of locations and users. BIS 2470 part I may be referred for construction details of septic tanks and soak pit disposal arrangement. <p style="text-align: center;">CPHEEO Recommended size of septic tank up to 300 users.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="3">No. of Users</th> <th rowspan="3">Length (m)</th> <th rowspan="3">Breadth (m)</th> <th colspan="2">Liquid depth (m) (cleaning interval of)</th> </tr> <tr> <th>2 years</th> <th>3 years</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>1.5</td> <td>0.75</td> <td>1.0</td> <td>1.05</td> </tr> <tr> <td>10</td> <td>2.0</td> <td>0.90</td> <td>1.0</td> <td>1.40</td> </tr> <tr> <td>15</td> <td>2.0</td> <td>0.90</td> <td>1.3</td> <td>2.00</td> </tr> <tr> <td>20</td> <td>2.3</td> <td>1.10</td> <td>1.3</td> <td>1.80</td> </tr> <tr> <td>50</td> <td>5.0</td> <td>2.00</td> <td>1.0</td> <td>1.24</td> </tr> <tr> <td>100</td> <td>7.5</td> <td>2.65</td> <td>1.0</td> <td>1.24</td> </tr> <tr> <td>150</td> <td>10.0</td> <td>3.00</td> <td>1.0</td> <td>1.24</td> </tr> <tr> <td>200</td> <td>12.0</td> <td>3.30</td> <td>1.0</td> <td>1.24</td> </tr> <tr> <td>300</td> <td>15.0</td> <td>4.00</td> <td>1.0</td> <td>1.24</td> </tr> </tbody> </table> <p>Notes:</p> <ul style="list-style-type: none"> Capacities are recommended on the assumption that discharge from only WC shall be treated in the septic tank. Provision of 300mm should be made for free board. Sizes of septic tank are based on certain assumption on peak discharges, as estimated in IS:2470 (part 1) and while choosing the size of septic tank exact calculations shall be made. For users over 100, the tank may be divided into independent parallel chambers of maintenance and cleaning. 	No. of Users	Length (m)	Breadth (m)	Liquid depth (m) (cleaning interval of)		2 years	3 years	5	1.5	0.75	1.0	1.05	10	2.0	0.90	1.0	1.40	15	2.0	0.90	1.3	2.00	20	2.3	1.10	1.3	1.80	50	5.0	2.00	1.0	1.24	100	7.5	2.65	1.0	1.24	150	10.0	3.00	1.0	1.24	200	12.0	3.30	1.0	1.24	300	15.0	4.00	1.0	1.24	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
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19.	Air Pollution from Vehicles, Plants and Equipment	Air pollution due to deployed vehicles, equipment and machinery	<ul style="list-style-type: none"> The Contractor shall take every precaution to reduce dust levels at contractor's establishment sites and/or operational construction sites by sprinkling of water through pressurized fine spray nozzles. All tipper trucks carrying construction debris shall be covered with net cloth and wet prior to dispatch of every trip, to prevent en-route spills as well as airborne dust during transit. Tipper trucks shall not be overloaded beyond designated capacities and shall be provided with tail board, to avoid en-route spills. The dust levels during collection and loading operations of construction debris shall be controlled through periodical sprinkling of water through mobile water tankers of adequate capacity fitted with pressurized fine spray with hose reels and stationed at excavation areas. The Contractor shall procure the construction plants and machinery, which shall conform to the pollution control norms specified by the MoEF&CC/CPCB/TSPCB. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director																																																				

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility	
				Planning and Execution	Supervision/ Monitoring
			<ul style="list-style-type: none"> All vehicles, equipment and machinery deployed for construction are regularly maintained and maintain a record of Pollution Under Control (PUC) certificates for all vehicles and machinery used during the contract period which shall be submitted to ESG Cell for verification, whenever required. The contractor shall maintain records and conduct fitness tests of all vehicles and machinery at regular intervals of one year and the fitness certificate shall be submitted to ESG Cell. Only fit vehicles and machinery shall be deployed during construction. Environmental monitoring of all construction operational sites and contractor's establishment sites shall be conducted at least once in a month as agreed/ approved ESG Cell. 		
20.	Noise Pollution from Vehicles, Plants and Equipment	Noise pollution due to deployed vehicles, equipment and machinery	<p>The Contractor shall confirm to the following:</p> <ul style="list-style-type: none"> All Construction plant, machinery and equipment used in construction shall strictly conform to the MoEF&CC/CPCB requirements with respect to emissions and noise levels/standards. Servicing/routine maintenance of vehicles, equipment and machinery shall be undertaken periodically as per the approval of ESG Cell to keep emissions and noise levels as per norms/minimum. All construction works with high noise levels shall be stopped after sunset hours. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
21.	Non-hazardous Waste Management	Safe disposal of waste from construction camp sites	<ul style="list-style-type: none"> The Contractor's EMP shall include a Management Plan for Non-Hazardous waste and approved by ESG Cell. The camp site shall have compost pits for treating organic waste and separate bins for collecting the inorganic waste, which shall be disposed of at nearest municipal disposal sites. The nearest such sites are available at Agartala. The contractor shall collect, and store non-hazardous waste generated at camp sites in HDPE/steel drums and stored in a segregated roofed area and periodically disposed at approved waste disposal facilities by Tripura State Pollution Control Board. 		
22.	Bio-diversity Management (flora and fauna)	Loss of vegetation/ tree cover	<ul style="list-style-type: none"> In order to compensate for the vegetation cleared and trees felled due to construction works, compensatory plantation to be undertaken through planting of 1430 trees (five (5) trees to compensate for one adult tree (1:5 / 286:1430) with 90% survival rate with three years maintenance. Only local species, approved by the forest department shall be used for both tree plantation and development of green/ landscaped areas. Normally, all such afforestation works are undertaken by Tripura Forest Department and maintained for three years as a deposit work to be borne by TIDCL. With these compensatory plantation measures, the tree cover lost could be regained in 2-3 years and thus the impacts could be mitigated. <p>In order to limit the impacts on the fauna during construction, the following measures shall be followed:</p> <ul style="list-style-type: none"> All work force shall be oriented to keep calm and walk away from the scene, in case, wild animals are sighted either during work hours at operational/work sites or at night hours at campsites. The construction work shall be restricted to day hours only. Work force shall be strictly instructed not to harm/kill and prohibited hunting of wild animals under any circumstances. The Construction camp and work force camp sites shall be established within IE. The camp sites and work force camps shall be access controlled and well-lit to avoid/prevent entry of wild animals. The work force shall be oriented not to feed monkeys and /or stray animals and to properly collect waste food in dustbins to prevent menace in camp area. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
23.	Ancient and Historical Monuments and Chance Finds	Impact/ loss of cultural/ historical resources	<ul style="list-style-type: none"> Bodhjungnagar IE and its surrounding areas do not have any protected Ancient and Historical Monuments and therefore no measures are warranted. All fossils, coins, articles of value of antiquity, structures and other remains or archaeological interest discovered on the site during excavation works (chance finds) shall be the property of the Government and shall be dealt with as per provisions of the relevant legislations/ Acts. The Contractor shall take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or thing. The matter shall be immediately brought to the notice of ESG Cell and TIDCL upon discovery of any such articles thereof and carry out TIDCL's instructions for dealing with the same and till such time all work shall be stopped. ESG Cell shall report the matter to competent authorities at state or Archaeological Survey of India (ASI) through TIDCL and no further work shall be undertaken, until the location is cleared by competent authorities. The contractor shall recommend the work on the site only after the site is cleared and he gets instructions from TIDCL through ESG Cell. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
24.	GBV (gender-based violence)	Possibility of GBV arising due to influx of migrant labour/ construction workers and existing workforce of IE and community of nearby areas	<ul style="list-style-type: none"> A GBV risk mitigation strategy plan shall be implemented by the contractor under the supervision of ESG Cell and coordination by TIDCL. The plan shall comprise identifying potential risks; mitigation measures; prevention and responses strategy; key actions/SOPs to receive complaints, maintaining confidentiality, handling procedure of complaints, resolution of complaints with survivor centric approach, commensurate to different construction phases. Some of the generic measures, which shall be included in the GBV risk mitigation and key action plan are summarized hereunder: <ul style="list-style-type: none"> Creating awareness about GBV related issues among workers during engagement and/or during Induction of workforce Mandatory consent signing of Code of Conduct (CoC) by all workforce (all categories and levels) to the adhere to the Policy on Sexual Harassment of Women at Workplace prior to the acceptance of the employment/ appointment order. The Code of Conduct for GBV related issues shall include/ cover at workforce camps and or community hotspots like nearby market areas frequented by workers after work hours and/or weekly off days, schools, vocational training centers, liquor shops and, migrant workers residing in rented accommodations within the villages/settlement areas. Sensitization and orientation of workforce (all categories, all levels) during induction phase about GBV and associated risks and pep-talk to refresh subject matter in routine toolbox meetings. These shall also be at periodic intervals (at least once in quarter) through external specialized NGOs/ social workers about Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Acts, 2013" and consequences of violations. Integrate briefings on GBV into existing induction training, safety talks, toolbox meetings, tailgate sessions and regular training. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility	
				Planning and Execution	Supervision/ Monitoring
			<ul style="list-style-type: none"> ○ Create awareness to labor supply contractor about labour laws as well as GBV risks and mitigation strategy as part of contractor's labour management procedure. ○ Installation of Informatory messages/signboards about GBV awareness and grievance redress mechanism, complaints/ emergency contact numbers at all appropriate/prominent locations covering workforce camps, campsite offices, site establishment such as hot mix plant, ready mix cement concrete plants and site laboratories among others. ○ Provision of separate rest areas and toilets for both men and women with adequate privacy, lighting, water and sanitation facilities. ○ Provision of rest rooms with adequate privacy, lighting facility for pregnant women and lactating mothers at workforce camps, campsite offices, site establishment as may be warranted. ○ Nomination of a designated woman staff through external specialized NGOs/ social workers for regular surveillance of all potential women at workplaces and engaging women workforce in small pep talks for eliciting their views on victimization, discrimination, sexual harassment and GBV related issues at workplace on regular basis for creating a sense of confidence, privacy, security, and awareness of complaints mechanism and GRM thereof. ○ Sensitization of workforce to avoid any type of commercial transactions (money lending/ borrowing) with local community, particularly women headed households, widows, single women, and senior citizens. ○ Sensitization of workforce to avoid any type of potential conflicts with local communities, particularly women at market areas, settlement areas, grocery shops, liquor vends and eateries, community water source points etc. always during project implementation phase. ○ Sensitization of workforce about strict prohibition of eve-teasing, stalking of women/adolescent girls near work sites/ educational institutions at all times during project implementation phase. ○ Establishing a committee for grievance redressal mechanism specially for matters related to sexual harassment and GBV matters, which shall be headed by women member representing TIDCL, ESG Cell and contractor, apart from representatives drawn from local women elected members and external specialized NGOs/ social workers, having local presence. The GRM shall include prevention and responses strategy; key actions/SOPs to receive complaints, maintaining confidentiality, handling procedure of complaints, resolution of complaints with survivor centric approach, commensurate to different construction phases. 		
25.	Risk from Electrical Equipment(s)	Occupational safety of workers	<p>The Contractor shall take all required precautions to prevent danger from electrical equipment and ensure that -</p> <ul style="list-style-type: none"> • No material shall be so stacked or placed as to cause danger or inconvenience to any person or the public. • All necessary fencing and lights shall be provided to protect the public in construction zones. • All machines to be used in the construction shall conform to the relevant Indian Standards (IS) codes, shall be free from patent defect, shall be kept in good working order, shall be regularly inspected, and properly maintained as per relevant BIS provision and to the approval of ESG Cell. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
26.	HIV/ AIDS	Likelihood of HIV/ AIDS among construction workers, existing workforce of IE and nearby area community	<ul style="list-style-type: none"> • Coordinate with State AIDS control society for dissemination materials amongst construction workers including creating awareness, education and Program convergence. • Make provisions for availability of condoms at convenient locations within the IE including installation of condom vending machines at labour camp, community-based meetings, consultations in camp, distribution of leaf let, IEC communication, posters, banners 		
27.	Clean-up Operations, Restoration and Rehabilitation during Contractor's Demobilization	Collection and safe disposal of construction debris from all work sites	<ul style="list-style-type: none"> • Contractor shall prepare 'Site Restoration Plans', which shall be approved by ESG Cell. The clean-up and restoration operations are to be implemented by the Contractor prior to demobilization. • The Contractor shall clear all temporary structures; dispose of all garbage, night soil and POL (Petroleum, Oil and Lubricants) wastes as approved by ESG Cell. • All establishments' sites like material stack yards, camp sites, workforce campsites, hot mix plants, batch mix plants concrete, crusher units, borrow areas, muck disposal sites have to be restored as per restoration plan approved by ESG Cell • All disposal pits or trenches shall be filled in and effectively sealed off. Residual topsoil, if any shall be distributed (in a layer of 30 mm) on restored sites, adjoining/ proximate barren land or areas identified by the Contractor and approved by the ESG Cell. • All construction zones and facilities including culverts, road-side areas, camps, Hot Mix plant sites, Crushers, batching plant sites and any other area used/affected due to the project operations shall be left clean and tidy, at the Contractor's expense and restored to previous state or to the entire satisfaction of ESG Cell. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
28.	Environmental Monitoring during both construction and maintenance phase	Monitoring air, noise, water and soil quality at project construction sites	<ul style="list-style-type: none"> • The Contractor shall undertake monitoring of air, water, noise and soil quality covering all construction sites as well as establishment sites such as material stack yards, workforce camps, camp sites, crusher unit, hot mix plant among others, through an NABL accredited laboratory (monthly during construction and quarterly during maintenance phase). • The contractor shall also monitor the performance of the various mitigation/ enhancement measures, which shall include survival rate and replanting of saplings, nature-based bio-engineering interventions, improved air quality, reduced noise levels, reuse of treated effluent, maintenance of drainage and waterbodies, landscape areas, groundwater recharging structure, among others. 		
Maintenance Phase/ Operation Stage					
	The following measures are required to further offset the residual impacts on various key environmental attributes like geology, hydrogeology, groundwater, air, noise, land use, waste management among others during the operation phase:			EHS Officer, Contractor and	Senior Environmental Specialist of ESG

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility	
				Planning and Execution	Supervision/ Monitoring
			<ul style="list-style-type: none"> Routine maintenance and cleaning of all the rainwater percolation wells for recharging groundwater during pre and post monsoon seasons and ensure its effective functional status. Routine maintenance and upkeep of the green belt area i.e. parks and open areas, which is also expected to replenish groundwater. DoIC/ TIDCL shall continue to encourage and promote all industrial units (both existing and upcoming) within the industrial estate, to install roof water harvesting and groundwater recharging structures within their respective individual industrial plots for replenishment of groundwater resources. Upon demobilization of the contractor, all the campsites, material stack yards, hot mix plant, concrete batch plant and workforce camps etc. are to be restored to their previous stage. All the construction remanent materials/ debris shall be cleared and disposed of at approved disposal sites. Ensure a routine maintenance and upkeep of all the compensatory saplings with minimum survivability of 70% including replanting the dead saplings and replacement of damaged tree guards, if any for a minimum period of 3 years to offset the net loss and ensure net gain from 3rd year onwards. Ensure routine maintenance and periodical cleaning/ desludging of all septic tank and soak pit combines by the allocated industries within industrial estate and disposed of at approved municipal sites, to mitigate the impacts on surface and ground water pollution during the operation phase. All the upcoming industries during the operation phase will be deemed to be regulated for emissions through consent management (CTE and CTO) under the air, noise and water (Prevention and Control of Pollution) Acts. TIDCL should regularly obtain such compliance reports from all the industries allocated within the industrial estate. Periodical environmental monitoring shall be conducted for ambient air, noise, surface and ground water and soils through an NABET accredited agency/ laboratory will be carried out during the operation phase. Ensure routine cleaning of all solar panels to ensure optimum green power generation within industrial estate, to ensure optimum power generation and to offset GHG emissions. All the damaged and dis-functional solar panel, if any, are to be disposed of in accordance with Solar E-waste Management Rules. Ensure that all the upcoming industries with major machineries have appropriate/ suitable isolated machine foundations and control measures, to limit vibration beyond threshold levels. In addition, also ensure routine maintenance and upkeep of the internal roads. Such measures can reduce impacts of ground borne vibrations during the operation phase. All the upcoming industries, which may generate both hazardous and non-hazardous wastes during the operation phase are deemed to be covered under respective regulations for waste management and disposal All the upcoming industries within the IE are deemed to be covered under The Occupational Safety, Health and Working Conditions Code, 2020 (ref. Table 2-1) which covers work zone safety arrangements for their deployed workforce within the industrial premises. The industrial estate shall have a "onsite emergency response plan (ERP) for addressing natural disasters/ calamity and hazard vulnerability during the operation phase in line with the district disaster management plan comprising the following: <ul style="list-style-type: none"> As part of the emergency response plan, the IE in charge shall establish and maintain regular coordination with the designated officers for Disaster Management at district/sub-division/ district levels. Maintaining regular coordination will enable us to seek quick response, in the event of natural disaster and/or any other natural calamity. All work force irrespective of levels and various industries within IE, are to be provided with training to respond in an emergency and periodic mock drill shall be conducted to ensure the preparedness to respond any emergency situations. All project operations shall be planned and coordinated in tandem with the daily/weekly weather predictions/alerts issued by competent authorities as relevant for the district and all such alerts shall be duly considered and review the scheduled work programs on a daily basis. IE shall have designated Incident Controller (IC), Emergency Controller (EC), Assembly Coordinator (AC) and other required personnel, drawn from various industries for the emergency response mechanism in an event of natural disaster/ calamity in line with the ERP. A template for Disaster Management and Emergency Response Plan has been given in Appendix-9 to IEE, which is to be dovetailed with the district disaster management plan and suiting to requirements of the operation phase. All industrial workforce who may be engaged by the upcoming industries are deemed to be covered under National Labour Act, 1970, The Child Labour (Prohibition and Regulation) Amendment Act, 2016, The Child Labour (Prohibition and Regulation) Act, 1986 and The Occupational Safety, Health and Working Conditions Code, 2020. All industrial workforce who may be engaged by the upcoming industries are deemed to be covered under the Prevention of Sexual Harassment (POSH) Act, 2013, which address risks related to gender-based violence, in the unlikely event. 	Environmental Officers of PIU & PMU at IE Level	Cell, PMU under the overall guidance of Project Director

Table 9-2: Environment Management Plan - Testing and Commissioning of Electrical Feeder Cables (33/11 KV) and Communication Cables (SCADA/ OFC) within Utility Corridor & E

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility	
				Planning and Execution	Supervision/ Monitoring
Pre-Construction/ Design Stage					
1.	Permissions for installation, testing and commissioning of electric feeder cables	None	<ul style="list-style-type: none"> Tripura State Electricity Corporation Limited (TSECL).is the designated and Nodal Agency for installation, testing and commissioning of electric feeder cables within Bodhjungnagar IE. Hence, permission from any other agency is not required. The contractor designated for laying electrical feeder (33/11 KV) cables shall have a valid license and approved/ enlisted by the Tripura State Electricity Corporation Limited (TSECL). Copy of the valid license and approved/ enlistment by the Tripura State Electricity Corporation Limited (TSECL) shall be submitted to the PIU and ESG Cell under PMU same to ESG Cell. 	PDMC (Design Consultant) and TIDCL	DoIC/ TIDCL (Environmental Safeguards team)
Construction Stage Activities					
2.	Site inspection	None	<ul style="list-style-type: none"> The contractor shall inspect the cable corridor and check the readiness of duct for laying of electric feeder cables. Minor modifications or alterations, if any required shall be got done through the civil contractor and the respective PIU 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
3.	Laying, test and commissioning of electric feeder cables	None	<ul style="list-style-type: none"> All works during supply, erection, testing and commissioning shall be executed confirming to the technical and safety requirements stipulated under the Indian Electricity Rules, 1956 and BIS 1255;1983 and amendments thereof. All work shall be well planned, coordinated and swiftly completed, including providing connections to the existing industries and newly developed industrial plots. 		
4.	Site clearance and abandoning/ disusing existing electric feeder cables	Waste disposal	<ul style="list-style-type: none"> The UTILITY CORRIDOR duct shall be cleared of all debris/ remanent/ residual materials, after commissioning of the feeder cables. The feeder cables shall have line markers of approved type at regular intervals All debris/ remanent materials shall be collected, scavenged for reuseable materials and waste materials shall be disposed of as scrap or dumped at solid waste management facility of Agartala Municipal Corporation, Agartala. The existing overhead cables shall be dismantled, and underground feeder cables shall be abandoned/ disused, and no excavation shall be carried out to retrieve the existing underground feeder cables as scrap material. 		
5.	Orientation of EMP for contractor	Orientation will sensitize contractor to minimize impacts and implement EMP requirements in a better way during project implementation phase	<p>The ESG Cell will orient the contractor with the EMP and EHS requirements under the contract. This shall include but not limited to the following</p> <ul style="list-style-type: none"> Contractual Obligations of Contractor to submit Contractor's Site Environmental Management Plan (C-SEMP). C-SEMP prepared by Contractor shall be reviewed and approved by the ESG Cell, prior to commencement of construction works. Implementation of various plans required under C-SEMP related to Occupation Health & Safety (OHS), material management plan, non-hazardous waste management plan, camp site management, workforce influx management plan, worker's camp management plan, emergency response plan (ERP) including conducting periodic mock drills, etc. Workforce/Labour Management Procedures in line with Govt. of India and State Govt. norms Procedures for Worker's safety at all operational sites Implementation of GBV risk mitigation strategy plan at workforce camps, operational sites and at other hotspots likely to be frequented by workers after work hours/leisure and/or on weekly off days Contractor to designate/ appoint one full time, qualified Environmental, Health and Safety Officer, who shall be solely responsible for implementation of all the EMP stipulations and EHS requirements under the contract in close co-ordination/consultation with Environment Specialist under ESG Cell and TIDCL. Establishing GRM (Grievance Redress Mechanism) for Contractors' workforce as well as for existing industries/ workforce/ community for issues arising due to construction activities. 		
6.	EHS Performance Requirements	Will sensitize contractor about EHS requirements in a better way during project implementation phase	<ul style="list-style-type: none"> The EHS (Environment, Social, Health and Safety) performance requirements by the contractor under contract have been specified and incorporated as special conditions and performance requirements in bid documents of contract packages. The EHS performance requirements incorporated in the bid documents, obligate the contractor, upon mobilization, to prepare a Contractor's SEMP (C-SEMP), which shall include Occupational Health and Safety (OHS) Plan, labor management plan, workers' campsite management plan, grievance redressal mechanism (GRM) for workforce, GBV risks mitigation and among others in accordance with the Gol, Govt. of Tripura and ADB requirements. The C-SEMP submitted by the contractor shall be reviewed and approved by the ESG Cell, prior to commencement of feeder laying works. The approved C-SEMP also be reviewed periodically (as and when required but at least once in three (3) months) by ESG Cell and updated in a timely manner, to address changed requirements, if any during project implementation. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
7.	Disaster Management & Emergency Response Plan	Will enable contractor(s) preparedness and response to any emergency situation during project implementation phase	<ul style="list-style-type: none"> The overall vulnerability of West Tripura district including Bodhjungnagar IE is categorized as High for earthquakes and thunderstorms. In order to ensure safety of work force during any kind of natural calamity like earthquake a Disaster Management and Emergency Response Plan for Bodhjungnagar IE must be prepared by contractor as part of C-SEMP, suiting to contractor's scale of establishment, which shall be approved by ESG Cell. All work force, irrespective of levels, are to be provided with training to respond in an emergency and periodic mock drill shall be conducted to ensure the preparedness to respond any emergency situations. All project operations shall be planned and coordinated in tandem with the daily/weekly weather predictions/alerts issued by competent authorities as relevant for the district and all such alerts shall be duly considered and review the scheduled work programs on a daily basis. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility	
				Planning and Execution	Supervision/ Monitoring
			<ul style="list-style-type: none"> At project level, contractor shall designate an Incident Controller (IC), Emergency Controller (EC), Assembly Coordinator (AC) and other required personnel for the emergency response mechanism in an event of natural disaster/ calamity in line with the ERP. As part of the ERP, the contractor shall establish and maintain regular coordination with the designated officers for Disaster Management at district/sub-division/ district levels. Maintaining regular coordination will enable us to seek quick response, in the event of natural disaster and/or any other natural calamity. West Tripura district has a Disaster Management Plan at district and subdivision levels, which provide the institutional arrangements, designated officers, emergency response systems, infrastructure facilities like hospitals, fire stations, police station at tehsil, sub-division and village levels. 		
8.	Work Zone Safety Requirements	Will enable contractor to ensure safety requirements at work zones during project implementation phase	<ul style="list-style-type: none"> Prior to commencement of feeder cable laying works, contractor will prepare and submit Contractor's SEMP (C-SEMP), which will include contractor's management plan for (i) Work Management; (ii) work zone safety management plan for the prioritized stretches/ areas, in accordance with approved implementation schedule. Commencement of any activity by contractor without prior approval of these requirements will be treated as "non-compliance to contract obligations". All work force of the Contractor shall be subjected to an orientation program, which familiarize them with work requirements, safety practices at work, safe distances to keep from earth moving equipment, first aid facilities, emergency response, on-site sanitation facilities and practices to be adopted, rights and privileges of workforce among others. The orientation shall be carried on Induction, at the start of the day for work through toolbox meetings and tailgate sessions Orientation shall also include concern for community safety around operational sites/areas as well, Orientation shall also include first aid facilities, emergency care and emergency response plan available at operational sites and at workforce camps. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
9.	COVID - 19 Requirements for Construction Workers	Will enable contractor to respond due to eruption outbreak of Covid variants	<ul style="list-style-type: none"> In respect of COVID situation, Standard Operating Procedures (SOPs) and Guidelines for Construction Sites for COVID-19 Outbreak issued by Central Public Works Department, Government of India, May 2020 and Tripura State Govt. shall be followed as & when notified. Contractor shall mandatorily adhere to these Govt. of Tripura and Gol COVID-19 SOPs at all construction sites, which shall cover all contract workers, particularly migrant construction workers during the mobilization and subsequent phases of construction by the contractor: 		
10.	Labour/ Workforce Management	Protection of labour rights privileges including equal/ rightful wages	<ul style="list-style-type: none"> Contractor shall comply with all labour regulations of Govt. of Tripura, Government of India and The Occupational Safety, Health and Working Conditions Code, 2020 Contractor shall prefer skilled/ unskilled local labour drawn from nearby places/ region wherever feasible/extent possible, to benefit local community. 		
11.	Occupational Safety, Health, First Aid Facilities and Documenting Safety at all Construction and Operation sites	Will enable contractor to ensure safety requirements at work zones during project implementation phase	<ul style="list-style-type: none"> All workforce/ labour shall be provided with safety instructions daily, depending upon the work, for which they are likely to be deployed for the day/shift. Labour shall be provided with PPEs at no cost and ensure that the same is always being used by the work force, while at work. In case of damaged or lost PPEs, some shall be replaced without any cost to labour. All labour shall be instructed and encouraged to report, irrespective of small or major or fatal injury to the supervisory staff and all such incidents shall be documented, and ensure such incidents are not repeated by taking adequate precautions. All Supervisory staff shall be provided with mobile phones for better communication across all operational areas, in case of emergency or otherwise The contractor shall establish a small first aid room/ mini clinic at the campsite and make available a standby vehicle for emergency purposes for transportation in case of accident with serious injuries at site. Any accident with fatalities shall be reported promptly to ESG Cell and shall take measures to compensate the affected person in accordance with existing regulation. First aid facilities and free emergency care shall be provided to all workforce, irrespective of their rank/level and no cost shall be recovered from them on this account. The contractor shall deploy a medical practitioner periodically at the camp site to attend to health issues/first aid and shall conduct regular health check-ups of all staff and workers employed in the project. Further, no wages shall be cut for a period of absence as a result of injury – The contractor shall mandatorily have Contractor All Risk (CAR) policy to cover workers of the main contractor and as well as all sub-contractors and third parties. All work site(s) shall have first aid kits and details of major/nearby hospitals displayed prominently in local language, in case of emergency and/fatalities to work force and/or public, as a consequence of operations. The supervisory staff shall be provided with a wireless communication system (mobile telephones for better communication in the operational area and also with other operational areas, in case of emergency or otherwise. The Contractor shall comply with all the precautions as required for ensuring the safety of the workmen as per the Government of India norms/regulations All workforce deployed shall be governed by labour management procedures of TIDCL and Tripura Building and Other Construction Workers Welfare Board with regards to safety and welfare measures (including equal wages for men and women) for workers employed at building and other construction sites. The Contractor shall make sure that during the construction work all relevant provisions are adhered to. The Contractor shall not employ any person below the age of 18 years for any construction work and no woman shall be employed for hazardous work, unless and otherwise she is trained to carry put such work. The Contractor shall mark 'hard hat' and 'no smoking' and other 'high risk' areas and enforce compliance to use of PPE with zero tolerance. These shall be reflected in the Construction Safety Plan to be prepared by the Contractor during mobilization and shall be approved by ESG Cell To promote and encourage a Safety culture, senior engineers in Contractors and consultants' teams shall wear helmets and safety jackets at all operational sites. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility	
				Planning and Execution	Supervision/ Monitoring
			<ul style="list-style-type: none"> Visitors/officials to work sites are to be provided with PPEs (hard hats and safety shoes) and shall be briefed on ongoing operations at that specific time and related safety requirement at work site including safe distances to keep during the site visit. The work force shall be subjected only to standard work shifts/hours. Overtime allowances, if applicable/warranted shall be paid with ceiling limits. Working beyond such ceiling limits shall be discouraged, even if, so desired workforce or contractor. 		
12.	Air Pollution from Vehicles, Plants and Equipment	Air pollution due to deployed vehicles, equipment and machinery	<ul style="list-style-type: none"> The Contractor shall take every precaution to reduce dust levels at contractor's establishment sites and/or operational construction sites by sprinkling of water through pressurized fine spray nozzles. All trucks, carrying electric feeder cables/ materials shall not be overloaded beyond designated capacities All vehicles, equipment and machinery deployed for construction are regularly maintained and maintain a record of Pollution Under Control (PUC) certificates for all vehicles and machinery used during the contract period which shall be submitted to ESG Cell for verification, whenever required. The contractor shall maintain records and conduct fitness tests of all vehicles and machinery at regular intervals of one year and the fitness certificate shall be submitted to ESG Cell. Only fit vehicles and machinery shall be deployed during construction. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
13.	Noise Pollution from Vehicles, Plants and Equipment	Noise pollution due to deployed vehicles, equipment and machinery	<p>The Contractor shall confirm to the following:</p> <ul style="list-style-type: none"> All machinery and equipment and vehicles used in construction shall strictly conform to the MoEF&CC/CPCB requirements with respect to emissions and noise levels/standards. Servicing/routine maintenance of vehicles, equipment and machinery shall be undertaken periodically as per the approval of ESG Cell to keep emissions and noise levels as per norms/minimum. All construction works with high noise levels shall be stopped after sunset hours. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
14.	Non-hazardous Waste Management	Safe disposal of waste from construction camp sites	<ul style="list-style-type: none"> The Contractor's EMP shall include a Management Plan for Non-Hazardous waste and approved by ESG Cell. The contractor shall collect, and store non-hazardous waste generated at camp sites in HDPE/steel drums and stored in a segregated roofed area and periodically disposed at approved waste disposal facilities by Tripura State Pollution Control Board. 		
15.	GBV (gender-based violence)	Possibility of GBV arising due to influx of migrant labour/ construction workers and existing workforce of IE and community of nearby areas	<ul style="list-style-type: none"> A GBV risk mitigation strategy plan shall be implemented by the contractor under the supervision of ESG Cell and coordination by TIDCL. The plan shall comprise identifying potential risks; mitigation measures; prevention and responses strategy; key actions/SOPs to receive complaints, maintaining confidentiality, handling procedure of complaints, resolution of complaints with survivor centric approach, commensurate to different construction phases. Some of the generic measures, which shall be included in the GBV risk mitigation and key action plan are summarized hereunder: <ul style="list-style-type: none"> Creating awareness about GBV related issues among workers during engagement and/or during Induction of workforce Mandatory consent signing of Code of Conduct (CoC) by all workforce (all categories and levels) to the adhere to the Policy on Sexual Harassment of Women at Workplace prior to the acceptance of the employment/ appointment order. The Code of Conduct for GBV related issues shall include/ cover at workforce camps and or community hotspots like nearby market areas frequented by workers after work hours and/or weekly off days, schools, vocational training centers, liquor shops and, migrant workers residing in rented accommodations within the villages/settlement areas Sensitization and orientation of workforce (all categories, all levels) during induction phase about GBV and associated risks and pep-talk to refresh subject matter in routine toolbox meetings. These shall also be at periodic intervals (at least once in quarter) through external specialized NGOs/ social workers about Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Acts, 2013" and consequences of violations. Integrate briefings on GBV into existing induction training, safety talks, toolbox meetings, tailgate sessions and regular training. Create awareness to labor supply contractor about Labour laws as well as GBV risks and mitigation strategy as part of contractor's Labour management procedure. Installation of Informatory messages/signboards about GBV awareness and grievance redress mechanism, complaints/ emergency contact numbers at all appropriate/prominent locations covering workforce camps, campsite offices, site establishment such as hot mix plant, ready mix cement concrete plants and site laboratories among others. Provision of separate rest areas and toilets for both men and women with adequate privacy, lighting, water and sanitation facilities. Provision of rest rooms with adequate privacy, lighting facility for pregnant women and lactating mothers at workforce camps, campsite offices, site establishment as may be warranted. Nomination of a designated woman staff through external specialized NGOs/ social workers for regular surveillance of all potential women at workplaces and engaging women workforce in small pep talks for eliciting their views on victimization, discrimination, sexual harassment and GBV related issues at workplace on regular basis for creating a sense of confidence, privacy, security and awareness of complaints mechanism and GRM thereof. Sensitization of workforce to avoid any type of commercial transactions (money lending/ borrowing) with local community, particularly women headed households, widows, single women and senior citizens. Sensitization of workforce to avoid any type of potential conflicts with local communities, particularly women at market areas, settlement areas, grocery shops, liquor vends and eateries, community water source points etc. at all times during project implementation phase. Sensitization of workforce about strict prohibition of eve-teasing, stalking of women/adolescent girls near work sites/ educational institutions at all times during project implementation phase. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility	
				Planning and Execution	Supervision/ Monitoring
			<ul style="list-style-type: none"> Establishing a committee for grievance redressal mechanism specially for matters related to sexual harassment and GBV matters, which shall be headed by women member representing TIDCL, ESG Cell and contractor, apart from representatives drawn from local women elected members and external specialized NGOs/ social workers, having local presence. The GRM shall include prevention and responses strategy; key actions/SOPs to receive complaints, maintaining confidentiality, handling procedure of complaints, resolution of complaints with survivor centric approach, commensurate to different construction phases. 		
16.	Release of toxic pollutants, chemicals and gases to receptors (air, water, land) from transformers and other project equipment	Soil and water pollution & safe disposal of waste materials	<ul style="list-style-type: none"> Conduct training on PCB hazards related to old transformers and requirements of national laws and regulations for their phase out and environmentally sound disposal PCBs will not be used in any transformers and any other project facilities or equipment. Equipment purchased by Contractor for use on the project to be accompanied by letter from the manufacturer that it is guaranteed PCB free and labelled as PCB free. Contractor to provide PIU/ PMU with material data sheets for insulating oil meeting technical specifications for use in new transformers. In the absence of test data all transformers at existing substations or which will be disturbed by the distribution works must be assumed by the Contractor to contain PCBs and the oil must be sampled and analyzed following UNEP Guidelines for the Identification of PCB and Materials Containing PCB36 and a health and safety risk assessment and plan referring to the measures in UNEP (2002) PCB Transformers and Capacitors: From Management to Reclassification and Disposal. Workers must wear suitable chemical and/or oil-resistant gloves, goggles, and protective clothing whilst sampling the transformer oils. Eye wash station and water supply to shower to be provided during sampling due to risk of PCB coming into contact with skin. If PCBs are found in existing transformers and other project equipment it should be labelled as such and replaced with new equipment. Transformers containing PCBs may not be retained in-situ given the 2025 deadline which coincides with the date of the project completion. Equipment that is found to be PCB free is to be labelled as being PCB free for future reference. Contractor and PIU to ensure appropriate transport, storage, decontamination, and disposal of contaminated units; disposal should involve facilities capable of safely transporting and disposing of hazardous waste containing PCBs. In decommissioning and disposing of transformers (at existing substations) regardless of containing PCB oils, PIU and Contractor to follow Hazardous Waste Management and Handling Rules, 2008 and 2016 of India for transport, storage and disposal of potentially PCB oil containing transformers. The handling, transport, storage and disposal of old transformers by third party vendor will be subject to approval obtained from Tripura State Pollution Control Board and receiving State Pollution Control Board as vendors for disposal not available in Tripura. On reaching the stores Contractor/ PIU must ensure that old transformers are stored on drip trays and surrounding soil at existing substation locations exposed to oil leakage from equipment should be assessed by Contractor/ PIU and appropriate removal and / or remediation measures should be implemented in accordance with the General EHS Guidelines. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
17.	HIV/ AIDS	Likelihood of HIV/ AIDS among construction workers, existing workforce of IE and community of nearby areas	<ul style="list-style-type: none"> Coordinate with State AIDS control society for dissemination materials amongst construction workers including creating awareness, education and Program convergence Make provisions for availability of condoms at convenient locations within the IE including installation of condom vending machines at labour camp, community-based meetings, consultations in camp, distribution of leaf let, IEC communication, posters, banners 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
18.	Clean-up Operations, Restoration and Rehabilitation during Contractor's Demobilization	Collection and safe disposal of construction debris from work sites	<ul style="list-style-type: none"> Contractor shall prepare 'Site Restoration Plans', which shall be approved by ESG Cell. The clean-up and restoration operations are to be implemented by the Contractor prior to demobilization. The Contractor shall clear all temporary structures; dispose of all garbage, night soil and POL (Petroleum, Oil and Lubricants) wastes as approved by ESG Cell. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
Maintenance Phase/ Operation Stage					
	<p>The following measures are required to further offset the residual impacts on various key environmental attributes like geology, hydrogeology, groundwater, air, noise, land use, waste management among others during the operation phase:</p> <ul style="list-style-type: none"> Routine maintenance and cleaning of all the rainwater percolation wells for recharging groundwater during pre and post monsoon seasons and ensure its effective functional status. Routine maintenance and upkeep of the green belt area i.e. parks and open areas, which is also expected to replenish groundwater. DoIC/ TIDCL shall continue to encourage and promote all industrial units (both existing and upcoming) within the industrial estate, to install roof water harvesting and groundwater recharging structures within their respective individual industrial plots for replenishment of groundwater resources. Upon demobilization of the contractor, all the campsites, material stack yards, hot mix plant, concrete batch plant and workforce camps etc. are to be restored to their previous stage. All the construction remanent materials/ debris shall be cleared and disposed of at approved disposal sites. Ensure a routine maintenance and upkeep of all the compensatory saplings with minimum survivability of 70% including replanting the dead saplings and replacement of damaged tree guards, if any for a minimum period of 3 years to offset the net loss and ensure net gain from 3rd year onwards. 			EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility	
				Planning and Execution	Supervision/ Monitoring
			<ul style="list-style-type: none"> • Ensure routine maintenance and periodical cleaning/ desludging of all septic tank and soak pit combines by the allocated industries within industrial estate and disposed of at approved municipal sites, to mitigate the impacts on surface and ground water pollution during the operation phase. • All the upcoming industries during the operation phase will be deemed to be regulated for emissions through consent management (CTE and CTO) under the air, noise and water (Prevention and Control of Pollution) Acts. TIDCL should regularly obtain such compliance reports from all the industries allocated within the industrial estate. • Periodical environmental monitoring shall be conducted for ambient air, noise, surface and ground water and soils through an NABET accredited agency/ laboratory will be carried out during the operation phase. • Ensure routine cleaning of all solar panels to ensure optimum green power generation within industrial estate, to ensure optimum power generation and to offset GHG emissions. All the damaged and dis-functional solar panel, if any, are to be disposed of in accordance with Solar E-waste Management Rules. • Ensure that all the upcoming industries with major machineries have appropriate/ suitable isolated machine foundations and control measures, to limit vibration beyond threshold levels. In addition, also ensure routine maintenance and upkeep of the internal roads. Such measures can reduce impacts of ground borne vibrations during the operation phase. • All the upcoming industries, which may generate both hazardous and non-hazardous wastes during the operation phase are deemed to be covered under respective regulations for waste management and disposal • All the upcoming industries within the IE are deemed to be covered under The Occupational Safety, Health and Working Conditions Code, 2020 (ref. Table 2-1) which covers work zone safety arrangements for their deployed workforce within the industrial premises. • The industrial estate shall have a "onsite emergency response plan (ERP) for addressing natural disasters/ calamity and hazard vulnerability during the operation phase in line with the district disaster management plan comprising the following: <ul style="list-style-type: none"> ○ As part of the emergency response plan, the IE in charge shall establish and maintain regular coordination with the designated officers for Disaster Management at district/sub-division/ district levels. Maintaining regular coordination will enable us to seek quick response, in the event of natural disaster and/or any other natural calamity. ○ All work force irrespective of levels and various industries within IE, are to be provided with training to respond in an emergency and periodic mock drill shall be conducted to ensure the preparedness to respond any emergency situations. ○ All project operations shall be planned and coordinated in tandem with the daily/weekly weather predictions/alerts issued by competent authorities as relevant for the district and all such alerts shall be duly considered and review the scheduled work programs on a daily basis. ○ IE shall have designated Incident Controller (IC), Emergency Controller (EC), Assembly Coordinator (AC) and other required personnel, drawn from various industries for the emergency response mechanism in an event of natural disaster/ calamity in line with the ERP. ○ A template for Disaster Management and Emergency Response Plan has been given in Appendix-9 to IEE, which is to be dovetailed with the district disaster management plan and suiting to requirements of the operation phase. • All industrial workforce who may be engaged by the upcoming industries are deemed to be covered under National Labour Act, 1970, The Child Labour (Prohibition and Regulation) Amendment Act, 2016, The Child Labour (Prohibition and Regulation) Act, 1986 and The Occupational Safety, Health and Working Conditions Code, 2020. • All industrial workforce who may be engaged by the upcoming industries are deemed to be covered under the Prevention of Sexual Harassment (POSH) Act, 2013, which address risks related to gender-based violence, in the unlikely event. 		

Table 9-3: Environment Management Plan - Testing and Commissioning of Water and Effluent Pipelines within Utility Corridor

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility	
				Planning and Execution	Supervision/ Monitoring
Pre-Construction/ Design Stage Activities					
1.	Permissions for installation, testing and commissioning of water and effluent pipelines	None	<ul style="list-style-type: none"> Drinking Water & Sanitation Wing of Public Works Department, Govt. of Tripura is the designated and Nodal Agency for installation, testing and commissioning of water and effluent pipelines within Bodhjungnagar IE. Hence, permission from any other agency is not required. Contractor designated for laying water and effluent pipelines shall have valid license and approved/ enlisted by the Drinking Water & Sanitation Wing of Public Works Department, Govt. of Tripura. Copy of the valid license and approved/ enlistment by the Drinking Water & Sanitation Wing of Public Works Department, Govt. of Tripura shall be submitted to the PIU and ESG Cell under PMU 	PDMC (Design Consultant) and TIDCL	DoIC/ TIDCL (Environmental Safeguards team)
Construction Stage Activities					
2.	Site inspection	None	<ul style="list-style-type: none"> Contractor shall inspect the pipeline corridor and check the readiness of duct for laying of water and effluent pipelines. Minor modifications or alterations, if any required shall be got done through the civil contractor and the respective PIU 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
3.	Laying, test and commissioning of pipelines	None	<ul style="list-style-type: none"> All works during supply, erection, testing and commissioning of water and effluent pipelines shall be executed confirming to the technical and safety requirements are governed by the code of practice for design and installation of water and effluent pipelines All work shall be well planned, coordinated and swiftly completed, including providing connections to the existing industries and newly developed industrial plots. 		
4.	Site clearance and abandoning/ disusing existing pipelines	Waste disposal	<ul style="list-style-type: none"> The utility corridor shall be cleared of all debris/ remanent/ residual materials, after commissioning of the pipelines. The pipelines shall have line markers of approved type at regular intervals All debris/ remanent materials shall be collected, scavenged for reuseable materials and waste materials shall be disposed of as scrap or dumped at solid waste management facility of Agartala Municipal Corporation, Agartala. The existing water and effluent pipelines shall be abandoned/ disused, and no excavation shall be carried out to retrieve the existing pipelines as scrap material. 		
5.	Orientation of EMP for contractor	Orientation will sensitize contractor to minimize impacts and implement EMP requirements in a better way during project implementation phase	<p>The ESG Cell will orient the contractor with the EMP and EHS requirements under the contract. This shall include but not limited to the following</p> <ul style="list-style-type: none"> Contractual Obligations of Contractor to submit Contractor's Site Environmental Management Plan (C-SEMP). C-SEMP prepared by Contractor shall be reviewed and approved by the ESG Cell, prior to commencement of construction works. Implementation of various plans required under C-SEMP related to Occupation Health & Safety (OHS), material management plan, non-hazardous waste management plan, camp site management, workforce influx management plan, worker's camp management plan, emergency response plan (ERP) including conducting periodic mock drills, etc. Workforce/Labour Management Procedures in line with Govt. of India and State Govt. norms Procedures for Worker's safety at all operational sites Implementation of GBV risk mitigation strategy plan at workforce camps, operational sites and at other hotspots likely to be frequented by workers after work hours/leisure and/or on weekly off days Contractor to designate/ appoint one full time, qualified Environmental, Health and Safety Officer, who shall be solely responsible for implementation of all the EMP stipulations and EHS requirements under the contract in close co-ordination/consultation with Environment Specialist under ESG Cell and TIDCL. Establishing GRM (Grievance Redress Mechanism) for Contractors' workforce as well as for existing industries/ workforce/ community for issues arising due to construction activities. 		
6.	EHS Performance Requirements	Will sensitize contractor about EHS requirements in a better way during project implementation phase	<ul style="list-style-type: none"> The EHS (Environment, Social, Health and Safety) performance requirements by the contractor under contract have been specified and incorporated as special conditions and performance requirements in bid documents of contract packages. The EHS performance requirements incorporated in the bid documents, obligate the contractor, upon mobilization, to prepare a Contractor's SEMP (C-SEMP), which shall include Occupational Health and Safety (OHS) Plan, labor management plan, workers' campsite management plan, grievance redressal mechanism (GRM) for workforce, GBV risks mitigation and among others in accordance with the Gol, Govt. of Tripura and ADB requirements. The C-SEMP submitted by the contractor shall be reviewed and approved by the ESG Cell, prior to commencement of pipe laying works. The approved C-SEMP also be reviewed periodically (as and when required but at least once in three (3) months) by ESG Cell and updated in a timely manner, to address changed requirements, if any during project implementation. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
7.	Disaster Management & Emergency Response Plan	Will enable contractor(s) preparedness and response to any emergency situation during project implementation phase	<ul style="list-style-type: none"> The overall vulnerability of West Tripura district including Bodhjungnagar IE is categorized as High for earthquakes and thunderstorms. In order to ensure safety of work force during any kind of natural calamity like earthquake a Disaster Management and Emergency Response Plan for Bodhjungnagar IE must be prepared by contractor as part of C-SEMP, suiting to contractor's scale of establishment, which shall be approved by ESG Cell. All work force, irrespective of level, are to be provided with training to respond in an emergency and periodic mock drill shall be conducted to ensure the preparedness to respond any emergency situations. All project operations shall be planned and coordinated in tandem with the daily/weekly weather predictions/alerts issued by competent authorities as relevant for the district and all such alerts shall be duly considered and review the scheduled work programs on a daily basis. At project level, contractor shall designate an Incident Controller (IC), Emergency Controller (EC), Assembly Coordinator (AC) and other required personnel for the emergency response mechanism in an event of natural disaster/ calamity in line with the ERP. As part of the ERP, the contractor shall establish and maintain regular coordination with the designated officers for Disaster Management at district/sub-division/ district levels. Maintaining regular coordination will enable us to seek quick response, in the event of natural disaster and/or any other natural calamity. West 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility	
				Planning and Execution	Supervision/ Monitoring
			Tripura district has a Disaster Management Plan at district and subdivision levels, which provide the institutional arrangements, designated officers, emergency response systems, infrastructure facilities like hospitals, fire stations, police station at tehsil, sub-division and village levels.		
8.	Work Zone Safety Requirements	Will enable contractor to ensure safety requirements at work zones during project implementation phase	<ul style="list-style-type: none"> Prior to commencement of pipe laying works, contractor will prepare and submit Contractor's SEMP (C-SEMP), which will include contractor's management plan for (i) Work Management; (ii) work zone safety management plan for the prioritized stretches/ areas, in accordance with approved implementation schedule. Commencement of any activity by contractor without prior approval of these requirements will be treated as "non-compliance to contract obligations". All work force of the Contractor shall be subjected to an orientation program, which familiarize them with work requirements, safety practices at work, safe distances to keep from earth moving equipment, first aid facilities, emergency response, on-site sanitation facilities and practices to be adopted, rights and privileges of workforce among others. The orientation shall be carried on Induction, at the start of the day for work through toolbox meetings and tailgate sessions Orientation shall also include concern for community safety around operational sites/areas as well, Orientation shall also include first aid facilities, emergency care and emergency response plan available at operational sites and at workforce camps. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
9.	COVID - 19 Requirements for Construction Workers	Will enable contractor to respond due to eruption outbreak of Covid variants	<ul style="list-style-type: none"> In respect of COVID situation, Standard Operating Procedures (SOPs) and Guidelines for Construction Sites for COVID-19 Outbreak issued by Central Public Works Department, Government of India, May 2020 and Tripura State Govt. shall be followed as & when notified. Contractor shall mandatorily adhere to these Govt. of Tripura and GoI COVID-19 SOPs at all construction sites, which shall cover all contract workers, particularly migrant construction workers during the mobilization and subsequent phases of construction by the contractor: 		
10.	Labour/ Workforce Management	Protection of labour rights privileges including equal/ rightful wages	<ul style="list-style-type: none"> Contractor shall comply with all labour regulations of Govt. of Tripura, Government of India and The Occupational Safety, Health and Working Conditions Code, 2020 Contractor shall prefer skilled/ unskilled local labour drawn from nearby places/ region wherever feasible/extent possible, to benefit local community. 		
11.	Occupational Safety, Health, First Aid Facilities and Documenting Safety at all Construction and Operation sites	Will enable contractor to ensure safety requirements at work zones during project implementation phase	<ul style="list-style-type: none"> All workforce/ labour shall be provided with safety instructions daily, depending upon the work, for which they are likely to be deployed for the day/shift. Labour shall be provided with PPEs at no cost and ensure that the same is always being used by the work force, while at work. In case of damaged or lost PPEs, some shall be replaced without any cost to labour. All labour shall be instructed and encouraged to report, irrespective of small or major or fatal injury to the supervisory staff and all such incidents shall be documented, and ensure such incidents are not repeated by taking adequate precautions. All Supervisory staff shall be provided with mobile phones for better communication across all operational areas, in case of emergency or otherwise The contractor shall establish a small first aid room/ mini clinic at the campsite and make available a standby vehicle for emergency purposes for transportation in case of accident with serious injuries at site. Any accident with fatalities shall be reported promptly to ESG Cell and shall take measures to compensate the affected person in accordance with existing regulation. First aid facilities and free emergency care shall be provided to all workforce, irrespective of their rank/level and no cost shall be recovered from them on this account. The contractor shall deploy a medical practitioner periodically at the camp site to attend to health issues/first aid and shall conduct regular health check-ups of all staff and workers employed in the project. Further, no wages shall be cut for a period of absence as a result of injury – The contractor shall mandatorily have Contractor All Risk (CAR) policy to cover the workers of main contractor as well as all subcontractors and third parties. All work site(s) shall have first aid kits and details of major/nearby hospitals displayed prominently in local language, in case of emergency and/fatalities to work force and/or public, as a consequence of operations. The supervisory staff shall be provided with a wireless communication system (mobile telephones for better communication in the operational area and also with other operational areas, in case of emergency or otherwise. The Contractor shall comply with all the precautions as required for ensuring the safety of the workmen as per the Government of India norms/regulations All workforce deployed shall be governed by labour management procedures of TIDCL and Tripura Building and Other Construction Workers Welfare Board with regards to safety and welfare measures (including equal wages for men and women) for workers employed at building and other construction sites. The Contractor shall make sure that during the construction work all relevant provisions are adhered to. The Contractor shall not employ any person below the age of 18 years for any construction work and no woman shall be employed for hazardous work, unless and otherwise she is trained to carry put such work. The Contractor shall mark 'hard hat' and 'no smoking' and other 'high risk' areas and enforce compliance to use of PPE with zero tolerance. These shall be reflected in the Construction Safety Plan to be prepared by the Contractor during mobilization and shall be approved by ESG Cell To promote and encourage a Safety culture, senior engineers in Contractors and consultants' teams shall wear helmets and safety jackets at all operational sites. Visitors/officials to work sites are to be provided with PPEs (hard hats and safety shoes) and shall be briefed on ongoing operations at that specific time and related safety requirement at work site including safe distances to keep during the site visit. The work force shall be subjected only to standard work shifts/hours. Overtime allowances, if applicable/warranted shall be paid with ceiling limits. Working beyond such ceiling limits shall be discouraged, even if, so desired workforce or contractor. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
12.	Air Pollution from Vehicles, Plants and Equipment	Air pollution due to deployed vehicles,	<ul style="list-style-type: none"> The Contractor shall take every precaution to reduce dust levels at contractor's establishment sites and/or operational construction sites by sprinkling of water through pressurized fine spray nozzles. All trucks, carrying pipe materials shall not be overloaded beyond designated capacities 	EHS Officer, Contractor and Environmental	Senior Environmental Specialist of ESG

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility	
				Planning and Execution	Supervision/ Monitoring
		equipment and machinery	<ul style="list-style-type: none"> All vehicles, equipment and machinery deployed for construction are regularly maintained and maintain a record of Pollution Under Control (PUC) certificates for all vehicles and machinery used during the contract period which shall be submitted to ESG Cell for verification, whenever required. The contractor shall maintain records and conduct fitness tests of all vehicles and machinery at regular intervals of one year and the fitness certificate shall be submitted to ESG Cell. Only fit vehicles and machinery shall be deployed during construction. 	Officers of PIU & PMU at IE Level	Cell, PMU under the overall guidance of Project Director
13.	Noise Pollution from Vehicles, Plants and Equipment	Noise pollution due to deployed vehicles, equipment and machinery	<p>The Contractor shall confirm to the following:</p> <ul style="list-style-type: none"> All machinery and equipment and vehicles used in construction shall strictly conform to the MoEF&CC/CPCB requirements with respect to emissions and noise levels/standards. Servicing/routine maintenance of vehicles, equipment and machinery shall be undertaken periodically as per the approval of ESG Cell to keep emissions and noise levels as per norms/minimum. All construction works with high noise levels shall be stopped after sunset hours. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
14.	Non-hazardous Waste Management	Safe disposal of waste from construction camp sites	<ul style="list-style-type: none"> The Contractor's EMP shall include a Management Plan for Non-Hazardous waste and approved by ESG Cell. The contractor shall collect, and store non-hazardous waste generated at camp sites in HDPE/steel drums and stored in a segregated roofed area and periodically disposed at approved waste disposal facilities by Tripura State Pollution Control Board. 	Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
15.	GBV (gender-based violence)	Possibility of GBV arising due to influx of migrant labour/ construction workers and existing workforce of IE and community of nearby areas	<ul style="list-style-type: none"> A GBV risk mitigation strategy plan shall be implemented by the contractor under the supervision of ESG Cell and coordination by TIDCL. The plan shall comprise identifying potential risks; mitigation measures; prevention and responses strategy; key actions/SOPs to receive complaints, maintaining confidentiality, handling procedure of complaints, resolution of complaints with survivor centric approach, commensurate to different construction phases. Some of the generic measures, which shall be included in the GBV risk mitigation and key action plan are summarized hereunder: <ul style="list-style-type: none"> Creating awareness about GBV related issues among workers during engagement and/or during Induction of workforce Mandatory consent signing of Code of Conduct (CoC) by all workforce (all categories and levels) to the adhere to the Policy on Sexual Harassment of Women at Workplace prior to the acceptance of the employment/ appointment order. The Code of Conduct for GBV related issues shall include/ cover at workforce camps and or community hotspots like nearby market areas frequented by workers after work hours and/or weekly off days, schools, vocational training centers, liquor shops and, migrant workers residing in rented accommodations within the villages/settlement areas Sensitization and orientation of workforce (all categories, all levels) during induction phase about GBV and associated risks and pep-talk to refresh subject matter in routine toolbox meetings. These shall also be at periodic intervals (at least once in quarter) through external specialized NGOs/ social workers about Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Acts, 2013" and consequences of violations. Integrate briefings on GBV into existing induction training, safety talks, toolbox meetings, tailgate sessions and regular training. Create awareness to labor supply contractor about labour laws as well as GBV risks and mitigation strategy as part of contractor's labour management procedure. Installation of Informatory messages/signboards about GBV awareness and grievance redress mechanism, complaints/ emergency contact numbers at all appropriate/prominent locations covering workforce camps, campsite offices, site establishment such as hot mix plant, ready mix cement concrete plants and site laboratories among others. Provision of separate rest areas and toilets for both men and women with adequate privacy, lighting, water and sanitation facilities. Provision of rest rooms with adequate privacy, lighting facility for pregnant women and lactating mothers at workforce camps, campsite offices, site establishment as may be warranted. Nomination of a designated woman staff through external specialized NGOs/ social workers for regular surveillance of all potential women at workplaces and engaging women workforce in small pep talks for eliciting their views on victimization, discrimination, sexual harassment and GBV related issues at workplace on regular basis for creating a sense of confidence, privacy, security and awareness of complaints mechanism and GRM thereof. Sensitization of workforce to avoid any type of commercial transactions (money lending/ borrowing) with local community, particularly women headed households, widows, single women and senior citizens. Sensitization of workforce to avoid any type of potential conflicts with local communities, particularly women at market areas, settlement areas, grocery shops, liquor vends and eateries, community water source points etc. at all times during project implementation phase. Sensitization of workforce about strict prohibition of eve-teasing, stalking of women/adolescent girls near work sites/ educational institutions at all times during project implementation phase. Establishing a committee for grievance redressal mechanism specially for matters related to sexual harassment and GBV matters, which shall be headed by women member representing TIDCL, ESG Cell and contractor, apart from representatives drawn from local women elected members and external specialized NGOs/ social workers, having local presence. The GRM shall include prevention and responses strategy; key actions/SOPs to receive complaints, maintaining confidentiality, handling procedure of complaints, resolution of complaints with survivor centric approach, commensurate to different construction phases. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
16.	HIV/ AIDS	Likelihood of HIV/ AIDS among construction workers, existing workforce of	<ul style="list-style-type: none"> Coordinate with State AIDS control society for dissemination materials amongst construction workers including creating awareness, education and Program convergence Make provisions for availability of condoms at convenient locations within the IE including installation of condom vending machines at labour camp, community-based meetings, consultations in camp, distribution of leaf let, IEC communication, posters, banners 	EHS Officer, Contractor and Environmental	Senior Environmental Specialist of ESG Cell, PMU under

Sl. No.	Project Stage/ Activity	Anticipated Impacts	Mitigation Management Measures/ GIIP Measures	Responsibility	
				Planning and Execution	Supervision/ Monitoring
		IE and community of nearby areas		Officers of PIU & PMU at IE Level	the overall guidance of Project Director
17.	Clean-up Operations, Restoration and Rehabilitation during Contractor's Demobilization	Collection and safe disposal of construction debris from work sites	<ul style="list-style-type: none"> Contractor shall prepare 'Site Restoration Plans', which shall be approved by ESG Cell. The clean-up and restoration operations are to be implemented by the Contractor prior to demobilization. The Contractor shall clear all temporary structures; dispose of all garbage, night soil and POL (Petroleum, Oil and Lubricants) wastes as approved by ESG Cell. 		
Maintenance Phase/ Operation Stage					
	<p>The following measures are required to further offset the residual impacts on various key environmental attributes like geology, hydrogeology, groundwater, air, noise, land use, waste management among others during the operation phase:</p> <ul style="list-style-type: none"> Routine maintenance and cleaning of all the rainwater percolation wells for recharging groundwater, stormwater holding/ retention ponds, treated effluent holding ponds during pre and post monsoon seasons and ensure their effective functional status. Routine maintenance and upkeeping of the green belt area i.e. parks and water bodies, which is also expected to replenish groundwater. DoIC/ TIDCL shall continue to encourage and promote all industrial units (both existing and upcoming) within the industrial estate, to install roof water harvesting and groundwater recharging structures within their respective individual industrial plots for replenishment of groundwater resources. Upon demobilization of the contractor, all the campsites, material stack yards, hot mix plant, concrete batch plant and workforce camps etc. are to be restored to their previous stage. All the construction remanent materials/ debris shall be cleared and disposed of at approved disposal sites. Ensure a routine maintenance and upkeep of all the compensatory saplings with minimum survivability of 70% including replanting the dead saplings and replacement of damaged tree guards, if any for a minimum period of 3 years to offset the net loss and ensure net gain from 3rd year onwards. Ensure routine maintenance and periodical cleaning/ desludging of all septic tank and soak pit combines by the allocated industries within industrial estate and disposed of at approved municipal sites, to mitigate the impacts on surface and ground water pollution during the operation phase. All the upcoming industries during the operation phase will be deemed to be regulated for emissions through consent management (CTE and CTO) under the air, noise and water (Prevention and Control of Pollution) Acts. TIDCL should regularly obtain such compliance reports from all the industries allocated within the industrial estate. Periodical environmental monitoring shall be conducted for ambient air, noise, surface and ground water and soils through an NABET accredited agency/ laboratory will be carried out during the operation phase. Ensure routine cleaning of all solar panels to ensure optimum green power generation within industrial estate, to ensure optimum power generation and to offset GHG emissions. All the damaged and dis-functional solar panel, if any, are to be disposed of in accordance with Solar E-waste Management Rules. Ensure that all the upcoming industries with major machineries have appropriate/ suitable isolated machine foundations and control measures, to limit vibration beyond threshold levels. In addition, also ensure routine maintenance and upkeep of the internal roads. Such measures can reduce impacts of ground borne vibrations during the operation phase. All the upcoming industries, which may generate both hazardous and non-hazardous wastes during the operation phase are deemed to be covered under respective regulations for waste management and disposal All the upcoming industries within the IE are deemed to be covered under The Occupational Safety, Health and Working Conditions Code, 2020 (ref. Table 2-1) which covers work zone safety arrangements for their deployed workforce within the industrial premises. The industrial estate shall have a "onsite emergency response plan (ERP) for addressing natural disasters/ calamity and hazard vulnerability during the operation phase in line with the district disaster management plan comprising the following: <ul style="list-style-type: none"> As part of the emergency response plan, the IE in charge shall establish and maintain regular coordination with the designated officers for Disaster Management at district/sub-division/ district levels. Maintaining regular coordination will enable us to seek quick response, in the event of natural disaster and/or any other natural calamity. All work force irrespective of levels and various industries within IE, are to be provided with training to respond in an emergency and periodic mock drill shall be conducted to ensure the preparedness to respond any emergency situations. All project operations shall be planned and coordinated in tandem with the daily/weekly weather predictions/alerts issued by competent authorities as relevant for the district and all such alerts shall be duly considered and review the scheduled work programs on a daily basis. IE shall have designated Incident Controller (IC), Emergency Controller (EC), Assembly Coordinator (AC) and other required personnel, drawn from various industries for the emergency response mechanism in an event of natural disaster/ calamity in line with the ERP. A template for Disaster Management and Emergency Response Plan has been given in Appendix-9 to IEE, which is to be dovetailed with the district disaster management plan and suiting to requirements of the operation phase. All industrial workforce who may be engaged by the upcoming industries are deemed to be covered under National Labour Act, 1970, The Child Labour (Prohibition and Regulation) Amendment Act, 2016, The Child Labour (Prohibition and Regulation) Act, 1986 and The Occupational Safety, Health and Working Conditions Code, 2020. All industrial workforce who may be engaged by the upcoming industries are deemed to be covered under the Prevention of Sexual Harassment (POSH) Act, 2013, which address risks related to gender-based violence, in the unlikely event. 			EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director

Table 9-4: Environment Management Plan – area-based components of subprojects

Note: The guidelines mentioned hereunder are to be followed for building and construction projects, to ensure sustainable environmental management plan in pursuance of Notification No. S.O.3252 (E) of 22nd December 2014 under EIA Notification, 2006.

Sl. No.	Project Stage/ Activity	Mitigation Management Measures/ GIIP Measures	Responsibility	
			Planning and Execution	Supervision/ Monitoring
Pre-Construction/ Design Stage Activities				
1.	Project planning and preparation	<ul style="list-style-type: none"> The building layout, set-back/side margin, podium, basement ventilation etc. is prepared based on local building byelaws and is approved by competent local authorities. The Project Proponent shall obtain all necessary clearance/ permission from all relevant agencies including the Town Planning Authority before commencing the work. Provisional fire NOC to be obtained from local CFO (Chief Fire Officer) "Consent-to-Establish and Consent-to-Operate" shall be obtained as required from State Pollution Control Board as provided in the Air (Prevention and Control of Pollution) Act, 1981 and Water (Prevention and Control of Pollution) Act, 1974 The project proponent shall put in place a credible enforcement mechanism for compliance of energy conservation measures with its allottees, as projected, in perpetuity. This would be monitored by the designated Energy Conservation/ efficiency Authority in the State. 	PDMC (Design Consultant) and TIDCL	DoIC/ TIDCL (Environmental Safeguards team)
Construction Stage Activities				
2.	Pre-requisites Environment Impacts on Project Land	<ul style="list-style-type: none"> Soil and ground water samples at the construction site shall be tested to ascertain that there is no threat to ground water quality by leaching heavy metals and other toxic contaminants. The top fertile soil to be preserved and to be later used in landscape. The excavation/demolition debris must be disposed of in designated landfill areas or to be used within site for levelling purposes. Under no circumstance, the debris will be disposed in riverbeds/ lakes etc. Undertaking to be given by project proponent that occupancy will be given only after drainage and water connections are in place. Dust/smoke prevention measures such as wheel washing, water sprinkler, screening, barricading and debris chute must be installed. This should comply with the provisions of eco-sensitive zone regulations, coastal zone regulations, heritage areas (identified in the master plan or issued separately as specific guidelines), water body zones (in such zones, no construction is permitted in the water-spread and buffer belt of 30 m minimum around the FTL [full tank level]), various hazard prone area regulations, and others if the site falls under any such area. The site planning should take into account heat island effect, size and density of the built-up areas cause heat island effect; wherein higher air temperatures are created in the dense urban areas as against the low-rise surrounding built-up areas. The solar access in the morphology of clusters can be understood in terms of utilization of direct (and not reflected or diffused) solar radiation, mainly for day lighting and heat gain. This defines the minimal distances between the buildings and the relations between built-up volume and open spaces. The proportion of open spaces and built-up edges should be designed such that it ensures winter solar access and summer ventilation. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
3.	Water	<ul style="list-style-type: none"> Proponent shall obtain permission for ground water withdrawal from the State Ground Water Authority. Storm water control and its re-use as per CGWB and BIS standards for various applications The natural flow of existing storm water channel should not be altered or diverted. Keeping in view the use of large quantities of water in curing, measures for reducing water demand during construction should be followed. Curing water should be sprayed on concrete structures; free flow of water should not be allowed for curing. After liberal curing on the first day, all concrete structures should be painted with curing chemical to save water. Concrete structures should be covered with thick cloth/gunny bags and then water should be sprayed on them. This would avoid water rebound and will ensure sustained and complete curing. Ponds should be made using cement and sand mortar to avoid water flowing away from the flat surface while curing. The developer should ensure groundwater and municipal water meet the water quality norms as prescribed in the Indian Standards for various applications (Indian Standards for drinking [IS 10500-1991], irrigation applications [IS 11624-1986]). The use of potable water during construction should be minimized. Separation of grey and black water should be done by the use of dual plumbing line for separation of grey and black water. Source of water to be identified. Water treatment measures such as filtration, softeners, RO etc. should be implemented. Low flow fixtures and sensors to be used to promote water conservation. Water meters to be installed to monitor consumption of water. Water balance table/chart should be prepared 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
4.	Wastewater Treatment	<ul style="list-style-type: none"> Sewage treatment plant of capacity capable of treating 100% wastewater to be installed on site. Tertiary treatment such as dual media filter, activated carbon filter and ozonation/ chlorination to be provided so that the treated water characteristics are as per Central Pollution Control Board (CPCB) norms. If STP and pump room are installed in basement, adequate ventilation as per NBC air changes norms should be provided. Treated wastewater to be recycled for flushing and gardening. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
5.	Drainage Pattern	<ul style="list-style-type: none"> Excess treated water disposal plan to be submitted. Total paved area of the site under parking, roads, paths or any other use should not exceed 25% of the site area or net imperviousness of the site not to exceed the imperviousness factor as prescribed by the NBC 2005 (BIS 2005b), whichever is more stringent. The final disposal point for excess treated water discharge will be municipal sewers for areas where sewerage network is present. In areas where sewerage network is absent, the excess treated water can be used for agriculture or can be disposed of as per CPCB rules. Storm water disposal plan to be submitted. The final disposal point for storm water will be municipal storm drain for areas where storm water network is present. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director

Sl. No.	Project Stage/ Activity	Mitigation Management Measures/ GIIP Measures	Responsibility	
			Planning and Execution	Supervision/ Monitoring
		<ul style="list-style-type: none"> In areas where storm water network is absent, the storm water surface runoff can be disposed of in nearby natural water streams/ nallas. 		
6.	Ground Water	<ul style="list-style-type: none"> Hydro-geological survey for ground water analysis shall be submitted. Aquifer capacity and Ground water yield shall be determined. A rainwater harvesting plan shall be submitted indicating the number of recharge pits and bores and total rainwater to be harvested. Rainwater to be harvested and as a safety precaution, rainwater on-line filters be provided as per NBC norms. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
7.	Solid Waste Management	<p>During construction phase:</p> <ul style="list-style-type: none"> Disposal of muck during construction phase should not create any adverse effect on the neighboring communities and be disposed taking the necessary precautions for general safety and health aspects of people, only in approved sites with the approval of competent authority The Rules on the Solid Waste Management including Construction Waste issued by the MoEFCC as amended will be applicable. Construction spoils, including bituminous material and other hazardous materials, must not be allowed to contaminate water courses and the dump sites for such material must be secured so that they should not leach into the ground water. Any hazardous waste generated during construction phase should be disposed of as per applicable rules and norms with necessary approvals of the State Pollution Control Board. Miscellaneous site debris such as broken tiles etc. shall be used on site for leveling /backfilling purposes. Packaged STP /mobile toilets shall be provided for labour camp. Polymer bags used for cement and gypsum shall be handed over to authorized recyclers. Cardboard boxes and other packaging material will be handed over to authorized recyclers. <p>Post construction phase:</p> <ul style="list-style-type: none"> Organic waste composter (OWC) or Vermiculture pits shall be installed on site for biodegradable waste treatment (capacity calculated at 0. 3kg/tenement/ day) The manure generated shall be used for landscaping. The non-biodegradable waste or e-waste shall be handed over to authorized recyclers. STP sludge shall be removed using filter press or centrifuge mechanism. The dried sludge cakes shall be used as manure in landscaping. Minimize waste generation; streamline waste segregation, storage, and disposal; and promote resource recovery from waste. Resource recovery from waste: Employ resource recovery systems for biodegradable waste as per the Solid Waste Management and Handling Rules, 2000 of the MoEFCC. Make arrangements for recycling of waste through local dealers. The use of covering sheets should be done for trucks to prevent dust dispersion from the trucks and washing of tyres when trucks with soil l debris coming on road. Hazardous Waste Management: Products, such as paints, cleaners, oils, batteries, and pesticides that contain potentially hazardous ingredients require special care when being disposed of. Improper disposal of household hazardous wastes can include pouring it down the drain, on the ground, into storm sewers, or in some cases putting them out with the trash. The hazardous wastes from construction and demolition activities are centering oil, formwork oil, tar and tar products (bitumen, felt, waterproofing compounds, etc.), wood dust from treated wood, lead containing products, chemical admixtures, sealants, adhesive solvents, Explosives and related products and equipment used in excavation, acrylics, and silica, etc. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
8.	Air Quality and Noise Levels	<p>A) During construction phase:</p> <ul style="list-style-type: none"> The diesel required for operating DG sets shall be stored in underground tanks and clearance from the Chief Controller of Explosives shall be taken, as applicable. Ambient noise levels should conform to residential standards both during day and night as per Noise Pollution (Control and Regulation) Rules, 2000. Incremental pollution loads on the ambient air and noise quality should be closely monitored during construction phase. Adequate measures should be made to reduce ambient air and noise level during construction phase, so as to conform to the stipulated standards by CPCB/ SPCB. Burning of waste to be banned. The construction site DG to be maintained regularly so that the smoke emission and noise levels are as per permissible norms. Regular P.U.C check for all construction machinery coming on site be done. 63 Noise cancellation and insulation devices such as mufflers, barricades etc. to be used to avoid noise propagation to adjoining areas. <p>B) Post construction phase:</p> <ul style="list-style-type: none"> DG to be regularly maintained so that the smoke emission and noise levels are as per permissible norms. It shall be at least 6 meters away from the boundary. Air quality monitoring to be done quarterly STP and water pumps, air blowers etc. should be installed with noise cancellation devices or suitable acoustical enclosures to be given so that the noise levels as per NBC norms are maintained <p>C) During Construction & Operation</p> <ul style="list-style-type: none"> The provisions of the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981) and the rules made thereunder be complied for control of noise pollution during construction and operation. Setting up the barriers: The National Building Code 2005 suggests that design solutions such as barrier blocks should be used to reduce external LA 10 noise levels to at least 60-70 dB (A) at any point 1.0 m from any inward looking facade. Green belts and landscaping could act as an effective means to control noise pollution. In the case of railway tracks, a minimum distance of 50m to 70m may be provided between the buildings and the tracks. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
9.	Energy	<ul style="list-style-type: none"> Appropriate processes and material be used to encourage reduction in carbon footprint 	EHS Officer, Contractor and	Senior Environmental Specialist of ESG

Sl. No.	Project Stage/ Activity	Mitigation Management Measures/ GIIP Measures	Responsibility	
			Planning and Execution	Supervision/ Monitoring
		<ul style="list-style-type: none"> Use of glass be reduced by up-to 40% to reduce the electricity consumption and load on air-conditioning. If necessary, use high quality double glass with special reflective coating in windows. Solar water heater to be provided adequately. Common area lighting should be Solar I LED. Install energy meters to monitor overall consumption, and timer-switch for all common area lighting, and other consumption of measurable energy Fly ash should be used as building material in the construction as per the provisions of the Fly Ash Notification of September 1999 and amended as on 27th August 2003 and 3rd November 2009. Wherever possible recycled materials having low embodied energy are used. 76.Use of light coloured, reflective roofs having an SRI (solar reflectance index) of 50% or more should be promoted. The dark coloured, traditional roofing finishes have SRI varying from 5% to 20%. Optimize use of energy systems in buildings that should maintain a specified indoor environment conducive to the functional requirements of the building by following mandatory compliance measures (for all applicable buildings) as recommended in the Energy Conservation Building Code (ECBC) 2007 of the Bureau of Energy Efficiency, Government of India. The energy systems include air conditioning systems, indoor lighting systems, water heaters, air heaters, and air circulation devices. Use the concept of passive solar design of buildings using architectural design approaches that minimize energy consumption in buildings by integrating conventional energy-efficient devices, such as mechanical and electrical pumps, fans, lighting fixtures, and other equipment, with the passive design elements, such as building orientation, landscaping, efficient building envelope, appropriate fenestration, increased day lighting design, and thermal mass. The building should be oriented optimally based on Sun-path and engineering analysis to curtail excessive solar radiation. Lighting systems should comply with the ECBC 2007 and applicable to interior spaces of buildings, exterior building features, including facades, illuminated roofs, architectural features, entrances, exits, loading docks, and illuminated canopies, exterior building grounds etc. except emergency lighting and lighting in dwelling units. All the point light sources installed in the building for general lighting shall be LEDs or LEDs or equivalent. All the linear light sources installed in the building for general lighting shall be T-5 or at least 4 Star BEE rated TFLs or equivalent. The installed interior lighting power shall not exceed the LPD (Lighting Power Density) value as recommended by ECBC 2007 Automatic Lighting shutoff control be installed: Interior lighting/Exterior Lighting systems shall be equipped with an automatic control device in accordance with ECBC 2007. Occupancy sensors that shall turn the lighting off within 30 minutes of the occupant leaving the space. It should also have the option of manual turning on lights when the space is occupied. ECBC requires controls in day lit areas that are capable of reducing the light output from luminaries by at leastcontrollingcontrolling of exterior lighting with photo- controls where lighting can be turned off after a fixed interval. The tapping of renewable sources of energy for lighting, heating, cooling and ventilation needs deserve special attention. For captive solar power generation, a minimum of 15 percent of sanctioned load is the requirement. Solar photovoltaic (SPV) systems are direct energy conversion systems that convert solar radiation into electric energy. SPV systems should be installed to reduce use of conventional sources of energy. Roof tops of buildings as well as other exposed areas such as parking shades should be utilized for installation of SPV systems. Hot water requirements in buildings should be met through use of various types of solar water heating systems, viz. flat plate collector single glazed double glazed; evacuated tube collectors; and Water heating with solar concentrators. The Project Proponent should ensure regular energy audit. <ul style="list-style-type: none"> To validate the predicted energy consumption, thermal comfort, and visual comfort criteria by an energy auditor approved by the BEE, Government of India. To ascertain continued safety in the operation of the electrical and mechanical systems of the building through proper maintenance by the owner or the occupants. This will be ensured in the contract document by providing for the commissioning of all electrical and mechanical systems by the respective supplier or builder. Moreover, the respective facility management group assigned by the owner or the occupants themselves, will carry out the maintenance facilities. Energy conservation measures like installation of CFLs/LEDs for the lighting in the areas outside the building should be an integral part of the project design and should be in place before project commissioning. Used CFLs and TFLs should be properly collected and disposed of /sent for recycling as per the prevailing guidelines/ rules of the regulatory authority to avoid mercury contamination. Use of solar panels may be done to the extent possible. 	Environmental Officers of PIU & PMU at IE Level	Cell, PMU under the overall guidance of Project Director
10.	Traffic Movement System	<ul style="list-style-type: none"> Width of driveways, parking provision, ramp width and slope to be kept as per local by laws. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
11.	Provisions for Differently able	<ul style="list-style-type: none"> The Project Proponent should provide at least the minimum level of accessibility for persons with disabilities. <ul style="list-style-type: none"> Ensure accessibility and usability of the facilities in the building for employees, visitors and clients with disabilities. Ensure access to facilities and services by adopting appropriate site planning to eliminate barriers as per the recommended standards (NBC 2005 [BIS 2005n). Layout and designing of interior and exterior facilities as per principles of universal design such as prescribed by the National Building Code of India, building management policies and procedures, provision of auxiliary aids & appliances, and staff training in disability awareness. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
12.	Green Belt/Green Cover	<ul style="list-style-type: none"> Provide a minimum of 1 tree for every 80 sq.mt of plot area. Wherever trees are cut or transplanted, compensatory plantation in the ratio of 1:5 to be done in the premise. Native species of trees to be planted (ref. Appendix-8) Vegetation provides shading and promotes evaporative cooling. In hot and dry climates, evaporative cooling through appropriately sized wet surfaces or fountains has a desirable effect. It should be planned for maximum benefit. The project should have detailed proposals for tree plantation, landscaping, creation of open areas etc. along with a layout plan to an appropriate scale. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director

Sl. No.	Project Stage/ Activity	Mitigation Management Measures/ GIIP Measures	Responsibility	
			Planning and Execution	Supervision/ Monitoring
13.	Disaster/ Risk Assessment Plan	<ul style="list-style-type: none"> • Fire tender movement plan to be submitted. • Firefighting system to be provided as per the fire NOC. • Turning radius to be kept as per Fire Noc or as prescribed in the local by- laws. • A public address system to be installed as per the Fire Safety norms. • Place of assembly to be indicated. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
14.	Socio Economic Impact and CSR	<ul style="list-style-type: none"> • Biodegradable and non-bio-degradable waste bins to be provided for every household to promote waste segregation at source. • Importance of environment and various environment drives to be initiated. 103 Importance of maintenance of environment infrastructure to be showcased by issuing pamphlets etc. • Provision for health care, medical kit, creche, First-Aid room shall be given during construction phase for the construction workers. • Adequate shelter for resting hours, creche, clean and potable drinking water to be provided to construction workers. • All local labour welfare laws must be complied with. • Concerns of the communities being affected by the Project are to be responded to as a priority, and all possible CSR is to be rendered to make the responses effectively beneficial. 		
15.	Environment Management Plan (EMP)	<ul style="list-style-type: none"> • Detailed environment management plan comprising of estimated capital cost and O&M cost for the following environment infrastructure should be submitted: <ul style="list-style-type: none"> ○ Sewage Treatment Plant ○ Landscaping ○ Rainwater Harvesting ○ Power backup for environment infrastructure. ○ Environment Monitoring ○ Solid Waste Management ○ Solar and Energy Conservation • Environment Monitoring Cell with defined functions and responsibility shall be set up and its details be submitted. 	EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director
Maintenance Phase/ Operation Stage				
	<p>The following measures are required to further offset the residual impacts on various key environmental attributes like geology, hydrogeology, groundwater, air, noise, land use, waste management among others during the operation phase:</p> <ul style="list-style-type: none"> • Routine maintenance and cleaning of all the rainwater percolation wells for recharging groundwater, stormwater holding/ retention ponds, treated effluent holding ponds during pre and post monsoon seasons and ensure their effective functional status. • Routine maintenance and upkeep of the green belt area i.e. parks and open areas, which is also expected to replenish groundwater. • DoIC/ TIDCL shall continue to encourage and promote all industrial units (both existing and upcoming) within the industrial estate, to install roof water harvesting and groundwater recharging structures within their respective individual industrial plots for replenishment of groundwater resources. • Upon demobilization of the contractor, all the campsites, material stack yards, hot mix plant, concrete batch plant and workforce camps etc. are to be restored to their previous stage. All the construction remanent materials/ debris shall be cleared and disposed of at approved disposal sites. • Ensure a routine maintenance and upkeep of all the compensatory saplings with minimum survivability of 70% including replanting the dead saplings and replacement of damaged tree guards, if any for a minimum period of 3 years to offset the net loss and ensure net gain from 3rd year onwards. • Ensure routine maintenance and periodical cleaning/ desludging of all septic tank and soak pit combines by the allocated industries within industrial estate and disposed of at approved municipal sites, to mitigate the impacts on surface and ground water pollution during the operation phase. • All the upcoming industries during the operation phase will be deemed to be regulated for emissions through consent management (CTE and CTO) under the air, noise and water (Prevention and Control of Pollution) Acts. TIDCL should regularly obtain such compliance reports from all the industries allocated within the industrial estate. • Periodical environmental monitoring shall be conducted for ambient air, noise, surface and ground water and soils through an NABET accredited agency/ laboratory will be carried out during the operation phase. • Ensure routine cleaning of all solar panels to ensure optimum green power generation within industrial estate, to ensure optimum power generation and to offset GHG emissions. All the damaged and dis-functional solar panel, if any, are to be disposed of in accordance with Solar E-waste Management Rules. • Ensure that all the upcoming industries with major machineries have appropriate/ suitable isolated machine foundations and control measures, to limit vibration beyond threshold levels. In addition, also ensure routine maintenance and upkeep of the internal roads. Such measures can reduce impacts of ground borne vibrations during the operation phase. • All the upcoming industries, which may generate both hazardous and non-hazardous wastes during the operation phase are deemed to be covered under respective regulations for waste management and disposal • All the upcoming industries within the IE are deemed to be covered under The Occupational Safety, Health and Working Conditions Code, 2020 (ref. Table 2-1) which covers work zone safety arrangements for their deployed workforce within the industrial premises. • The industrial estate shall have a "onsite emergency response plan (ERP) for addressing natural disasters/ calamity and hazard vulnerability during the operation phase in line with the district disaster management plan comprising the following: <ul style="list-style-type: none"> ○ As part of the emergency response plan, the IE in charge shall establish and maintain regular coordination with the designated officers for Disaster Management at district/sub-division/ district levels. Maintaining regular coordination will enable us to seek quick response, in the event of natural disaster and/or any other natural calamity. 		EHS Officer, Contractor and Environmental Officers of PIU & PMU at IE Level	Senior Environmental Specialist of ESG Cell, PMU under the overall guidance of Project Director

Sl. No.	Project Stage/ Activity	Mitigation Management Measures/ GIIP Measures	Responsibility	
			Planning and Execution	Supervision/ Monitoring
		<ul style="list-style-type: none"> ○ All work force irrespective of levels and various industries within IE, are to be provided with training to respond in an emergency and periodic mock drill shall be conducted to ensure the preparedness to respond any emergency situations. ○ All project operations shall be planned and coordinated in tandem with the daily/weekly weather predictions/alerts issued by competent authorities as relevant for the district and all such alerts shall be duly considered and review the scheduled work programs on a daily basis. ○ IE shall have designated Incident Controller (IC), Emergency Controller (EC), Assembly Coordinator (AC) and other required personnel, drawn from various industries for the emergency response mechanism in an event of natural disaster/ calamity in line with the ERP. ○ A template for Disaster Management and Emergency Response Plan has been given in Appendix-9 to IEE, which is to be dovetailed with the district disaster management plan and suiting to requirements of the operation phase. ● All industrial workforce who may be engaged by the upcoming industries are deemed to be covered under National Labour Act, 1970, The Child Labour (Prohibition and Regulation) Amendment Act, 2016, The Child Labour (Prohibition and Regulation) Act, 1986 and The Occupational Safety, Health and Working Conditions Code, 2020. ● All industrial workforce who may be engaged by the upcoming industries are deemed to be covered under the Prevention of Sexual Harassment (POSH) Act, 2013, which address risks related to gender-based violence, in the unlikely event. 		

9.2 Budgetary Provision for Additional EMP Measures

385. The IEE has identified specific environmental enhancement measures, which are to be implemented, in addition to the GIIPs included under EMP (Table 9-1 to 9-4). The estimated budgetary provisions for such environmental enhancement measures are INR 193.23 Lakh and is given in **Table 9-5**.

Table 9-5: Budgetary Provisions for EMP Implementation

Sl. No	Description	INR in lakhs
1	Land/ Additional Industrial Plot Development, Common facilities, utility facility and Social Infrastructure	
(a)	Provision for construction of geocell wall along with suitable nature-based bio-engineering Interventions, Geo-cell Reinforced Earth Retaining wall length 1.5km	Included in civil works cost
(b)	Provision for development of green belt along pathway, in pen areas (20.22 ha), Greenery along with pond pathway (12845.77 Sqm).	Included in civil works cost
(c)	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory (Ambient Air Quality Monitoring, Water quality Monitoring, Noise level Monitoring and Soil Quality Monitoring). Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard etc. (ref. Table 9-8 for parameters, monitoring locations, duration and frequency)	8.55 (ref. Appendix-12, Table-1 for detailed calculation)
2	Widening of Roads and Construction of Storm water drain with utility corridor	
(a)	Extraction of 286 nos. trees from the land of Bodhjunnagar industrial area (all-inclusive cost)	2.69 (ref. Appendix-12, Table-2 for detailed calculation)
(b)	Provision for Planting 1430 nos. of saplings and their maintenance for 3 years with minimum 70% survival rate. Planting of trees both sides of roads & open areas, 0.60 m dia holes, 1 m deep dug in the ground, mixing the soil with decayed farmyard/ sludge manure, planting the saplings, backfilling the trench, watering, fixing the bamboo tree guard and maintaining the plants for 3 years with minimum 70% survival rate (all-inclusive cost).	47.19 (ref. Appendix-12, Table-2 for detailed calculation)
(c)	Provision for construction of storm water holding ponds at 5 locations within IE, with a cumulative holding capacity 73.25 million liters by impounding the existing valley/ local depression(s), with an outlet weir for discharge of excess/overflow. Provision includes necessary arrangements for pumping the water after requisite water treatment and connecting to the approved existing distribution network.	Included in civil works cost
(d)	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory (Ambient Air Quality Monitoring, Water quality Monitoring, Noise level Monitoring and Soil Quality Monitoring). Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard etc. (ref. Table 9-8 for parameters, monitoring locations, duration and frequency)	26.69 (ref. Appendix-12, Table-3 for detailed calculation)
3	Corrective Action Plan for CETP	
(a)	Refurbish the CETP of 500 KLD capacity with replacement of all dysfunctional/ damaged units including all equipment, instrumentation and control, to ensure a fully functional CETP, capable of treating the influent wastewater to the stipulated effluent standards by CPCB/ TSPCB.	Included in civil works cost
(b)	Identification of all liquid waste generating industrial units unconnected to CETP and laying required additional pipeline network for conveyance of the effluent to ensure their connectivity to the CETP.	Included in civil works cost
(c)	Engage a qualified and experienced operation and maintenance agency with adequate staff to ensure satisfactory functioning of CETP including qualitative	Included in civil works cost

Sl. No	Description	INR in lakhs
	and quantitative monitoring of both inflow and outflow to the CETP. Ensure allocation of adequate budgetary resource for both capital and recurring maintenance cost for trouble free operation of the CETP	
(d)	Establish a functional Online Continuous Emission Monitoring System (OCEMS) at the CETP and ensure its connectivity to CPCB as well as TSPCB	20.0 Provisional cost- shall be borne by DoIC/ TIDCL.
(e)	Ensure to periodic renewals of CTO issued on 07.08.2020 (currently valid up to 30.08.2025) and fulfill all terms and conditions to the consent, including submission of mandated CETP monitoring reports to TSPCB	Actual cost shall be borne by DoIC/ TIDCL
(f)	Engage an accredited and TSPCB /NABL approved laboratory/ agency for independent 3rd party periodical monitoring of the CETP including an annual CEPT performance evaluation.	50.0 Provisional cost- shall be borne by DoIC/ TIDCL.
(g)	Emptying the stagnated effluent ponds by pumping it to the refurbished CETP for treatment/ reuse and converting the emptied areas into stormwater runoff and/ or treated effluent retention ponds	5.0 Provisional cost- shall be borne by DoIC/ TIDCL.
(h)	Provision for construction of effluent holding/ retention ponds for reuse of treated effluent at 2 locations within IE including their inter-connectivity, with a cumulative holding capacity of 10 million liters. Provision includes necessary arrangements for pumping the water to the nearest rubber/ other industries, which require water for industrial use.	Included in civil works cost
(i)	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory (Ambient Air Quality Monitoring, Water quality Monitoring, Noise level Monitoring and Soil Quality Monitoring). Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard etc. (ref. Table 9-8 for parameters, monitoring locations, duration and frequency)	9.58 (ref. Appendix-12, Table-4 for detailed calculation)
(j)	Provision for construction of rainwater percolation wells at 23 locations, selected based on in-situ percolation rate within the IE. The percolation wells shall be constructed as per the guidelines Central Ground Water Authority and/or Central Public Works Department, Govt. of India.	Included in civil works cost
4	Industrial Safety & Security, Civil Work (, Upgradation of Boundary Wall, New Construction of Boundary Wall etc.	
(a)	Provision for construction & upgradation of boundary wall, security cabin, and gate, etc.	Included in civil works cost
(b)	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory (Ambient Air Quality Monitoring, Water quality Monitoring, Noise level Monitoring and Soil Quality Monitoring). Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard etc. (ref. Table 9-8 for parameters, monitoring locations, duration and frequency)	7.53 (ref. Appendix-12, Table-5 for detailed calculation)
5	Upgradation of electrical & power supply and Installation of solar plant and mechanical accessories works	
(a)	Upgradation of electrical & power supply and Installation of solar plant and mechanical accessories works, Power connection has been considered for industrial plots, substations, facilities, offices, streetlights etc. of the Industrial estate	Included in Civil & Electrical works cost
(b)	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory (Ambient Air Quality Monitoring, Water quality Monitoring, Noise level Monitoring and Soil Quality Monitoring). Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard etc. (ref. Table 9-8 for parameters, monitoring locations, duration and frequency)	13.00 (ref. Appendix-12, Table-6 for detailed calculation)

Sl. No	Description	INR in lakhs
6	Provision for Environmental Specialist (full time), Bio-Engineering Specialist (intermittent input) and Horticultural specialist (intermittent input)	Positions to be deployed by PMSC
7	Cost for institutional strengthening, capacity building and training	3.0 Training to be provided through PMSC Safeguard Specialists
Total Rounded off (in Lacs)		193.23

386. The specific environment enhancement measures will be included in the bid documents, to make it part of civil works contract and thus to bind the contractor for implementation of the same. Thus, the contractor is deemed to have paid these requirements at the bidding stage itself.

9.3 Implementation of EMP under Civil Works Contract

387. The EMPs are to be included in bidding and contract documents and verified by the ESG Cell under PMU. The PIUs and their respective contractors will be required to deploy full-time qualified and dedicated Environment, Health and Safety (EHS) officers to ensure implementation of EMPs during construction and maintenance phase.

388. The contractor will be required to submit a site environmental management plan (SEMP) to the PIU/ESG Cell under PMU for review and approval. No work shall be commenced by the contractor prior to approval of SEMP by PIU and ESG Cell under PMU. The SEMP shall include (i) proposed sites/locations for establishing construction work camps, material stack/ storage areas, hauling roads, disposal areas for solid and hazardous wastes; (ii) specific requirements for mitigation measures as per approved EMP; (iii) monitoring program as per EMP; and (iv) budget for EMP implementation.

9.4 Institutional Arrangements for EMP Implementation & Monitoring

389. The DoIC, GoT will establish a dedicated Project Management Unit (PMU) and four 4 PIUs²³ for implementation of all 9 industrial estates. The DoIC will also appoint a Project Management and Supervision Consultant (PMSC), who will be responsible for the project management and work supervision at the field levels of all the industrial estates. The PMSC shall comprise several domain experts and headed by a team leader.

390. The PMU will establish an environmental, social and gender (ESG) cell, to be headed by a designated officer of the DoIC/ TIDCL at Superintending or Executive Engineer level. The ESG Cell shall have (a) one Environmental (Safeguard cum Climate Change) Expert at PMU level with 25 months of intermittent input spread over construction phase of 36 months and 1 year DLP/O&M phase (b) One Environmental Safeguard Expert at PMU Level with 35 months of input during construction phase of 36 months and 1 year DLP/O&M phase (c) One Environmental Safeguard Expert at PIU Level with 25 months of input during construction phase of 36 months and 1 year DLP/O&M phase (c) One Bio-Diversity Expert will be designated from Tripura Forest Department oversee and guide the bio-diversity aspects of the

²³ The project will have one PMU established at Agartala, whereas 4 PIUs to cover all 9 industrial estates i.e. 2 for West Tripura District, 1 for North Tripura and 1 for South Tripura district.

project and will be available for entire project implementation period and O&M/DLP phase and (d) One Landscape Architect cum Horticultural Expert with intermittent input of 4 months during construction phase of 36 months and 1 year DLP/O&M phase) for all Industrial Estates under the TIIDP. One more additional independent consultant (for Environmental Safeguard) would be appointed for one year to provide handholding support to the TIDCL and ensure 5-6 month overlapping period with Project Management and Supervision Consultant (PMSC) under the Tripura Industrial Infrastructure Development Project (TIIDP). All experts will be appointed by the Tripura Industrial Development Corporation (TIDCL) through the Project Monitoring & Supervision Consultant (PMSC).

391. Further, PIU(s) at each IE will have one designated official of the respective department at Assistant Engineer level as Safeguards Officer. The contractor(s) of the respective packages will have one full time EHS officer for the day-to-day implementation of the EMP measures under the guidance of PIU and officers of ESG Cell from PMU. The staffing of the ESG Cell, PIU and the contractor(s) for implementation of EMP is given in **Table 9-6**. The qualification requirement for the positions to be provided by the PMSC for the ESG Cell, PIU and contractors are given in **Appendix-11**.

Table 9-6: Environmental Safeguards Staffing at PMU, PIUs, PMSC, and contractors for EMP Implementation

Sl. No.	Entity	Staff to be Deployed
1	PMU	<ul style="list-style-type: none"> One designated officer at Superintending or Executive Engineer level from, DoIC/TIDCL (as head of ESG Cell). He/ She will be supported by (a) one Environmental (Safeguard cum Climate Change) Expert at PMU level with 25 months of intermittent input spread over construction phase of 36 months and 1 year DLP/O&M phase (b) One Environmental Safeguard Expert at PMU Level with 35 months of input during construction phase of 36 months and 1 year DLP/O&M phase, (c) one Bio-Diversity Expert will be designated from Tripura Forest Department to oversee and guide the bio-diversity aspects of the project and will be available for entire project implementation period and O&M/DLP phase and (d) One Landscape Architect cum Horticultural Expert with intermittent input of 4 months during construction phase of 36 months and 1 year DLP/O&M phase) for all Industrial Estates under the TIIDP. One more additional independent consultant (for Environmental Safeguard) would be appointed for one year to provide handholding support to the TIDCL and ensure 5-6 month overlapping period with Project Management and Supervision Consultant (PMSC) under the Tripura Industrial Infrastructure Development Project (TIIDP). Positions indicated under (a), (b) & (d) are provisioned through PMSC and (c) position is provisioned through deputation from Tripura Forest Department by DoIC/ TIDCL. One designated officer at Superintending level from, DoIC/TIDCL (as head of ESG Cell).
2	PMSC	<ul style="list-style-type: none"> He/ She will be supported by (a) One Environmental Safeguard Expert at PMSC Level with 35 months of input during construction phase of 36 months and 1 year DLP/O&M phase, (b) one Bio-Diversity Expert will be designated from Tripura Forest Department to look after the bio-diversity aspect of the project and will be available for entire project implementation period and O&M/DLP phase and (c) One Landscape Architect cum Horticultural Expert with intermittent input of 4 months during construction phase of 36 months and 1 year DLP/O&M phase) for all Industrial Estates under the Tripura Industrial Infrastructure Development Project (TIIDP) Positions indicated under (a) & (c) are provisioned through PMSC and (c) position is provisioned through deputation from Tripura Forest Department by DoIC/ TIDCL.

Sl. No.	Entity	Staff to be Deployed
		<ul style="list-style-type: none"> The Environment Expert, will report to Safeguards Officer at (Executive Engineer at (TIDCL) ESG Cell & PMU and Environment (Safeguard cum Climate Change Expert) at PMU Level.
3	PIUs	<ul style="list-style-type: none"> One designated officer (Executive Engineer level), covering all PIUs (as head of Safeguards at PIU Level. One Environmental Safeguard Expert at PIU Level with 25 months of input during construction phase of 36 months and 1-year DLP/O&M phase. The Environment Expert will report to Environmental Safeguard Expert at PMSC Level and Safeguard Officer at PIU level (Assistant Engineer)
4	Contractors	<ul style="list-style-type: none"> Each of the contract package(s) shall have one full-time Environmental, Health and Safety (EHS) Officer, to be provided by the respective contractor(s). The EHS officers will report to (a) Safeguards Officer at PIU (Assistant Engineer level), (b) Environment Expert at IE/ PIU level and (c) Environment Expert at PMSC and Environmental (Safeguard cum Climate Change) Expert, at PMU

9.5 Key Tasks & Responsibilities of Superintending or Executive Engineer, PMU

392. The head of the ESG Cell (Superintending or Executive Engineer, level officer) at PMU will have the overall responsibility for implementation of ADB-cleared EMPs in compliance with ADB's SPS 2009, regulatory requirements of the country, project-specific GRM as agreed between DoIC/ TIDCL and ADB.

393. The Key tasks and responsibilities of the Superintending or Executive Engineer, PMU shall be as follows:

- a) Ensure that the final sector-wise EMPs, including relevant mitigation measures which need to be implemented during the construction stage by the contractors are included in the bidding and contract documents.
- b) Ensure establishment of ESG Cell at PMU and environmental officers at PIUs levels (through relevant office orders).
- c) Ensure all project components have the requisite environmental clearances and comply with the central and state regulations. If not pursue and obtain the same in timely manner.
- d) Ensure timely disclosure of final IEEs/EMPs in locations and form accessible to the public;
- e) Provide guidance and oversee environmental management aspects and ensure EMPs are implemented by PIUs, and contractors at respective industrial estates/ contract package level;
- f) Facilitate and ensure compliance with all regulatory requirements of both central & state particularly related to environmental clearances, CTEs, CTOs, as well as any other statutory requirements, as warranted;
- g) Supervise and provide guidance to the PIUs to carry out the environmental monitoring as per the IEE/EMP;
- h) Review, monitor, and evaluate the effectiveness with which the EMPs are implemented, and recommend corrective actions to be taken as necessary;
- i) Consolidate monthly environmental monitoring reports from PIUs and submit semi-annual environmental monitoring reports (EMR) during construction stage; and annual EMR during operation stage (till issuance of the Project completion report by ADB) to ADB for review and clearance.

- j) Ensure that the contractors understand their responsibilities to implement the EMP and mitigate environmental impacts associated with their construction activities and with support of TIDCL provide training to their staff as required.
- k) In case unanticipated environmental impacts occur during the project implementation stage, including design changes, inform ADB, and, as required, update the IEE and EMP in consultation with relevant government agencies for clearance by ADB before any changes are implemented.
- l) In case of non-compliance, inform ADB, and prepare in consultation with relevant government agencies and implement as necessary a corrective action plan for clearance by ADB.
- m) Ensure that the Grievance redressal committees (GRC) at all three levels are (a) established (following office orders); and (b) functional during implementation of the Project.
- n) Redressal of grievances brought about through the GRM in a timely manner.

394. The institutional roles and responsibilities for environmental safeguards implementation at PIUs, PMSC, and Contractor's level are described below:

9.6 Key Tasks & Responsibilities of PIU

395. The PIU(s) will be responsible for the following:

- a) Liaise with local offices of regulatory agencies in obtaining consents/ permissions/ clearances /approvals.
- b) Review and approve Contractor sub-plans e.g. Construction EMP plus Traffic Management Plan, Construction Waste Management Plan, and Health and Safety Plan with support of PMSC.
- c) Oversee day-to-day implementation of EMPs by contractors, including compliance with all government rules and regulations.
- d) Coordination for timely actions for redressal of GRM by all parties
- e) Ensure that the contractors submit monthly environmental management reports (these reports will be included as part of the contractors' monthly progress reports). Further, review and submit it to PMU.
- f) Coordinate public consultation and information disclosure.
- g) In case unanticipated environmental impacts occur during the project implementation stage, including design changes, inform PMU/ADB, as required, help update the IEE and EMP for clearance by ADB before any changes are implemented.
- h) In case of non-compliance, inform PMU/ADB, and help prepare and implement as necessary a corrective action plan for clearance by ADB.

9.7 Key Tasks & Responsibilities of Environment Safeguard Expert, PMSC

396. The Senior Environment Safeguard Expert (reporting to Superintending or Executive Engineer, PMU) will provide overall supervision to the safeguards team under PMU, PIU, PMSC and Contractor(s).

397. The key tasks and responsibilities of the Environment Safeguard Expert will be as follows:

- a) Ensure implementation of ADB-cleared EMPs by PIU and contractors including reporting to DoIC/ TIDCL and ADB:

- b) Support DoIC/ TIDCL and PIUs and other officers with environmental responsibilities in ensuring compliance with loan covenants related to environmental safeguards as well as state and national environment laws and regulations.
- c) Develop an environment, health and safety (labor) training plan and provide formal environmental management trainings at the appropriate stage in project implementation as set out in the EMPs (and agreed training plan) including preparation of all training materials in a format that can be used for future reference, document attendees for trainings through photographs and attendance list.
- d) Develop environment management checklists based on the EMPs for use by officers and PIU and contractor's staff with environmental responsibilities, to undertake daily checks in their supervision and monitoring activities during pre-construction, construction and maintenance phases.
- e) Support DoIC/ TIDCL, PIUs and their contractors in understanding the national laws and regulations, international good practices for environmental management, and the mitigation and monitoring requirements set out in the IEE and EMPs including the corrective actions required for each of the prioritized industrial estates.
- f) Assist PIUs to monitor and supervise implementation of the project EMP by themselves and their contractors.
- g) Review and confirm that necessary provisions of the disclosed EMP (updated versions if any since bidding stage) are included in the contracts for further implementation and compliance.
- h) Assist DoIC/ TIDCL to update the IEE/prepare addendum to IEE to reflect any changes (such as location, alignment, length, design, addition of new sub-components etc.) including undertaking any site-specific assessment and identifying mitigation measures required.
- i) Review and confirm the detailed designs adequately incorporate all EMP measures and conform with the IFCs EHS guidelines.
- j) Review and confirm that all pre-construction requirements and relevant clearances and permits have been obtained prior to commencement of works.
- k) Maintain records and copies of all clearances, permits, licenses and insurances obtained by DoIC/ TIDCL and contractors.
- l) Review and approve the contractor's pre-construction documentation as required by the EMP (e.g. CEMP/SEMP) and confirm requirements as well as national laws and regulations.
- m) Review documentation and undertake regular site visits to ensure the EMP implementation.
- n) Facilitate monthly EHS meetings and undertake at least one site visit every month to all active project sites across all contract packages during the construction period to check PIUs supervision and monitoring activities and adequate implementation of EMP measures and, advise DoIC/ TIDCL and their contractors if improvements are needed, document each site visit in field visit note including photographs.
- o) In addition to monthly site visits carry out at least quarterly in-depth environmental audits and random spot checks of all contractors to verify compliance to applicable requirements during construction.
- p) Prepare monthly/quarterly updates and assist DoIC/ TIDCL in preparing the semi-annual environmental monitoring reports in accordance with template (ref. **Appendix-13**).

- q) Assist DoIC/ TIDCL to update the IEE (additional assessment and consultations) and EMPs in the event of unanticipated impact, including a change in scope or design, or the siting or routing of project components.
- r) Record and help DoIC/ TIDCL to develop and implement corrective action as necessary to address exceedance of performance standards or non-compliance issues.
- s) Support DoIC/ TIDCL to locally disclose the IEE/EMP per the EMP requirements, prepare a community liaison plan, and continue to disclose information on and conduct meaningful consultations with the affected communities especially in relation to sites with adjacent properties and the distribution line routings.
- t) Support DoIC/ TIDCL to operationalize and effectively implement the grievance redress mechanism, including raising awareness of its existence with affected communities, resolving grievances related to environmental issues that have been submitted, and keeping adequate documentation.
- u) Support DoIC/ TIDCL to respond to any EHS related grievances.
- v) Prepare operational procedures in line with the requirements set out in the EMP to be adopted by DoIC/ TIDCL and provide them with training on their operationalization.
- w) Prepare a final EMR, setting out in detail the compliance level of all the EMP requirements and capacity strengthening of DoIC/ TIDCL to continue to comply with the EMP requirements during maintenance phase as part of the project completion report (PCR)

9.8 Responsibilities of Environment (Safeguard cum Climate Change) Expert

398. The Environmental (Safeguard cum Climate Change) Expert (reporting to ESG Cell at PMU) and deployed at PIU level will provide overall supervision to the EHS officers of contractors under respective PIU(s).

399. The key tasks and responsibilities of the Environmental (Safeguard cum Climate Change) Expert will be as follows:

- a) Assist the PIU and contractors in day-to-day implementation of ADB-cleared EMPs including reporting to PMU.
- b) Support PIUs and PMU and other officers with environmental responsibilities in ensuring compliance with loan covenants related to environmental safeguards as well as state and national environment laws and regulations.
- c) Assist in providing formal environmental management trainings at the appropriate stage in project implementation as set out in the EMPs (and agreed training plan) including preparation of all training materials in a format that can be used for future reference, document attendees for trainings through photographs and attendance list.
- d) Assist implementing environment management checklists based on the EMPs for use by PIU and contractor's staff with environmental responsibilities, to undertake daily checks in their supervision and monitoring activities during pre-construction, construction and maintenance phases.
- e) Support PIUs and their contractors in understanding the national laws and regulations, international good practices for environmental management, and the mitigation and monitoring requirements set out in the IEE and EMPs including the corrective actions required for each of the prioritized industrial estates.

- f) Assist PIUs and contractors to monitor and supervise implementation of the project EMP by themselves and their contractors.
- g) Review and confirm that necessary provisions of the disclosed EMP (updated versions if any since bidding stage) are included in the contracts for further implementation and compliance.
- h) Assist PMU/ PIU to review and confirm the detailed designs adequately incorporate all EMP measures and conform with the IFCs EHS guidelines.
- i) Assist to PMU/PIU to review and confirm that all pre-construction requirements and relevant clearances and permits have been obtained prior to commencement of works.
- j) Assist PMU/ PIU to maintain records and copies of all clearances, permits, licenses and insurances obtained by DoIC/ TIDCL and contractors.
- k) Assist PMU/ PIU to review and approve the contractor's pre-construction documentation as required by the EMP (e.g. CEMP/SEMP) and confirm requirements as well as national laws and regulations;
- l) Assist PMU/ PIU to review documentation and undertake regular site visits to ensure the EMP implementation.
- m) Assist PMU/ PIU to facilitate monthly EHS meetings and undertake at least one site visit every month to all active project sites across all contract packages during the construction period to check PIUs supervision and monitoring activities and adequate implementation of EMP measures and, advise DoIC/ TIDCL and their contractors if improvements are needed, document each site visit in field visit note including photographs.
- n) In addition to monthly site visits carry out at least quarterly in-depth environmental audits and random spot checks of all contractors to verify compliance to applicable requirements during construction.
- o) Assist PMU/ PIU to prepare monthly/quarterly updates and assist DoIC/ TIDCL in preparing the semi-annual environmental monitoring reports in accordance with template agreed with ADB.
- p) Assist PMU to update the IEE (additional assessment and consultations) and EMPs in the event of unanticipated impact, including a change in scope or design, or the siting or routing of project components.
- q) Assist PMU/ PIU to record and help DoIC/ TIDCL to develop and implement corrective action as necessary to address exceedance of performance standards or non-compliance issues;
- r) Assist PMU/ PIU to locally disclose the IEE/EMP per the EMP requirements, prepare a community liaison plan, and continue to disclose information on and conduct meaningful consultations with the affected communities especially in relation to sites with adjacent properties and the distribution line routings.
- s) Assist PMU/ PIU to operationalize and effectively implement the grievance redress mechanism, including raising awareness of its existence with affected communities, resolving grievances related to environmental issues that have been submitted, and keeping adequate documentation.
- t) Assist PMU/ PIU to respond to any EHS related grievances.
- u) Assist PMU/ PIU to prepare operational procedures in line with the requirements set out in the EMP to be adopted by DoIC/ TIDCL and providing them with training on their operationalization.

- v) Assist PMU/ PIU to prepare a final EMR, setting out in detail the compliance level of all the EMP requirements and capacity strengthening of DoIC/ TIDCL to continue to comply with the EMP requirements during maintenance phase as part of the project completion report (PCR).

9.9 Responsibilities of Bio-Diversity Specialist, PMSC

400. The Bio-diversity Specialist (reporting to Superintending or Executive Engineer/ Senior Environmental Specialist, PMU) will have the following key tasks and responsibilities:

- a) Assist the PMU, PIU and contractors in bio-diversity related matters during day-to-day implementation of ADB-cleared EMPs at all industrial estates:
- b) Assist implementing bio-diversity management checklists based on the EMPs for use by PIU and contractor's staff with environmental responsibilities, to undertake daily checks in their supervision and monitoring activities during pre-construction, construction and maintenance phases.
- c) Support PIUs and their contractors in understanding the good practices for bio-diversity management, and the mitigation and monitoring requirements set out in the IEE and EMPs including the corrective actions required for each of the prioritized industrial estates.
- d) Assist PMU to update the IEE (additional assessment and consultations) and EMPs in the event of unanticipated impact on biodiversity, including a change in scope or design, or the siting or routing of project components.
- e) Assist PMU/ PIU to record and help DoIC/ TIDCL to develop and implement corrective action as necessary to address exceedance of performance standards or non-compliance issues related to biodiversity matters.
- f) Assist PMU/ PIU to respond to any bio-diversity matters related like species identification prior to site selection, species selection for open area/ green area development during pre-construction, construction and maintenance phases.

9.10 Responsibilities of Horticultural Specialist, PMSC

401. The Horticulture Specialist (reporting to Superintending or Executive Engineer/ Senior Environmental Specialist, PMU) will have the following key tasks and responsibilities:

- a) Assist the PMU, PIU and contractors in horticulture related matters during day-to-day implementation of ADB-cleared EMPs at all industrial estates.
- b) Support PIUs and their contractors in understanding the good practices for horticulture management and monitoring requirements including the corrective actions required for each of the prioritized industrial estates.
- c) Assist PMU/ PIU to record and help DoIC/ TIDCL to develop and implement corrective action as necessary to address non-compliance issues related to horticulture related matters.
- d) Assist PMU/ PIU to respond to any horticulture related matters like species identification prior to site selection, site preparation, species selection for open area/ green area development during pre-construction, construction and maintenance phases.

9.11 Responsibilities of Environment, Health and Safety Officer

- a) The Environment, Health and Safety Officer (reporting to ESG Cell at PMU) deployed by respective contractors under respective PIU(s) will have the following key tasks and responsibilities:
- b) Prepare the CEMP/SEMP covering (details of construction camp sites; construction materials storage areas; spoil management plan; health & safety plans; traffic management plans; and on-site grievance redressal mechanism).
- c) Implement the EMP in respect of actions allocated to the Contractor during construction.
- d) Ensure adherence to all applicable national environment, health, safety and labor laws.
- e) Support TIDCL/PMSC to update the IEE for clearance by ADB following the change of location/design/new components identified under the Project.
- f) Ensure that construction workers including all formal and informal subcontractors understand their responsibilities to implement the EMP and mitigate environmental impacts associated with their pre-construction and construction activities with support of TIDCL.
- g) Support the PMU/PIUs in undertaking ongoing consultation and implementing the GRM.
- h) Submit monthly environmental monitoring reports to the PIUs (these reports will be included as part of the contractors' monthly progress reports). It will identify the work undertaken over the reporting period and document the environmental, health and safety measures including qualitative and quantitative monitoring activities that have been carried out, problems encountered, and follow-up actions that were taken (or will be taken) to correct the problems).
- i) In case unanticipated environmental impacts occur during the project implementation stage, including design changes, inform PIUs/PMU, and as required, help update the IEE and EMP for clearance by ADB before any changes are implemented.
- j) In case of non-compliance, inform PIUs/PMU/PMSC, and help prepare and implement as necessary a corrective action plan for clearance by ADB.

9.12 ADB's Responsibility

- a) Conduct periodic site visits during the project implementation to confirm compliance with the EMP.
- b) In case of significant issues, conduct supervision missions with detailed review by ADB's Environment specialists/officers or consultants.
- c) Review the semi-annual reports submitted by TIDCL to ensure that adverse impacts and risks are mitigated as planned and agreed with ADB.
- d) Work with TIDCL to rectify to the extent possible any failures to comply with their safeguard commitments, as covenanted in the loan agreement, and exercise remedies to re-establish compliance as appropriate; and
- e) Prepare a project completion report that assesses whether the objective and desired outcomes of the EMPs have been achieved, taking into account the baseline conditions and monitoring results.
- f) The institutional arrangement for implementation of the EMP during the construction stage is given in **Figure 9-1**.

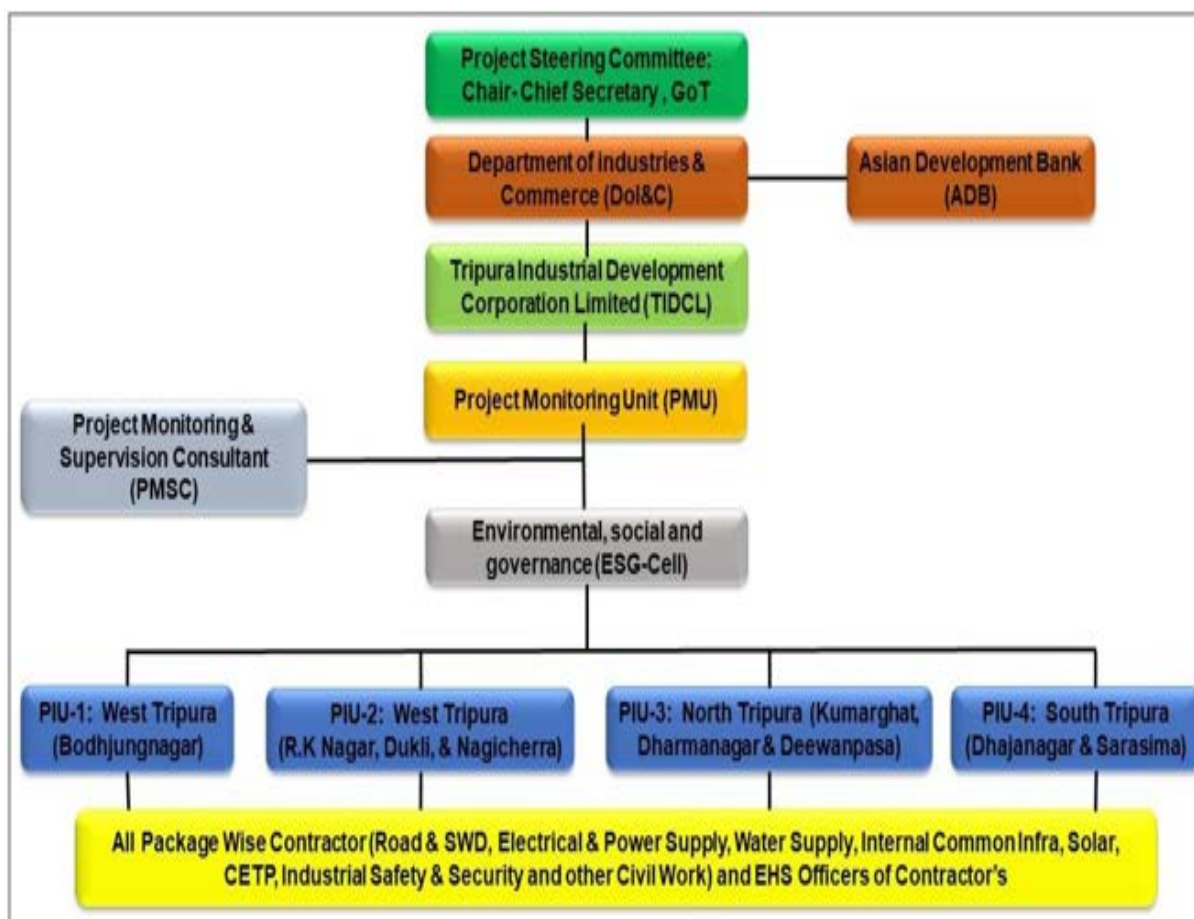


Figure 9-1: Institutional Arrangement for Implementation of EMP

9.13 Training and Capacity Building

402. The training on EMP implementation shall be provided to the Project staff (PMU, PIUs, PMSC, and EHS Officers of contractors) by the Senior Environment specialist of PMU (position provided by PMSC), after mobilization of most of the project staff during construction stage.

403. The outline of training on EMP implementation for capacity building is given in **Table 9-7**. The estimated cost for the training is ₹300,000 (excluding trainings of contractors which will be part of EMP implementation cost during construction) to be covered by the project's capacity building program. The detailed cost and specific modules will be customized for the available skill set after assessing the capabilities of the target participants and the requirements of the project by the Environmental Specialist of PMSC.

Table 9-7: Outline of Training on EMP Implementation for Capacity Building

Description	Duration & Participants	Cost Provision & Source of Fund
1. Introduction and Sensitization to policies and regulatory requirements <ul style="list-style-type: none"> • ADB Safeguards Policy Statement • Government of India and Govt. of Tripura applicable safeguard laws, regulations and policies including labor laws and occupational health and safety (OHS) requirements and 	Half day All PIU, PMU & Contractors managerial and EHS officers	INR: 300,000 (Lump sum) Included in overall project cost

Description	Duration & Participants	Cost Provision & Source of Fund
practices, etc. <ul style="list-style-type: none"> • Incorporation of EMP into the project design and contracts • Monitoring, reporting and corrective action planning. 		
2. Good Construction Practices and EMP implementation <ul style="list-style-type: none"> • All EMP mitigation and monitoring measures under EMP including Roles and responsibilities for implementation • Construction site standard operating procedures (SOP) for both linear and area-based components • Occupational Health and Safety (OHS) requirements and practices, etc. • Site clean-up and restoration, on site sanitation and waste management plan • Grievance redress mechanism • Reporting and disclosure 	Half day All PIU, PMU & Contractors managerial and EHS officers	
3. Orientation to Contractors <ul style="list-style-type: none"> • All EMP mitigation and monitoring measures under EMP • Construction site standard operating procedures (SOP) for both linear and area-based components • Occupational Health and Safety (OHS) requirements and practices, etc including toolbox talk on daily basis. • On site sanitation, waste management plan • Site clean-up and restoration • Reporting and disclosure <p>Note: Shall be conducted once during mobilization of contractor and thereafter refresher orientation once every month. In addition, daily toolbox talks briefing on OHS requirements and practices, prior to start of work</p>	Half day PIU field supervisors and contractors EHS officers, field supervisors and workers (both skilled & unskilled)	

404. Training on ADB’s requirements and EMP implementation shall also be provided to the Project staff through the Capacity Development Resource Centre (CDRC) regular program, ADB or during Review Mission.

9.14 Environmental Monitoring Plan

405. During the construction and maintenance phase (concurrent to 1 year defect liability period), the prevailing environment conditions are to be monitored through a NABET accredited laboratory under the supervision of the PIU and ESG Cell.

406. The monitoring schedule, probable monitoring locations, parameters to be monitored and frequency is given in **Table 9-8**. The EHS officer of the contractor shall be primarily responsible for arranging the environmental monitoring under the overall guidance of the PIU and ESG Cell/

Table 9-8: Environmental Monitoring Schedule at Bodhjunnagar IE

Attribute	Typical Sampling Locations	Component/ Sector, Frequency & Duration for Monitoring							Total No of Samples
		Civil Works - Road and Junction & Storm Water Drain			Civil Work- Land Development, Landscaping, Common facilities and Social Infrastructure	Industrial Safety & Security, Civil Work (, Upgradation of Boundary Wall, New Construction of Boundary Wall etc.	Civil Work - Water Supply Infrastructure, Rainwater harvesting and Refurbishment of existing CETP	Upgradation of electrical & power supply and Installation of solar plant and mechanical accessories works	
Package No-		TIDCL-CW01-ADB-PIU1-BDN-01	TIDCL-CW02-ADB-PIU1-BDN-02	TIDCL-CW03-ADB-PIU1-BDN-03	TIDCL-CW11-ADB-PIU1-BJN-01	TIDCL-CW12-ADB-PIU1-BJN-02	TIDCL-CW13-ADB-PIU1-BJN-03	TIDCL-EW01-ADB-PIU1-BJN-01	
Air	Shall cover all active construction site(s), workforce camp site(s), material stack yard(s), crusher/ hot mix /batch mix plants	Construction phase-36 months	Construction phase-30 months	Construction phase-30 months	Construction phase-30 months	Construction phase-24 months	Construction phase-36 months	Construction phase-36 months	191
		2 locations, once a quarter (18 samples)	2 locations, once a quarter (15 samples)	2 locations, once a quarter (15 samples)	2 locations, once a quarter (15 samples)	2 locations, once a quarter (12 samples)	2 locations, once a quarter (18 samples)	2 locations, once a quarter (18 samples)	
		Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	
		1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	2 locations, once in 6 months (20 samples)	
		Total-28	Total-25	Total-25	Total-25	Total-22	Total-28	Total-38	
Water	Shall cover drinking water sources for workforce camps and hand pumps/natural water sources along/near to project	Construction phase-36 months	Construction phase-30 months	Construction phase-30 months	Construction phase-30 months	Construction phase-24 months	Construction phase-36 months	Construction phase-36 months	191
		2 locations, once a quarter (18 samples)	2 locations, once a quarter (15 samples)	2 locations, once a quarter (15 samples)	2 locations, once a quarter (15 samples)	2 locations, once a quarter (12 samples)	2 locations, once a quarter (18 samples)	2 locations, once a quarter (18 samples)	
		Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	

Attribute	Typical Sampling Locations	Component/ Sector, Frequency & Duration for Monitoring							Total No of Samples
		Civil Works - Road and Junction & Storm Water Drain			Civil Work- Land Development, Landscaping, Common facilities and Social Infrastructure	Industrial Safety & Security, Civil Work (, Upgradation of Boundary Wall, New Construction of Boundary Wall etc.	Civil Work - Water Supply Infrastructure, Rainwater harvesting and Refurbishment of existing CETP	Upgradation of electrical & power supply and Installation of solar plant and mechanical accessories works	
	construction activities	1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	2 locations, once in 6 months (20 samples)	
		Total-28	Total-25	Total-25	Total-25	Total-22	Total-28	Total-38	
Noise	Shall cover all active construction site(s), workforce camp site(s), material stack yard(s), crusher/ hot mix /batch mix plants	Construction phase-36 months	Construction phase-30 months	Construction phase-30 months	Construction phase-30 months	Construction phase-24 months	Construction phase-36 months	Construction phase-36 months	191
		2 locations, once a quarter (18 samples)	2 locations, once a quarter (15 samples)	2 locations, once a quarter (15 samples)	2 locations, once a quarter (15 samples)	2 locations, once a quarter (12 samples)	2 locations, once a quarter (18 samples)	2 locations, once a quarter (18 samples)	
		Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	
		1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	2 locations, once in 6 months (20 samples)	
		Total-28	Total-25	Total-25	Total-25	Total-22	Total-28	Total-38	
Soil	Shall cover adjacent areas of construction sites, camp sites, crusher/hot mix/batch mix plants sites, and workforce camps	Construction phase-36 months	Construction phase-30 months	Construction phase-30 months	Construction phase-30 months	Construction phase-24 months	Construction phase-36 months	Construction phase-36 months	191
		2 locations, once a quarter (18 samples)	2 locations, once a quarter (15 samples)	2 locations, once a quarter (15 samples)	2 locations, once a quarter (15 samples)	2 locations, once a quarter (12 samples)	2 locations, once a quarter (18 samples)	2 locations, once a quarter (18 samples)	
		Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	Maintenance/ DLP phase- 60 months	
		Total-28	Total-25	Total-25	Total-25	Total-22	Total-28	Total-38	

Attribute	Typical Sampling Locations	Component/ Sector, Frequency & Duration for Monitoring							Total No of Samples
		Civil Works - Road and Junction & Storm Water Drain			Civil Work- Land Development, Landscaping, Common facilities and Social Infrastructure	Industrial Safety & Security, Civil Work (, Upgradation of Boundary Wall, New Construction of Boundary Wall etc.	Civil Work - Water Supply Infrastructure, Rainwater harvesting and Refurbishment of existing CETP	Upgradation of electrical & power supply and Installation of solar plant and mechanical accessories works	
		1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	1 location, once in 6 months (10 samples)	2 locations, once in 6 months (20 samples)	
		Total-28	Total-25	Total-25	Total-25	Total-22	Total-28	Total-38	
Provision for Budget of environmental monitoring within IE through NABET Accredited Laboratory (Ambient Air Quality Monitoring, Water quality Monitoring, Noise level Monitoring and Soil Quality Monitoring). (in Lakh)		9.58	8.55	8.55	8.55	7.53	9.58	13.00	65.36

10.0 CONCLUSIONS AND RECOMMENDATION

407. The IEE has assessed the proposed infrastructure construction works as well as the baseline environment within the core and buffer zones of Bodhjunnagar IE. The IEE has not identified any significant and irreversible long-term impact, but will have localized, short-term impacts, confined to the existing IE boundary. Therefore, as per ADB's SPS 2009, the Project (Bodhjunnagar IE) is defined as "category B" for environment safeguards and the IEE report has been prepared.

408. The proposed construction works will not have impact on forest areas, protected areas, endangered/ threatened/ rare flora and fauna, protected monuments/ cultural heritage structures within the core zone. The construction works will require felling of 286 trees, which includes 47 Agar trees (*Aquilaria malaccensis*) and 4 Jalpai trees (*Elaeocarpus serratu*) and rest of trees are commonly found in the region. The Agar and Jalpai trees are listed as endangered and threatened species by Tripura state forest department. TIDCL has obtained permission for the felling/ extraction of all 286 trees from the competent authorities of the forest department.

409. The proposed development works will not have impact on forest areas, protected areas, endangered/ threatened/ rare flora and fauna, protected monuments/ cultural heritage structures within the core zone.

410. The impacts due to the construction activities like vegetation clearance, dust and noise levels, air pollution due to vehicular emissions, worker's safety, construction site management, construction material management including debris disposal, on and off-site sanitation management works are largely reversible and short term in nature. Measures to minimize such impacts are described under the environmental management plan (sector wise). The EMP also includes institutional responsibilities for supervision & implementation monitoring throughout the construction stage.

411. The Bodhjunnagar IE does not have any project component(s) which qualify as "Associated Facility. The existing CETP within the IE has been considered as "Existing Facility" in accordance with the ADB's SPS, 2009. The audit of the CETP includes a corrective action plan (CAP) including the reuse of the treated effluent for industrial use. The required budgetary provisions for CAP are included in the EMP.

412. Additionally, several environmental conservation measures like balancing earthwork cut and fill quantities (86198.52 cum) and reuse for green area development, construction of stormwater holding/ retention ponds at 5 locations with a cumulative capacity of 73.25 million liters, groundwater recharging/ percolation wells at 23 locations to offset the withdrawal of groundwater for industrial purposes of the IE, plantation of 1430 saplings (5 saplings for each of 286 trees felled) with 3 year maintenance for minimum 70% survival rate to offset the net loss and ensure net gain from 3rd year onwards, development of green belt in open areas (20.22 ha) and 12845.77 sqm of green belt over pond pathway, 32.54 km long utility corridor, periodical monitoring of ambient air quality, ambient noise levels, water and soil quality at construction sites throughout the construction stage, and capacity development (of PMU, PIUs, and contractors) have been considered along with necessary budgetary provisions (INR 193.23 lakhs).

413. The EMP including the CAP will be included in the bid documents, to make it part of civil works contract and binding of the contractor for implementation of the EMP during construction stage.

414. The IEE covers the applicable environmental regulations and has determined that the proposed development works at Bodhjunnagar IE will not require prior environmental clearances either from the state or central levels (as per EIA notification 2006 and amendments thereof). However, the contractor will be required to obtain CTE and CTO for campsites, hot-mix plants, concrete batch plants, etc. from the Tripura State Pollution Control Board. No Objection Certificate (NOC) will be required from the Central Ground Water Authority for construction of new tube wells to meet the projected industrial water demand of the IE. Seeking such required extensions, permissions, consents, and NOC will not pose any regulatory risks.

415. The stakeholders i.e. owners of the existing industries as well as the workforce within the IE have been consulted, to seek their suggestions/ viewpoints, inadequacies in the existing infrastructure and many of which have been included in the project design.

416. The IEE includes grievance redressal mechanism to resolve any complaints from aggrieved existing industries and/or their workforce, if any arise during the construction stage. The GRM stipulates a time frame for resolution of grievances in a three-tier mechanism. In addition, the contractor will also require having a GRM to resolve any complaints from the construction workforce.

APPENDIX-1

RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST-BODHJUNGNAGAR IE

APPENDIX-1: RAPID ENVIRONMENTAL ASSESSMENT (REA) CHECKLIST

Instructions:

(i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Safeguards Division (SDSS) for endorsement by the Director, SDSS and for approval by the Chief Compliance Officer.

(ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's: (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.

(iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: IND 58021-001/ Tripura Industrial Infrastructure Development Project, Bodhjunnagar IE in Tripura

Sector Division: Public Sector Management and Governance Sector Office (PSMG)

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area...		✓	Bodhjunnagar is an existing industrial estate (IE), for two decades
Densely populated?		✓	This is industrial estate with no provision for residential colonies.
Heavy with development activities?		✓	Only small and medium scale industries are within the IE
Adjacent to or within any environmentally sensitive areas?		✓	No Nearest protected or their notified eco-sensitive zone is at 21 kms from the IE
Cultural heritage site		✓	No No cultural heritage site is located within 300 meters from the IE in all directions. The nearest heritage site is Ujjayanta Palace, which is at a distance of 14 kilometers from IE.
Protected Area		✓	No The Sepahijila Wildlife Sanctuary and Clouded Leopard National Park are situated at 21 kms from the IE
Wetland		✓	No The nearest wetland is College Tilla lake, situated at a distance of 8 km from IE
Mangrove		✓	None in Tripura State
Estuarine		✓	None in Tripura State
Buffer zone of protected area		✓	No Nearest protected or their notified eco-sensitive zone is at 21 kms from the IE
Special area for protecting biodiversity		✓	No Nearest protected or their notified eco-sensitive zone is at 21 kms from the IE
Bay		✓	None in Tripura State
B. Potential Environmental Impacts Will the Project cause...			

Screening Questions	Yes	No	Remarks
impacts on the sustainability of associated sanitation and solid waste disposal systems and their interactions with other urban services.		✓	Minor impacts are anticipated during the construction phase, which can be mitigated by implementing suitable measures
deterioration of surrounding environmental conditions due to rapid urban population growth, commercial and industrial activity, and increased waste generation to the point that both manmade and natural systems are overloaded and the capacities to manage these systems are overwhelmed?		✓	None anticipated. No untreated effluent will be discharged into the natural drainage channels. Existing effluent treatment plant within the IE is being refurbished to treat the liquid waste to meet the current national standards and reuse the treated effluent for industrial water use. The construction stage impact can be mitigated through septic tank and soak pit disposal arrangements.
degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds and forests)?		✓	None/ Not applicable
dislocation or involuntary resettlement of people?		✓	None/ Not applicable
disproportionate impacts on the poor, women and children, Indigenous Peoples, or other vulnerable group?		✓	None/ Not applicable
degradation of cultural property, and loss of cultural heritage and tourism revenues?		✓	None/ Not applicable
occupation of low-lying lands, floodplains, and steep hillsides by squatters and low-income groups, and their exposure to increased health hazards and risks due to pollutive industries?		✓	None/ Not applicable
water resource problems (e.g. depletion/degradation of available water supply, deterioration for surface and ground water quality, and pollution of receiving waters?		✓	None anticipated. No untreated effluent will be discharged into the natural drainage channels. Existing effluent treatment plant within the IE is being refurbished to treat the liquid waste to meet the current national standards and reuse the treated effluent for industrial water use. The development works also include construction of storm water holding ponds by impounding the existing valley/ local depression(s). The stormwater holding ponds will serve as a supplementary water source for the industrial estate, after requisite water treatment and expected to partially offset the use of ground water for industrial use.
air pollution due to urban emissions?		✓	None/ Not applicable All existing and upcoming industries within IE are regulated for emissions under the Air and Water Pollution Prevention Acts.
risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?		✓	Risks and vulnerability during construction phase are managed through appropriate preventive and safety measures. Chemical and biological hazards are not applicable.
road blocking and temporary flooding due to land excavation during rainy season?		✓	Impacts can be mitigated through appropriate preventive measures.
noise and dust from construction activities?		✓	Dust and noise levels can be regulated through appropriate preventive measures.
traffic disturbances due to construction material transport and wastes?		✓	The impacts can be mitigated through appropriate traffic scheduling and management plans.

Screening Questions	Yes	No	Remarks
temporary silt runoff due to construction?		✓	The temporary impacts are anticipated during the construction stage and can be mitigated through appropriate measures.
hazards to public health due to ambient, household and occupational pollution, thermal inversion, and smog formation?		✓	None/ Not applicable
water depletion and/or degradation?		✓	Project design include measures to replenish groundwater resources and reduce the dependence on use of groundwater for industrial use.
overpaying of ground water, leading to land subsidence, lowered ground water table, and salinization?		✓	None/ Not applicable
contamination of surface and ground waters due to improper waste disposal?		✓	None anticipated. No untreated effluent will be discharged into the natural drainage channels. Existing effluent treatment plant within the IE is being refurbished to treat the liquid waste to meet the current national standards and reuse the treated effluent for industrial water use. The development works also include construction of storm water holding ponds by impounding the existing valley/ local depression(s). The stormwater holding ponds will serve as a supplementary water source for the industrial estate, after requisite water treatment and expected to partially offset the use of ground water for industrial use.
pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?		✓	None/ Not applicable
large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		✓	The influx of the workforce will be managed and conflicts with the local people/ community will be avoided through appropriate measures
social conflicts if workers from other regions or countries are hired?		✓	The influx of the workforce will be managed and conflicts with the local people/ community will be avoided through appropriate measures
risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during operation and construction?		✓	None/ Not applicable
community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation, and decommissioning?		✓	None/ Not applicable

ASBESTOS SCREENING TOOL

Screening Questions	Yes*	May be*	No	Remarks *For those with answers of YES and MAY be , document the potential likelihood of asbestos being encountered.
Does the proposed project involve, or potentially involve, any of the following activities that are commonly associated with asbestos use:			✓	None/ Not applicable
<ul style="list-style-type: none"> • Construction/commissioning of a new asset? 			✓	None/ Not applicable
<ul style="list-style-type: none"> • Refurbishment / demolition of an existing asset? 			✓	None/ Not applicable
<ul style="list-style-type: none"> • Post-disaster response, involving reconstruction, repair, or removal of damaged asset? 			✓	None/ Not applicable
<ul style="list-style-type: none"> • Maritime activities? 			✓	None/ Not applicable
<ul style="list-style-type: none"> • Water supply, water sanitation, wastewater, sewerage, or water hygiene initiatives? 			✓	None/ Not applicable
<ul style="list-style-type: none"> • Earthworks, remedial activities, or solid waste management? 			✓	None/ Not applicable
<ul style="list-style-type: none"> • Power, telecommunications, or energy supply infrastructure? 			✓	None/ Not applicable
<ul style="list-style-type: none"> • Maintenance, demolition, transportation, or disposal of wastes associated with the above activities? 			✓	None/ Not applicable

A Checklist for Preliminary Climate Risk Screening

Country/Project Title: IND 58021-001/ Tripura Industrial Infrastructure Development Project Bodhjungnagar IE in Tripura.

Sector : Public Sector Management and Governance Sector Office (PSMG)

Subsector : Industry and trade sector development

Division/Department : Public Sector Management and Governance Sector Office (PSMG)

Screening Questions		Score	Remarks ¹
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather-related events such as floods, droughts, storms, landslides?	1	See below "other comments"
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc.)?	0	None
Materials and Maintenance	Would weather, current, and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	1	See below "other comments"
	Would weather, current, and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	0	None
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design lifetime?	1	See below "other comments"

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1–4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which includes providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high-risk project.

Result of Initial Screening (Low, Medium, High): Medium

Other Comments: Climate risk and adaptation assessment (CRA) and Climate Resilience Framework (CRF) has been considered and requisite provisions are included in the project design of all the 9 prioritized industrial estates.

Prepared by: ADB TA Consultant

¹ If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

APPENDIX-2

**Extract of EIA Notification 2006, with reference to
Industrial Estates**

(1)	(2)	(3)	(4)	(5)
6(b)	Isolated storage & handling of hazardous chemicals (As per threshold planning quantity indicated in column 3 of schedule 2 & 3 of MSIHC Rules 1989 amended 2000)	-	All projects	General Condition shall apply
7		Physical Infrastructure including Environmental Services		
7(a)	Air ports	^v "All projects including airstrips, which are for commercial use."	-	^v "Note: Air strips, which do not involve bunkering/ refueling facility and or Air Traffic Control, are exempted."
7(b)	All ship breaking yards including ship breaking units	All projects	-	-
7©	Industrial estates/ parks/ complexes/ areas, export processing Zones (EPZs), Special Economic Zones (SEZs), Biotech Parks, Leather Complexes.	If at least one industry in the proposed industrial estate falls under the Category A, entire industrial area shall be treated as Category A, irrespective of the area. Industrial estates with area greater than 500 ha. and housing at least one Category B industry.	Industrial estates housing at least one Category B industry and area <500 ha. Industrial estates of area > 500 ha. and not housing any industry belonging to Category A or B.	^v "Genral as well as special conditions shall apply." Note: 1. Industrial Estate of area below 500 ha. and not housing any industry of Category 'A' or 'B' does not require clearance. 2. If the area is less than 500 ha. but contains building and construction projects > 20,000 Sq. mts. And or development area more than 50 ha it will be treated as activity listed at serial no. 8(a) or 8(b) in the Schedule, as the case may be."
7(d)	Common hazardous waste treatment, storage and disposal facilities (TSDFs)	All integrated facilities having incineration & landfill or incineration alone	All facilities having land fill only	General Condition shall apply

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

(1)	(2)	(3)	(4)	(5)
7(e)	^v "Ports, harbours, break waters, dredging."	≥ 5 million TPA of cargo handling capacity (excluding fishing harbours)	< 5 million TPA of cargo handling capacity and/or ports/ harbours ≥10,000 TPA of fish handling capacity	^v "General Condition shall apply. Note: 1. Capital dredging inside and outside the ports or harbors and channels are included; 2. Maintenance dredging is exempt provided it formed part of the original proposal for which Environment Management Plan (EMP) was prepared and environmental clearance obtained."
7(f)	Highways	i) New National High ways; and ii) Expansion of National High ways greater than 30 KM, involving additional right of way greater than 20m involving land acquisition and passing through more than one State.	^v " i) All State Highway Project; and ii) State Highway expansion projects in hilly terrain (above 1,000 m AMSL) and or ecologically sensitive areas."	General Condition shall apply. Note: Highways include expressways."
7(g)	Aerial ropeways	^{v(xvi)(a)} "(i) All projects located at altitude of 1,000 mtr. And above. (ii) All projects located in notified ecologically sensitive areas."	^{v(xvi)(b)} "All projects except those covered in column (3)."	General Condition shall apply
7(h)	Common Effluent Treatment Plants (CETPs)		All projects	General Condition shall apply
7(i)	Common Municipal Solid Waste Management Facility (CMSWMF)		All projects	General Condition shall apply
8		Building /Construction projects/Area Development projects and Townships		
8(a)	Building and Construction projects		≥20000 sq.mtrs and <1,50,000 sq.mtrs. of built-up area#	#(built up area for covered construction; in the case of facilities open to the sky, it will be the activity area)
8(b)	Townships and Area Development projects.		Covering an area ≥ 50 ha and or built up area ≥1,50,000 sq .mtrs ++	++All projects under Item 8(b) shall be appraised as Category B1

I; II; III (i), (ii); IV (a), (b); V (i), (ii), (iii)(a), (b), (c), (iv), (v), (vi) (a), (b), (vii), (viii) (a), (b), (ix), (x), (xi), (xii) (a), (b), (xiii), (xiv) (a), (b), (xv) (a), (b), (xvi) (a), (b), (xvii); VI (a), (b); VII & VIII of the Notification, S.O. 3067(E) dated 01.12.2009 of the Ministry of Environment and Forests, (Published in the Gazette of India, Extraordinary, Part-II, and Section 3, Sub-section (ii), No. 2002] New Delhi, Tuesday, November 1, 2009; an amendment to EC notification S.O.1533(E) dated 14.09.2006

APPENDIX-3

**Environmental Audit Report with Corrective Action Plan (CAP)
of
Common Effluent Treatment Plant (CETP)
(500 KLD Capacity)
at
Bodhjungnagar Industrial Estate, Tripura**

**Prepared by PDMC for
DIC/ TIDCL, Government of Tripura**

February 2025

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Enclosures

Enclosure-1: Amended EIA Notification on CETP by MoEF&CC, Govt. of India

Enclosure-2: SEIAA /TSPCB issued letter for exemption of environmental clearance for existing CETP

Enclosure-3: Consent to Operate (CTO) for CETP issued by Tripura State Pollution Control Board (TSPCB)

Enclosure-4: Test reports of existing CETP done by O&M operator (M/s. Envirochem laboratories Pvt. Ltd.)

Enclosure-5: Test reports of influent and effluent samples of CETP carried out during April 2024

Enclosure-6: Extracts of TSPCB/ CPCB and NGT observations on the functioning of the CETP and actions identified for rectification by DIC/ TIDCL, Govt. of Tripura

1.0 Background

1. The Department of Industries & Commerce (DIC), Government of Tripura through Tripura Industrial Development Corporation Limited (TIDCL) has initiated an ambitious Project Readiness Financing (PRF) (Loan 6046-IND) from ADB for the infrastructure development of nine prioritized industrial estates (IE), across five districts in Tripura state.

2. The DIC has engaged a Project Design and Management Consultant (PDMC) under PRF for preparation of the feasibility and detailed project reports, and other assigned deliverables for nine prioritized industrial estates and to enable DIC for seeking the ensuing loan from ADB.

3. Bodhjungnagar industrial estate is one of the prioritized and largest industrial estate, located within West Tripura district. The industrial estate was established in 1998 and is spread over an area of 207.55 ha. (512.87 acres). Bodhjungnagar is 12 km from Agartala, the state capital and well connected to the national highway (NH-108 B and NH-8) and railway network through Jirania Railway Station. The Latitude and Longitude of the Bodhjungnagar industrial estate is 23°88'06.43"N and 91°36'50.72"E respectively.

2.0 Bodhjungnagar Industrial Estate

4. At present, Bodhjungnagar industrial estate has 128 industrial units mainly belonging rubber industries (28.87%), food processing (13%), construction and general industries (58.1%), most of them are being medium and small enterprises, barring a few large-scale industries. Other industries within Bodhjungnagar industrial estate include beverage production, dairy farming, cattle-feed manufacturing, plastic recycling, secondary iron and steel production, stone crushing, chemical production, and construction material manufacturing.

5. Bodhjungnagar, existing since year 1998 is spread over an area of 207.6¹ ha. At present, the estate has 132 industrial units mainly belonging to medium and small enterprises, barring a few large-scale industries. The industrial estate has been categorized into four zones namely growth center, export promotion industrial park, rubber park and food park. The common facilities within the industrial estate include warehouse, cold storage, food testing laboratory, food packaging unit, commercial center, canteen, guest house, fire station, weigh bridge and a common effluent treatment plant for rubber industries.

6. 7. Based on the need analysis, infrastructure development components considered within the Bodhjungnagar IE comprise are (i) development of vacant land into additional industrial plots (42 industrial plots spread over 20.83 ha); (ii) improvement of internal roads from single lane to intermediate/ two lane along with improvement of intersections/ junctions with adequate lighting facilities (16.260 km); (iii) storm water drains (31.03 km) with 49 culverts and 4 minor bridges; (iv) augmentation of water supply (10 raw water reservoirs, 7 new deep tube wells, 4.6 MLD capacity water treatment plant and 16.089 km distribution pipelines), (v) rainwater percolation wells at 22 locations (vi) utility corridor (32.54 km); (vii) augmentation of power system (HT/ LT/ SCADA cables/ OFC), 500 KW solar power generation (9 different locations within IE); and (viii) infrastructure and buildings for common facilities spread over nearly 16,000 sqm (1.6 ha.) like administrative office, multipurpose hall, & conference hall, creche facility, dispensary, canteen & food preparation area, miscellaneous

¹ The net planning area of Bodhjungnagar Industrial Estate is spread over an area of 207.64 ha. (512.82 acres) out of total 217.30 ha. (536.72 acres). Within the IE, 9.68 ha. (23.90 acre) of land has been excluded for development, as it is under un-authorized settlements.

utility centers & other common facilities like, recreational areas, bus stop, safety and security (ix) shops & business center; (x) future provision for residential housing – staff quarter, worker housing, women hostel etc. (d) refurbishment of common effluent treatment plant (CETP) - 500 KLD; and (xii) development of parks and open areas (20.22 ha) under the project; (xii) 02 nos. of CNG Buses and 2 nos. of battery-operated small E-vehicles, along with the necessary charging infrastructure, have been proposed to be improving internal mobility within the Industrial Estate.

3.0 Associated and Existing Facility

7. Bodhjunnagar IE, established in the year 1998 is spread over an area of 207.6 ha, out of which 118.2 ha has been allocated for 132 industrial units. The allocated areas for other facilities comprise 15.91 ha for roads/ parking, 15.58 ha for common facility/ utility areas, 5.36 ha for open areas and 52.14 ha available for future development.

8. The viability and existence of the present 132 industrial units do not depend upon proposed improvement works and neither these are included under ensuing ADB loan. The existing industrial units are regulated under the Air (Prevention and Control of Pollution) Act, 1981, Water (Prevention and Control of Pollution) Act, 1974 and have the valid CTE and CTO from the Tripura State Pollution Control Board. Therefore, these industrial units do not qualify as “Associated Facility²” in accordance with the ADB’s SPS, 2009 (Para 6, Appendix 1 of Safeguard Policy Statement, 2009).

9. Further, an on-site assessment of all other existing infrastructure like roads, entrance gate, boundary wall and other utilities within the IE was undertaken to identify past or present concerns relating to the impact on the environment. The on-site assessment³ did not identify any past and present concerns/ outstanding environmental concerns/ issues, except the existing common effluent treatment plant (CETP) which warranted corrective action plan to address outstanding environmental concerns and concurrent regulatory compliance(s) and thus considered as “Existing Facility⁴” in accordance with the ADB’s SPS, 2009.

4.0 Need for Environmental Audit

10. An environmental audit of the CETP of Bodhjunnagar IE has been carried as part of the IEE, since it has been considered as an ‘existing facility’. The objective of the audit was to identify past or present environmental/ regulatory compliance concerns and prepare an appropriate corrective action plan, to address all outstanding issues.

11. The environmental audit of the CETP is based on the on-site assessment, discussions with representing member unit(s) of the CETP, operation and maintenance (O&M) agency, as

² Associated Facility - that are not funded as part of the project (funding may be provided separately by the borrower/client or by third parties), and whose viability and existence depend exclusively on the project and whose goods or services are essential for successful operation of the project (**Para 6, APPENDIX 1 of Safeguard Policy Statement, 2009**).

³ On-site assessment of the existing infrastructure facilities within the IE was carried out as a pre-cursor to the IEE. The assessment included field inspection and interactions with the owner representative(s) of the industrial units within the IE. The field inspection indicated the industrial estate has no settlement areas, sensitive receptors like educational institutions/ hospitals/ religious structures, surface water bodies, lakes, forest/ ecologically sensitive areas, flood/ drainage concerns within its boundary or surrounding 500m peripheral area.

⁴ If a project involves an upgrade or expansion of existing facilities that has potential impacts on the environment, involuntary resettlement, and/or Indigenous Peoples, the requirements for environmental and social impact assessments and planning specified in Safeguard Requirements 1-3 will apply in addition to compliance audit. (**Para 12, Appendix 4 of Safeguard Policy Statement, 2009**).

well as review of the legacy issues related to non-connectivity of industrial units to CETP, treated effluent not confirming to the standards and non-connectivity of CETP to the Online Continuous Emission Monitoring System of CPCB etc. documented by both Tripura State Pollution Control Board, Central Pollution Control Board and National Green Tribunal (NGT)(Ref: Enclosure -2).

5.0 Common Effluent Treatment Plant (CETP)

12. The CETP within the Bodhjunnagar industrial estate was constructed in year 2016-17 with an installed capacity of 500 kilo liters per day (KLD) and was mainly contemplated to receive effluents from seven rubber industries apart from other industrial units. The flow diagram and sizes of the different units of the CETP are given in **Figure-1** and **Table-1**.

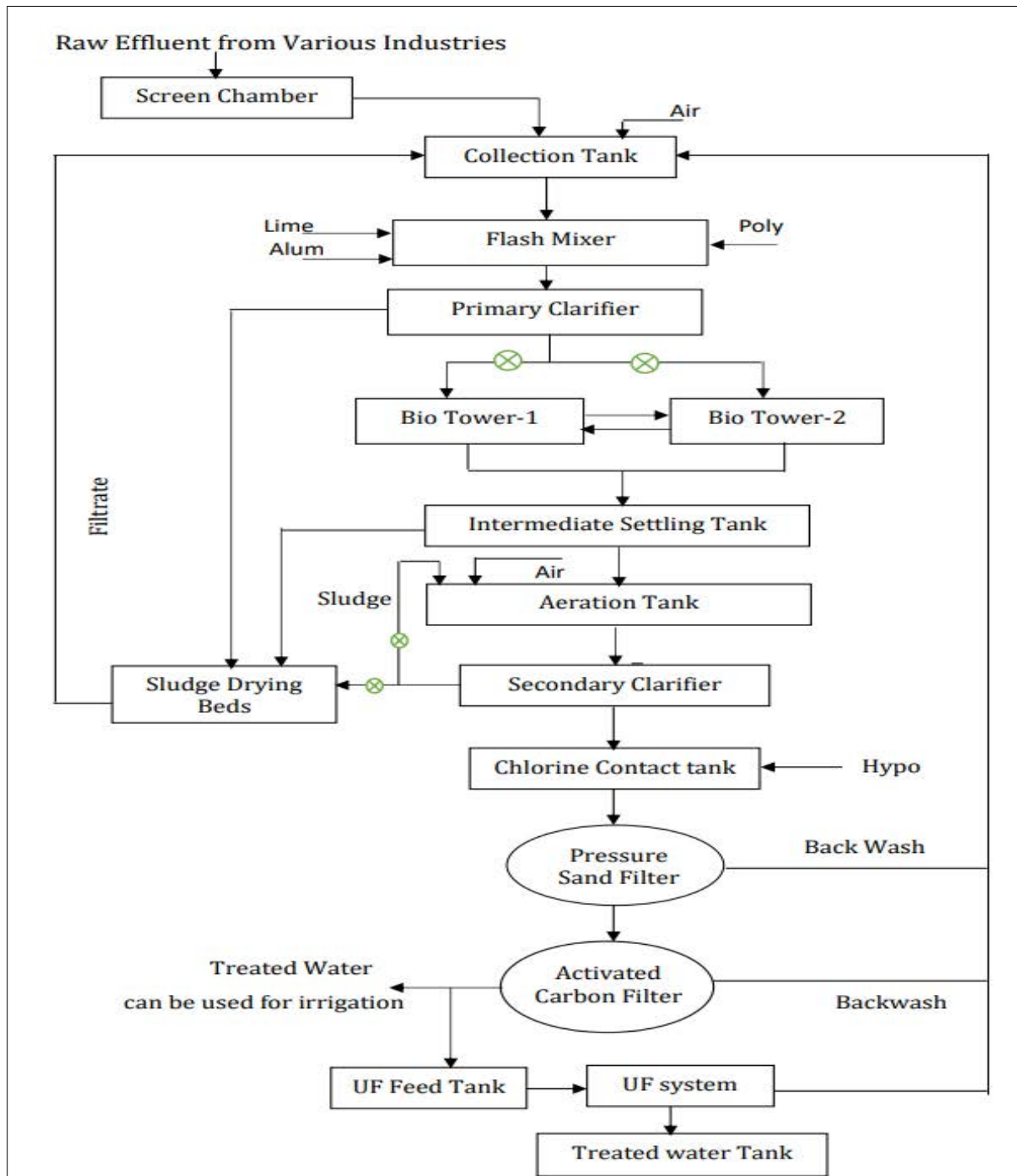


Figure-1: Process Flow Diagram of CETP

Table-1: Treatment Units of CETP

Sl. No.	Treatment Unit	Size of the Unit (L X B X D/H)	Remarks (status of treatment Units)
1	Bar Screen Chamber	600 X 600 X 600 mm (D)	Partially working but needs minor repairs
2	Rubber Traps	2000 X 6000 X 1200 mm (D)	Partially working but needs minor repairs
3	Equalization Tank	9700 X 9700 X 2700 mm (D)	Partially working but needs minor repairs
4	Flash Mixer	2900 X 2900 X 2500mm (D)	Dysfunctional
5	Primary Clarifier	6000 mm Dia X 2700 mm (D)	Partially working but needs minor repairs
6	Bio-Tower -1	6000 X 6000 X 6000 mm (H)	Dysfunctional
7	Bio-Tower-2	6000 X 6000 X 6000 mm (H)	Dysfunctional
8	Aeration Tank	12000X16000 X 3450mm (D)	Partially working but needs minor repairs
9	Secondary Clarifier	7200 mm Dia X 2500 mm (D)	Partially working but needs minor repairs
10	Chlorine Contact Tank	2500 X 5000 X 3000 mm (D)	Working
11	Feed Tank	4100 X 4100 X 3000 mm (D)	working
12	Treated Water Tank	4100 X 8200 X 3000 mm (D)	Partially working but needs minor repairs
13	Sludge drying bed	50400 X 12400 X 1500 mm (D)	Partially working but needs minor repairs

6.0 Present Status of Common Effluent Treatment Plant

5.1 Regulatory Requirements

13. The DIC/ TIDCL had obtained a prior environmental clearance (EC) for the CETP from the State Environmental Impact Assessment Authority (SEIAA), Tripura in 2016, in accordance with the EIA Notification, 2006. The EC had an initial validity of 5 years, which expired in 2021. The EIA notification was subsequently amended to exempt CETPs irrespective of capacities from prior requirement of EC vide notification S.O. 6250 (E) dated 19th December 2018 (ref. **Enclosure-1**). It summarizes that the “environmental clearances for CETPs setup for or within projects or activities which do not require environmental clearance are exempted, and if any of the existing or proposed member units of the said CETP produces or proposes to produce any product requiring environmental clearance, then the CETP shall need environmental clearance”.

14. At Bodhjunnagar Industrial Estate, there are no member units, which attract EIA Notification 2006 and amendments thereof. Hence, the requisite EC/renewal is not applicable for CETP at Bodhjunnagar. Further, the SEIAA, Tripura has confirmed to TIDCL that renewal of requisite EC for the CETP is not required vide letter No.F.8(25)/TSPCB/SEAC/2024/1695-98 dated 2nd July 2024 (ref. **Enclosure-2**).

15. The CETP has a consent to operate (CTO) from Tripura State Pollution Control Board under the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981, with a validity up to 30th August 2025, which requires periodic compliance to conditions to consent thereof (ref. **Enclosure-3**).

5.2 Connectivity and Inflow

16. At present, CETP, receive merely 25-30% of its installed capacity and largely remains underutilized. Although, initially contemplated to cater to seven rubber industries, presently only two are discharging their effluents to the CETP. The remaining rubber industries and few other liquid waste generating units are unable to discharge their effluents to the CETP, as the pipelines conveying the effluents as well as respective pumping arrangements are not functional. Moreover, many treatment units and equipment within the CETP are also not functional and direly in need of replacement. The fill packs of the two bio-towers have collapsed and thus the bio-towers are out of operation (ref. **Figure-2**).



Figure-2: Photographs of CETP including Damaged Bio-Towers

5.3 Treated Effluent Quality

17. The treated effluent is being tested for pH and COD (Chemical Oxygen Demand) parameters by the CETP operator on a daily basis. The day-wise test reports for the last five months i.e. October 2023 to February 2024 is given in **Enclosure-4**. Review of these test reports show a consistently exceeding 99% treatment efficiency, which raises concerns of reliability of the test reports. Therefore, samples of the untreated influent at the inlet/ equalization tank as well as treated effluent at the outlet of the CETP was collected 3 times per day (11 am, 2 pm and 5 pm) over three consecutive working days (23 to 25 April 2024) as part of this audit. The influent and effluent samples were analyzed at a NABL accredited laboratory and given in **Enclosure-5**. Review of this NABL test reports indicate that the treated effluent of the CETP is not fully confirming to the stipulated effluent standards by CPCB/ TSPCB.

18. The CETP, also has legacy issues related to the non-compliance of the treated effluent to the stipulated discharge standards as well as low inflow due to inadequate/ non-functional pipe connectivity documented by both Tripura State Pollution Control Board (TSPCB) and Central Pollution Control Board (CPCB) between years 2018 and 2022. The National Green Tribunal (NGT) in its order vide OA No. 1038 dated 14th Nov. 2019 has also issued directions to DIC/ TIDCL to undertake several corrective measures regarding the functioning of CETP and establish connectivity to Online Continuous Emission Monitoring System of the CPCB/ TSPCB.

19. All such documented observations and actions identified for rectification at CETP by DIC/ TIDCL by July 2022 are given in **Enclosure-6** and are briefly summarized hereunder:

- To complete the work of laying pipelines from effluent generating units for connecting to the CETP.

- To undertake necessary initiatives for making existing CETP fully operational and ensure treated effluent complies to the stipulated effluent standards.
- To regularly monitor the quality of effluent at both inlet (untreated effluent) and outlet (treated effluent) of CETP.
- To ensure the Online Continuous Emission Monitoring System (OCEMS) installed at CETP is connected to CPCB and TSPCB servers.

5.4 Reuse of Treated Effluent

20. At present, Bodhjungnagar industrial estate does not have any provision for reuse of treated effluent. The effluent (partial or whatsoever) from the CETP is being discharged into natural drainage channels, which gets collected in low lying areas and have formed effluent ponds within the industrial estate (ref. **Figure-3**).



Figure-3: Effluent Pond within Bodhjungnagar

21. The stagnating effluent pond(s) within the industrial estate cause odour and aesthetic issues. These ponds also have a potential for polluting surface as well as groundwater both within and outside the industrial estate. In the long run, effluent ponds may have cascading effects on species richness, particularly affecting those dependent on aquatic ecosystems, such as amphibians and certain insects, and also indirectly impacting birds and mammals through the food chain.

7.0 Audit Summary and Corrective Action Plan

22. DIC/ TIDCL has undertaken some of the required corrective measures like appointing an agency for operation and maintenance of CETP, conducting a survey of the industrial units having potential for wastewater generation for its connectivity to the CETP and installation of Online Continuous Emission Monitoring System (OCEMS) at the CETP.

23. The compliance audit has however identified the following additional measures as the “corrective action plan (CAP) for the CETP” in order to be fully compliant to the issues documented by State and Central Pollution Control Board reported between 2018 and 2022 and directions of NGT.

- Refurbish the CETP with replacement of all dysfunctional/ damaged units including all equipment, instrumentation and control, to ensure a fully functional CETP, capable of treating the influent wastewater to the stipulated effluent standards by CPCB/ TSPCB.

- Identify all liquid waste generating industrial units and ensure their connectivity to the CETP by laying required additional pipeline network for conveyance of the effluent.
- Engage a qualified and experienced operation and maintenance agency with adequate staff to ensure satisfactory functioning of CETP including qualitative and quantitative monitoring of both inflow and outflow to the CETP.
- Establish a functional Online Continuous Emission Monitoring System (OCEMS) at the CETP and ensure its connectivity to CPCB as well as TSPCB.
- Ensure to periodic renewals of CTO issued on 07.08.2020 (currently valid up to 30.08.2025) and fulfill all terms and conditions to the consent, including submission of mandated CETP monitoring reports to TSPCB.
- Engage an accredited and TSPCB /NABL approved laboratory/ agency for independent 3rd party periodical monitoring of the CETP including an annual CEPT performance evaluation.
- Ensure mandatory reuse of the treated effluent for industrial use either by the member units of the CETP and/ or any other industries and reduce the dependence on ground water resources for freshwater requirement.
- Implement construction of storm water holding ponds at suitable locations within industrial estate by impounding the existing valley/ local depression(s), with an outlet weir for discharge of excess/overflow (average annual rainfall of West Tripura is 2000mm). The stormwater holding ponds will serve as a supplementary water source, which can serve freshwater requirement of the industrial units (after requisite treatment, if required) reducing the withdrawal of groundwater for industrial use.
- Emptying the stagnated effluent ponds by pumping it to the refurbished CETP for treatment/ reuse and converting the emptied areas into stormwater runoff and/ or treated effluent retention ponds.
- Implement rainwater harvesting and groundwater recharging at suitable locations both within CETP and industrial estate.
- Develop green belt in all open areas within and periphery of CETP.
- Ensure allocation of adequate budgetary resource for both capital and recurring maintenance cost for trouble free operation of the CETP.

24. The IEE/ DPR of the infrastructure development at Bodhjunnagar industrial estate has considered all the measures suggested under the corrective action plan (CAP) for the CETP. The budgetary provisions made in the IEE/ DPR includes capital cost for all corrective measures as well as operation and maintenance of the CETP for a period five years.

25. The corrective action plan is expected to ensure the CETP to become environment friendly and compliant to the non-conformance issues documented by State and Central Pollution Control Board reported between 2018 and 2022 and directions of NGT.

26. The corrective action plan will be scheduled for implementation, concurrently with the construction works related to infrastructure development of Bodhjunnagar IE is anticipated to be implemented in 36 months, including monsoon season, commencing from April 2025. The total implementation period including defect liability period (DLP) and the operation and maintenance phase would be till March 2032.

27. The budgetary provisions and time frame for implementation of the corrective action plan will be agreed with ADB.

Enclosure-1

**Amended EIA Notification on CETP by MoEF&CC,
Govt. of India**

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 19th December, 2018

S.O. 6250(E). Whereas, by notification of the Government of India in the erstwhile Ministry of Environment and Forests number S.O.1533 (E), dated the 14th September, 2006, issued under sub-section (1), read with clause (v) of sub-section (2) of section (3) of the Environment (Protection) Act, 1986 (29 of 1986) and clause (d) of the sub-rule (3) of rule 5 of the Environment (Protection) Rules, 1986, hereinafter referred to as the said notification, the Central Government directed that on and from the date of its publication, the required construction of new projects or activities or the expansion or modernisation of existing projects or activities listed in the Schedule to the said notification entailing the capacity addition with change in process or technology and or product mix shall be undertaken in any part of India only after prior environmental clearance from the Central Government or as the case may be, by the State Level Environment Impact Assessment Authority, duly constituted by the Central Government under sub-section (3) of section 3 of the said Act, in accordance with the procedure specified therein;

And whereas, a draft notification for making amendments in the said notification, issued in exercise of the powers conferred by sub-section (1) and clause (v) of sub-section (2) of section 3 of the Environment (Protection) Act, 1986, read with sub-rule (3) of rule 5 of the Environment (Protection) Rules, 1986 was published vide S.O. 3018 (E), dated the 21st June, 2018, inviting objections and suggestions from all the persons likely to be affected there by, within a period of thirty days from the date of publication of the draft notification in the Gazette of India;

And whereas, a draft notification to extend the notice period was issued in exercise of the powers conferred by sub-section (1) and clause (v) of sub-section (2) of section 3 of the Environment (Protection) Act, 1986, read with sub-rule (3) of rule 5 of the Environment (Protection) Rules, 1986 was published vide S.O. 5213(E), dated the 8th October, 2018, inviting objections and suggestions from all the persons likely to be affected there by, within a period of another thirty days from the date of publication of the draft notification in the Gazette of India;

And whereas, all objections and suggestions received in response to the above-mentioned draft notification have been duly considered by the Central Government.

Now, therefore, in exercise of powers conferred by sub-section (1) and clause (v) of sub-section (2) of section 3 of the Environment (Protection) Act, 1986 (29 of 1986), read with clause (d) of sub-rule (3) of rule 5 of the Environment (Protection) Rules, 1986, the Central Government hereby makes the following further amendments in the said notification which shall come into force on the date of its publication in the Official Gazette, namely:-

In the said notification, in the Schedule, for item 7(h) and the entries relating thereto, the following item and entries shall be substituted, namely: -

Project or Activity		Category with threshold limit		Conditions if any
		A	B	
(1)	(2)	(3)	(4)	(5)
7(h)	Common Effluent Treatment Plants (CETPs)	-	All projects	General Condition shall apply Note: Environmental clearance for CETPs setup for or within projects or activities which do not require environmental clearance are exempted, and if any of the existing or proposed member units of the said CETP produces or proposes to produce any product requiring environmental clearance, then the CETP shall need environmental clearance.

[F.No. 22-28/2018-IA.III]

GEETA MENON, Jt. Secy.

Note: The principal notification was published in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (ii) *vide* number S.O. 1533 (E), dated the 14th September, 2006 and subsequently amended *vide* the following numbers: -

1. S.O. 1949 (E) dated the 13th November, 2006;
2. S.O. 1737 (E) dated the 11th October, 2007;

3. S.O. 3067 (E) dated the 1st December, 2009;
4. S.O. 695 (E) dated the 4th April, 2011;
5. S.O. 156 (E) dated the 25th January, 2012;
6. S.O. 2896 (E) dated the 13th December, 2012;
7. S.O. 674 (E) dated the 13th March, 2013;
8. S.O. 2204 (E) dated the 19th July 2013;
9. S.O. 2555 (E) dated the 21st August, 2013;
10. S.O. 2559 (E) dated the 22nd August, 2013;
11. S.O. 2731 (E) dated the 9th September, 2013;
12. S.O. 562 (E) dated the 26th February, 2014;
13. S.O. 637 (E) dated the 28th February, 2014;
14. S.O. 1599 (E) dated the 25th June, 2014;
15. S.O. 2601 (E) dated the 7th October, 2014;
16. S.O. 2600 (E) dated the 9th October, 2014
17. S.O. 3252 (E) dated the 22nd December, 2014;
18. S.O. 382 (E) dated the 3rd February, 2015;
19. S.O. 811 (E) dated the 23rd March, 2015;
20. S.O. 996 (E) dated the 10th April, 2015;
21. S.O. 1142 (E) dated the 17th April, 2015;
22. S.O. 1141 (E) dated the 29th April, 2015;
23. S.O. 1834 (E) dated the 6th July, 2015;
24. S.O. 2571 (E) dated the 31st August, 2015;
25. S.O. 2572 (E) dated the 14th September, 2015;
26. S.O. 141 (E) dated the 15th January, 2016;
27. S.O. 648 (E) dated the 3rd March, 2016;
28. S.O. 2269(E) dated the 1st July, 2016;
29. S.O. 2944(E) dated the 14th September, 2016;
30. S.O. 3518 (E) dated 23rd November 2016;
31. S.O. 3999 (E) dated the 9th December, 2016;
32. S.O. 4241(E) dated the 30th December, 2016; and
33. S.O. 3611(E) dated the 25th July, 2018.
34. S.O. 3977 (E) dated the 14th August, 2018
35. S.O. 5733 (E) dated the 14th November, 2018;
36. S.O. 5736 (E) dated the 15th November, 2018 and
37. S.O. 5845(E) dated the 26th November, 2018.

Enclosure-2

**SEIAA/TSPCB Issued letter for exemption of
Environmental Clearance for Existing CETP**

State Level Environment Impact Assessment Authority, Tripura

State Level Expert Appraisal Committee, Tripura

No.F.8 (25)/TSPCB/SEAC/2024/1695-98

July 02, 2024

To
The Managing Director
Tripura Industrial Development Corporation Ltd
Industries Building, 1st Floor,
Khejurbagan, P.O.Kunjaban
Agartala, Tripura-799006

Subject: Establishment of CETP at R.K.Nagar Industrial Area-modality of effluent treatment and water management of LPG Bottling Plant of IOCL and M/s Tripura Ispat at Bodhjunnagar IE respectively-regarding.

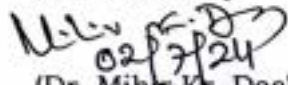
Sir,

This has a reference to your letter No.TIDC/ENGG/726 Part- II/170-71 dated 28/05/2024 on the subject cited above.

2. I would like to inform you that as per the Notification S.O.6250 (E) dated 19th December, 2018 of the Ministry of Environment, Forest & Climate Change, Govt. of India in regard to Project or Activity listed at 7(h)-Common Effluent Treatment Plants (CETPs), wherein it is clearly mentioned that "Environmental Clearance for CETPs setup for or within projects or activities which do not require environmental clearance are exempted, and if any of the existing or proposed member units of the said CETP produces or proposes to produce any product requiring environmental clearance, then the CETP shall need Environmental Clearance".

3. From the letter dated 28/05/2024, it appears that there is no existing or proposed member units of the said CETP produces or proposes to produce any product that requires EC, hence, obtaining Environment Clearance (EC) from SEIAA/SEAC, Tripura is not required at this stage.

Yours sincerely


(Dr. Mihir Kr. Das)
Member Secretary,
SEAC, Tripura

Copy to the:

1. Chairman, SEIAA Tripura, for kind information.
2. Chairman, SEAC Tripura, for kind information.
3. Member Secretary, SEIAA & Director, Department of Science, Technology & Environment, Government of Tripura for kind information.

PARIVESH BHAWAN

O/o Tripura State Pollution Control Board
Pandit Nehru Complex, Gorkhabasti
P.O.- Kunjaban, Agartala, West Tripura, Pin- 799006

Phone: 9436462706 (Chairman, SEIAA)
9436926569 (Chairman, SEAC)
9436120401 (Member Secretary, SEIAA)
9436168686 (Member Secretary, SEAC)
E-mail: tripura.seac@gmail.com

Enclosure-3

**Consent to Operate (CTO) for CETP issued
by Tripura State Pollution Control Board
(TSPCB)**



Certificate Sl. No. 11985

TRIPURA STATE POLLUTION CONTROL BOARDPARIVESH BHAWAN, Pandit Nehru Complex, Gorkhabasti,
Kunjaban, Agartala - 799 006, West Tripura.

No.F.17(10)/TSPCB/W/CETP/(M-Red)/5504/11072-77

Date : 31/8/2020

CERTIFICATE FOR CONSENT TO OPERATEUnder Section 25/26 of Water (Prevention and Control of Pollution) Act, 1974 and
Under Section 21 of the Air (Prevention and Control of Pollution) Act, 1981

Reference : i) Your Application No.48085

Dated : 07-08-2020

ii) Our NOC Register Sl. No.11195

For : Fresh Consent

Capital Investment : Rs. 419.15 Lakhs

Production Capacity: Treated Effluent : 500
MT/Day

Type : CETP

Category: Red

With reference to the above Application, a provisional Consent to Operate Certificate is hereby issued in favour of TIDC LTD (Tripura Industrial Development Corporation Ltd.) Applicant: Sri. Gautam Debbarma, Bodhjunnagar, Rubber Park, Agartala, Tripura (W) to discharge its industrial and other effluents arising out of their premises into a stream/ well/ land as per section 25/26 of Water (Prevention and Control of Pollution) Act, 1974 and to make emission from the plant /unit as per Section 21 of the Air (Prevention and Control of Pollution) Act, 1981 situated at Bodhjunnagar, Rubber Park, Agartala, Tripura (W) to subject to observance of other codal formalities of the Govt. of India/Govt. of Tripura/District Administration/ Agartala Municipal Corporation or concerned Municipal Council or concerned Nagar Panchayat (whichever is applicable)/ Health Department/Industries & Commerce Department and subject to observance of the following terms & conditions:

a. Inlet quality for CETP should conform to the following standards:

Sl No.	Parameter	Concentration (Maximum)
1.	pH	5.5 to 9.0
2.	BOD	500 mg/L
3.	COD	1100 mg/L
4.	Total Dissolved Solids (TDS)	2100 mg/L
5.	Total Suspended Solids (TSS)	1500 mg/L
6.	Oil & Grease	20 mg/L
7.	Phenolic Compounds (as C ₆ H ₅ OH)	5.0 mg/L
8.	Ammonical Nitrogen (as N)	50.0 mg/L
9.	Cyanide (as CN)	2.0 mg/L
10.	Hexavalent Chromium (as Cr ^{VI})	2.0 mg/L
11.	Total Chromium (as Cr)	2.0 mg/L
12.	Copper (as Cu)	3.0 mg/L
13.	Lead (as Pb)	1.0 mg/L
14.	Nickel (as Ni)	3.0 mg/L
15.	Zinc (as Zn)	15.0 mg/L
16.	Arsenic (as As)	0.2 mg/L
17.	Mercury (as Hg)	0.01 mg/L
18.	Cadmium (as Cd)	1.0 mg/L
19.	Selenium (as Se)	0.05 mg/L
20.	Fluoride (as F)	15.0 mg/L
21.	Boron (as B)	2.0 mg/L
Radio Active Materials		
22.	Alpha E mitters, micro curie/ML	10 ⁻⁷
23.	Beta E mitters, micro curie/ML	10 ⁻⁸

Contd. p/2

b. Treated effluent generated from CETP should conform to the following standard:

Sl. No.	Parameters	Max. Permissible values (in mg/L except for pH and Temperature)	
		Into inland surface water	On land for irrigation
General Parameters			
1.	pH		6-9
2.	Biological Oxygen Demand, BOD ₃ , 27°C	30	100
3.	Chemical Oxygen Demand (COD)	250	250
4.	Total Suspended Solids (TSS)	100	100
5.	Fixed Dissolved Solids (FDS)	2100	2100
Specific parameters			
6.	Temperature, °C	Shall not exceed more than 5°C above ambient temperature.	Shall not exceed more than 5°C above ambient temperature.
7.	Oil & Grease	10	10
8.	Ammonical -Nitrogen	50	-
9.	Total Kjeldahl Nitrogen (TKN)	50	-
10.	Nitrate- Nitrogen	10	-
11.	Phosphates, as P	5	-
12.	Chlorides	1000	1000
13.	Sulphates, as SO ₄	1000	1000
14.	Flouride	2	2
15.	Sulphides, as S	2	2
16.	Phenolic Compounds (as C ₆ H ₅ OH)	1	1
17.	Total Res. Chlorine	1	1
18.	Zinc	5	15
19.	Iron	3	3
20.	Copper	3	3
21.	Trivalent Chromium	2	2
22.	Manganese	2	-
23.	Nickel	3	-
24.	Arsenic	0.2	-
25.	Cyanide, as CN	0.2	-
26.	Vanadium	0.2	-
27.	Lead	0.1	-
28.	Hexavalent Chromium	0.1	-
29.	Selenium	0.05	-
30.	Cadmium	0.5	-
31.	Mercury	0.01	-
32.	Bio-assay test	As per industry specific standards	As per industry specific standards

- c. Online Continuous Effluent monitoring System(OCEMS) shall have to be always in workable condition and the real time data should be submitted to TSPCB as well as CPCB portal.
- d. The treated discharged water shall have to be reused in irrigation, gardening etc.
- e. The hazardous waste generated shall be disposed off as per provision of the Hazardous and Other Wastes (Management & Transboundary Movements) Rules, 2016.
- f. The applicant shall maintain good housekeeping and take adequate measures for control of pollution from all sources so as not to cause nuisance to surrounding area/inhabitants.
- g. The applicant shall bring some portion of the available open land under green coverage/ plantation.


Amrith Padic

Contd. p/3

[3]

- h. Reuse of treated waste water shall have to be ensured.
- i. The non-hazardous solid waste arising from CETP shall be disposed of scientifically so as not to cause any nuisance / pollution.
- j. The applicant shall take necessary permissions from concerned authority for disposal to dumping ground.
- k. CETP should apply for obtaining Hazardous Waste Authorization Certificate from the Board as per Rules.
- l. Neither storm water nor discharge from other premises shall be allowed to mix with the effluents from the factory.
- m. The CETP shall comply with the directions issued from TSPCB from time to time, if any.
- n. Banning order regarding Plastic Carry Bags issued vide Notification No.F.8(30)/DSTE/ENV/Pt-II/1679-97 dated 10.03.2015 & No.F.8(30)/DSTE/ENV/Pt-II/1984-2003 dated 19.03.2015 should be strictly adhered to.
- o. Public liability insurance coverage shall have to be provided to the workers of the unit.
- p. Compliance report may be submitted to the TSPCB once in a year.
- q. A copy of the Consent Certificate should be displayed in the office of the unit.
- r. The unit will have to follow other norms & standards issued by TSPCB from time to time.
- s. Violation of any of the above conditions could lead to withdrawal of the certificate/or levying Environmental Compensation as per the Rules.

This Certificate is valid upto 30.08.2025. Application for extension of validity of Consent Certificate shall have to be made one month before the date of expiry of validity of this Certificate.


(Amarendra Jamatia) 31/08/2020
Asst Environmental Engineer
Tripura State Pollution Control Board

To
TIDC LTD (Tripura Industrial Development Corporation Ltd.)
Applicant: Sri. Gautam Debbarma
Bodhjunnagar, Rubber Park, Agartala, Tripura (W)

Copy to :

- 1) District Magistrate, Tripura (W)
- 2) Director, Industries & Commerce, Tripura.
- 3) SDM, Sadar, Tripura (W)
- 4) Municipal Commissioner, Agartala Municipal Corporation, Agartala.
- 5) District Scientific Officer, DST&E, Tripura (W).


Asst Environmental Engineer 31/08/2020
Tripura State Pollution Control Board

Enclosure-4

**Test reports of existing CETP done by
O&M operator (M/s. Envirochem
laboratories Pvt. Ltd.)**



CETP COD ANALYSIS REPORT-JANUARY 2024

DATE	EFFLUENT		TREATED WATER	
	COD (mg/l)	PH	COD (mg/l)	PH
01-01-2024	368	7.0	16	7
02-01-2024	464	7.0	32	7
03-01-2024	608	7.0	32	7
04-01-2024	516	7.0	32	7
05-01-2024	464	7.0	32	7
06-01-2024	512	7.0	16	7
07-01-2024	1040	7.0	16	7
08-01-2024	624	7.0	32	7
09-01-2024	544	7.0	16	7
10-01-2024	384	7.0	32	7
11-01-2024	320	7.0	32	7
12-01-2024	448	7.0	32	7
13-01-2024	688	7.0	32	7
14-01-2024	1360	7.0	16	7
15-01-2024	1360	7.0	16	7
16-01-2024	1376	7.0	16	7
17-01-2024	1360	7.0	32	7
18-01-2024	688	7.0	32	7
19-01-2024	672	7.0	16	7
20-01-2024	448	7.0	32	7
21-01-2024	208	7.0	16	7
22-01-2024	192	7.0	16	7
23-01-2024	240	7.0	16	7
24-01-2024	480	7.0	16	7
25-01-2024	496	7.0	16	7
26-01-2024	384	7.0	16	7
27-01-2024	336	7.0	16	7
28-01-2024	960	7.0	80	7
29-01-2024	688	7.0	32	7
30-01-2024	602	7.0	32	7
31-01-2024	480	7.0	16	7



CETP COD ANALYSIS REPORT-DECEMBER 2023

DATE	EFFLUENT		TREATED WATER	
	COD (mg/l)	PH	COD (mg/l)	PH
01-12-2023	528	7.0	32	7
02-12-2023	176	7.0	32	7
03-12-2023	416	7.0	16	7
04-12-2023	512	7.0	32	7
05-12-2023	448	7.0	16	7
06-12-2023	448	7.0	16	7
07-12-2023	608	7.0	32	7
08-12-2023	400	7.0	16	7
09-12-2023	544	7.0	32	7
10-12-2023	592	7.0	16	7
11-12-2023	640	7.0	48	7
12-12-2023	288	7.0	32	7
13-12-2023	256	7.0	32	7
14-12-2023	224	7.0	32	7
15-12-2023	272	7.0	16	7
16-12-2023	352	7.0	32	7
17-12-2023	368	7.0	16	7
18-12-2023	448	7.0	16	7
19-12-2023	448	7.0	16	7
20-12-2023	608	7.0	32	7
21-12-2023	176	7.0	48	7
22-12-2023	256	7.0	32	7
23-12-2023	528	7.0	32	7
24-12-2023	432	7.0	48	7
25-12-2023	384	7.0	32	7
26-12-2023	176	7.0	48	7
27-12-2023	544	7.0	16	7
28-12-2023	352	7.0	32	7
29-12-2023	416	7.0	32	7
30-12-2023	512	7.0	16	7
31-12-2023	336	7.0	32	7



CETP COD ANALYSIS REPORT-NOVEMBER 2023

DATE	EFFLUENT		TREATED WATER	
	COD (mg/l)	PH	COD (mg/l)	PH
01-11-23	464	7.0	64	7
02-11-23	432	7.0	48	7
03-11-23	816	7.0	48	7
04-11-23	256	7.0	48	7
05-11-23	352	7.0	64	7
06-11-23	576	7.0	32	7
07-11-23	320	7.0	32	7
08-11-23	384	7.0	32	7
09-11-23	400	7.0	32	7
10-11-23	432	7.0	16	7
11-11-23	576	7.0	32	7
12-11-23	496	7.0	16	7
13-11-23	544	7.0	16	7
14-11-23	1600	7.0	32	7
15-11-23	272	7.0	16	7
16-11-23	336	7.0	32	7
17-11-23	320	7.0	32	7
18-11-23	512	7.0	32	7
19-11-23	432	7.0	16	7
20-11-23	688	7.0	32	7
21-11-23	320	7.0	16	7
22-11-23	336	7.0	32	7
23-11-23	352	7.0	32	7
24-11-23	480	7.0	32	7
25-11-23	752	7.0	16	7
26-11-23	592	7.0	16	7
27-11-23	624	7.0	16	7
28-11-23	464	7.0	16	7
29-11-23	432	7.0	16	7
30-11-23	384	7.0	32	7

Envirochem Laboratories Pvt. Ltd.

CETP COD ANALYSIS REPORT-OCTOBER 2023

DATE	EFFLUENT		TREATED WATER	
	COD (mg/l)	PH	COD (mg/l)	PH
01-10-23	176	7.5	48	7
02-10-23	256	7.0	32	7
03-10-23	528	7.0	32	7
04-10-23	432	7.0	48	7
05-10-23	384	7.0	32	7.5
06-10-23	592	7.0	16	7
07-10-23	544	7.0	16	7
08-10-23	624	7.0	32	7
09-10-23	656	7.0	16	7
10-10-23	496	7.0	16	7
11-10-23	640	7.0	32	7
12-10-23	592	7.0	32	7
13-10-23	544	7.0	16	7
14-10-23	944	7.0	32	7
15-10-23	1536	7.0	80	7
16-10-23	1424	7.0	32	7
17-10-23	672	7.0	32	7
18-10-23	1280	7.0	32	7
19-10-23	1216	7.0	32	7
20-10-23	912	7.0	16	7
21-10-23	720	7.0	32	7
22-10-23	160	7.0	64	7
23-10-23	192	7.0	32	7
24-10-23	144	7.0	16	7
25-10-23	272	7.0	64	7
26-10-23	672	7.0	32	7
27-10-23	384	7.0	32	7
28-10-23	325	7.0	48	7
29-10-23	112	7.0	32	7
30-10-23	112	7.0	16	7
31-10-23	528	7.0	32	7



CETP COD ANALYSIS REPORT-FEBRUARY 2024

DATE	EFFLUENT		TREATED WATER	
	COD (mg/l)	PH	COD (mg/l)	PH
01-02-2024	496	7.0	16	7
02-02-2024	602	7.0	16	7
03-02-2024	480	7.0	16	7
04-02-2024	400	7.0	16	7
05-02-2024	384	7.0	16	7
06-02-2024	624	7.0	32	7
07-02-2024	448	7.0	16	7
08-02-2024	432	7.0	48	7
09-02-2024	272	7.0	16	7
10-02-2024	448	7.0	16	7
11-02-2024	608	7.0	80	7
12-02-2024	528	7.0	32	7
13-02-2024	272	7.0	16	7
14-02-2024	304	7.0	16	7
15-02-2024	482	7.0	16	7
16-02-2024	384	7.0	16	7
17-02-2024	400	7.0	32	7
18-02-2024	304	7.0	32	7
19-02-2024	320	7.0	16	7
20-02-2024	576	7.0	16	7
21-02-2024	272	7.0	16	7
22-02-2024	1040	7.0	48	7
23-02-2024	144	7.0	16	7
24-02-2024	160	7.0	32	7
25-02-2024	976	7.0	32	7
26-02-2024	944	7.0	32	7
27-02-2024	704	7.0	64	7
28-02-2024	800	7.0	32	7
29-02-2024	592	7.0	16	7



 Envirochem Laboratories Pvt Ltd.

Enclosure-5

**Test reports of influent and effluent
samples of CETP carried out during April
2024**

Sample:	ETP OUTLET			ETP INLET				
DATE:	23.04.2024			23.04.2024				
TIME:	11.00 AM	2.00 PM	5.30 PM	11.00 AM	2.00 PM	5.30 PM	Limits	Limits
Parameters							ETP outlet limits when sample discharge at inland surface water(as per CPCB guidelines)	In case of ETP inlet there is no limit (as per CPCB guidelines)
pH	7.30	7.46	7.46	5.19	6.27	6.56	5.5-9.0	---
COD	51	46	71	880	860	850	250	---
BOD	16	12	20	245	232	218	30	---
TSS	11	13	12	19	92	98	100	---
Temp.	25	25	25	25	25	25	shall not exceed 5 deg C above the receiving water temperature	---
Oil & Grease	9.6	11	13	17	48	51	10	---
Phosphates as P	<0.05	<0.05	0.17	20	18	15	5	---
Chlorides	12	9.6	15	44	35	37	---	---
Sulphates as SO4	91	143	204	181	137	90	---	---
Iron	<0.05	<0.05	<0.05	0.73	0.9	0.31	3 mg/l	---
Ammoniacal Nitrogen (as N)	52	44	36	410	354	310	50	---
Arsenic(as As)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.2	---
Bio-assay	All fishes are survived in 100% effluent after 96 hours(TF=1)	All fishes are survived in 100% effluent after 96 hours(TF=1)	All fishes are survived in 100% effluent after 96 hours(TF=1)	No fish is survived in 100% effluent after 96 hours(TF=8)	No fish is survived in 100% effluent after 96 hours(TF=8)	No fish is survived in 100% effluent after 96 hours(TF=8)	90%survival of fish after 96 hours in 100 % effluent	---
Cadmium (as Cd)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	2	---
Copper (as Cu)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	3	---
Cyanide (as CN)	<0.02	<0.02	<0.02	0.52	0.22	<0.02	0.2	---
Fixed Solids	1458	1476	1308	1446	4234	1154	---	---
Fluoride (as F)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2	---
Hexavalent Chromium (as Cr+6)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.1	---
Lead (as Pb)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.1	---
Manganese (as Mn)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	2mg/l	---
Mercury (as Hg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.01	---
Nickel (as Ni)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	3	---
Nitrate Nitrogen as N-	1.2	1.3	52	2	0.52	0.48	10mg/l	---

Phenolic Compounds (as C6H5OH)	<0.001	<0.001	<0.001	21	11	0.82	1	---
Selenium (as Se)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.05	---
Sulphide (as H2S)	<0.1	<0.1	<0.1	2.3	0.29	0.81	2	---
Total Kjeldahl Nitrogen as N	71	60	45	425	362	326	100	---
Total residual chlorine	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1	---
Vanadium as V	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2mg/l	---
Zinc (as Zn)	<0.02	<0.02	<0.02	0.78	0.68	<0.02	5	---
Sample:	ETP OUTLET			ETP INLET				
DATE:	24.04.2024			24.04.2024				
TIME:	11.00 AM	2.00 PM	5.30 PM	11.00 AM	2.00 PM	5.30 PM		
Parameters							ETP outlet limits when sample discharge at inland surface water(as per CPCB guidelines)	In case of ETP inlet there is no limit (as per CPCB guidelines)
pH	7.25	7.43	7.45	5.23	6.32	6.52	5.5-9.0	---
COD	52	47	72	891	870	860	250	---
BOD	15	13	19	262	290	269	30	---
TSS	12	14	13	21	95	99	100	---
Temp.	25	25	25	25	25	25	shall not exceed 5 deg C above the receiving water temperature	---
Oil & Grease	10	12	14	19	45	49	10	---
Phosphates as P	<0.05	<0.05	0.2	21	19	16	5	---
Chlorides	14	12	17	36	37	39	---	---
Sulphates as SO4	89	141	202	179	134	88	---	---
Iron	<0.05	<0.05	<0.05	0.67	0.82	0.25	3 mg/l	---
Ammoniacal Nitrogen (as N)	37	41	60	360	334	320	50	---
Arsenic(as As)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.2	---
Bio-assay	All fishes are survived in 100% effluent after 96 hours(TF=1)	All fishes are survived in 100% effluent after 96 hours(TF=1)	All fishes are survived in 100% effluent after 96 hours(TF=1)	No fish is survived in 100% effluent after 96 hours(TF=8)	No fish is survived in 100% effluent after 96 hours(TF=8)	No fish is survived in 100% effluent after 96 hours(TF=8)	90%survival of fish after 96 hours in 100 % effluent	---
Cadmium (as Cd)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	2	---
Copper (as Cu)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	3	---
Cyanide (as CN)	<0.02	<0.02	<0.02	0.21	0.11	0.71	0.2	---

Bioassay	All fishes are survived in 100% effluent after 96 hours(TF=1)	All fishes are survived in 100% effluent after 96 hours(TF=1)	All fishes are survived in 100% effluent after 96 hours(TF=1)	No fish is survived in 100% effluent after 96 hours(TF=8)	No fish is survived in 100% effluent after 96 hours(TF=8)	All fishes are survived in 100% effluent after 96 hours(TF=1)	90% survival of fish after 96 hours in 100 % effluent	---
Cadmium (as Cd)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	2	---
Copper (as Cu)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	3	---
Cyanide (as CN)	<0.02	<0.02	<0.02	0.22	0.45	0.23	0.2	---
Fixed Solids	1074	1240	1212	4180	3622	1068	---	---
Fluoride (as F)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	2	---
Hexavalent Chromium (as Cr+6)	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.1	---
Lead (as Pb)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.1	---
Manganese (as Mn)	<0.02	<0.02	<0.02	<0.02	<0.02	0.13	2mg/l	---
Mercury (as Hg)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.01	---
Nickel (as Ni)	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	3	---
Nitrate Nitrogen as N-	42	44	43	0.56	0.88	1.2	10mg/l	---
Phenolic Compounds (as C6H5OH)	<0.001	<0.001	<0.001	2.9	1.3	<0.001	1	---
Selenium (as Se)	<0.005	<0.005		<0.005	<0.005	<0.005	0.05	---
Sulphide (as H2S)	<0.1	<0.1	<0.1	1.9	3.0	1.0	2	---
Total Kjeldahl Nitrogen as N	47	55	41	427	405	262	100	---
Total residual chlorine	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1	---
Vanadium as V	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.2mg/l	---
Zinc (as Zn)	<0.02	<0.02	<0.02	0.13	0.16	0.19	5	---

TEST REPORT

Name & Address of the Customer :	Report No.	: MSK/GHY/2024-25/00341A
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00075
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P INLET(BUDUJUNG NAGAR NAGAR AGARTALA)11:00 AM
	Sample Drawn on	: 23.04.2024
Reference No.& Date: W.O. NO.- 457426661		Dated : 11.05.2024

ANALYSIS RESULT

SL. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	5.19	...	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	880	...	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	245	...	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	19	...	APHA(23rd Edition)2540D
5.	Temperature	25	...	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	17	...	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	20	...	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	44	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO4	181	...	APHA (24th Edition), 4500 SO42-E
10.	Iron	0.73	...	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	410	...	APHA (24th Edition) 4500-NH3- F
12.	Arsenic as As (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	No fish is survived in 100% effluent after 96 hours(TF=8)	...	IS 6582 (Part II) : 2001 (RA 2013)_(O)
14.	Cadmium (as Cd)	<0.001	...	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	...	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	0.52	...	APHA (23rd Edition)4500 CN- F 2017
17.	Fixed Solids	1446	...	APHA 24th Edition, 2023 2540E
18.	Fluoride (as F)	-0.1	...	APHA (24th Edition), 4500 F- C/D

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Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024


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19.	Hexavalent Chromium (as Cr+6)	<0.05	...	APHA 23rd Edtn-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	<0.02	...	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	...	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	...	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	2	...	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	21	...	APHA (24th Edition),5530D
26.	Selenium (as Se)	<0.005	...	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	2.3	...	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	425	...	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	...	IS 3025 (Part 26)- 1986 Rfimd 2014
30.	Vanadium as V	<0.05	...	APHA (24th Edition), 4500 Norg B
31.	Zinc (as Zn)	0.78	...	APHA (24th Edition), 3120 B

Report Prepared By :



For Mitra S. K. Private Limited



 Authorised Signatory

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 Tel : 91 33 40143000 / 22650006 / 22650007 Fax : 91 33 22650008
 Email : info@mitrask.com. Website: www.mitrask.com

TEST REPORT

Name & Address of the Customer : "Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report No.	: MSK/GHY/2024-25/00341B
	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00076
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P INLET(BUDUJUNG NAGAR NAGAR AGARTALA)02:00 PM
	Sample Drawn on	: 23.04.2024
Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024		

ANALYSIS RESULT

SL. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	6.27	...	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	860	...	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	232	...	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	92	...	APHA(23rd Edition)2540D
5.	Temperature	25	...	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	48	...	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	18	...	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	35	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO ₄	137	...	APHA (24th Edition), 4500 SO42-E
10.	Iron	0.9	...	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	354	...	APHA (24th Edition) 4500-NH3- F
12.	Arsenic as As (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	No fish is survived in 100% effluent after 96 hours(TF=8)	...	IS 6582 (Part II) : 2001 (RA 2013)_(O)
14.	Cadmium (as Cd)	<0.001	...	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	...	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	0.22	...	APHA (23rd Edition)4500 CN- F 2017
17.	Fixed Solids	4234	...	APHA 24th Edition, 2023 2540E
18.	Fluoride (as F)	<0.1	...	APHA (24th Edition), 4500 F- C/D

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 Email : info@mitrask.com. Website: www.mitrask.com

Reference No. & Date: W.O. NO.- 457426661 Dated : 11.05.2024


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19.	Hexavalent Chromium (as Cr+6)	<0.05	...	APHA 23rd Edtn-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	<0.02	...	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	...	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	...	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	0.52	...	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	11	...	APHA (24th Edition),5530D
26.	Selenium (as Se)	<0.005	...	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	0.29	...	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	362	...	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	...	IS 3025 (Part 26)- 1986 Rffmd 2014
30.	Vanadium as V	<0.05	...	APHA (24th Edition), 4500 Norg B
31.	Zinc (as Zn)	0.68	...	APHA (24th Edition), 3120 B

Report Prepared By :



For Mitra S. K. Private Limited



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 Tel : 91 33 40143000 / 22650006 / 22650007 Fax : 91 33 22650008
 Email : info@mitrask.com. Website: www.mitrask.com

TEST REPORT

Name & Address of the Customer : "Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report No.	: MSK/GHY/2024-25/00341C
	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00077
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P INLET(BUDUJUNG NAGAR NAGAR AGARTALA)05:30 PM
	Sample Drawn on	: 23.04.2024
Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024		

ANALYSIS RESULT

SL. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	6.56	...	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	850	...	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	218	...	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	98	...	APHA(23rd Edition)2540D
5.	Temperature	25	...	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	51	...	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	15	...	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	37	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO4	90	...	APHA (24th Edition), 4500 SO42-E
10.	Iron	0.31	...	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	310	...	APHA (24th Edition) 4500-NH3- F
12.	Arsenic as As (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	No fish is survived in 100% effluent after 96 hours(TF=8)	...	IS 6582 (Part II) : 2001 (RA 2013)_(O)
14.	Cadmium (as Cd)	<0.001	...	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	...	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	<0.02	...	APHA (23rd Edition)4500 CN- F 2017
17.	Fixed Solids	1154	...	APHA 24th Edition, 2023 2540E
18.	Fluoride (as F)	~0.1	...	APHA (24th Edition), 4500 F- C/D

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Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024


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19.	Hexavalent Chromium (as Cr+6)	<0.05	...	APHA 23rd Edtn-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	<0.02	...	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	...	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	...	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	0.48	...	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	0.82	...	APHA (24th Edition),5530D
26.	Selenium (as Se)	<0.005	...	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	0.81	...	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	326	...	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	...	IS 3025 (Part 26)- 1986 Rfimd 2014
30.	Vanadium as V	<0.05	...	APHA (24th Edition), 4500 Norg B
31.	Zinc (as Zn)	<0.02	...	APHA (24th Edition), 3120 B

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TEST REPORT

Name & Address of the Customer :	Report No.	: MSK/GHY/2024-25/00341D
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00078
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P INLET(BUDUJUNG NAGAR NAGAR AGARTALA)11.00 AM
	Sample Drawn on	: 24.04.2024
Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024		

ANALYSIS RESULT

SL. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	5.23	...	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	891	...	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	262	...	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	21	...	APHA(23rd Edition)2540D
5.	Temperature	25	...	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	19	...	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	21	...	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	36	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO4	179	...	APHA (24th Edition), 4500 SO42-E
10.	Iron	0.67	...	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	360	...	APHA (24th Edition) 4500-NH3- F
12.	Arsenic as As (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	No fish is survived in 100% effluent after 96 hours(TF=8)	...	IS 6582 (Part II) : 2001 (RA 2013)_(O)
14.	Cadmium (as Cd)	<0.001	...	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	...	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	0.21	...	APHA (23rd Edition)4500 CN- F 2017
17.	Fixed Solids	2416	...	APHA 24th Edition, 2023 2540E
18.	Fluoride (as F)	~0.1	...	APHA (24th Edition), 4500 F- C/D

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Reference No.& Date: W.O. NO.- 457426661

Dated : 11.05.2024

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19.	Hexavalent Chromium (as Cr+6)	<0.05	...	APHA 23rd Edtn-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	<0.02	...	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	...	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	...	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	0.68	...	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	3.4	...	APHA (24th Edition),5530D
26.	Selenium (as Se)	<0.005	...	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	1.9	...	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	374	...	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	...	IS 3025 (Part 26)- 1986 Rflmd 2014
30.	Vanadium as V	<0.05	...	APHA (24th Edition), 4500 Norg B
31.	Zinc (as Zn)	0.26	...	APHA (24th Edition), 3120 B

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TEST REPORT

Name & Address of the Customer :	Report No.	: MSK/GHY/2024-25/00341E
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00079
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P INLET(BUDUJUNG NAGAR NAGAR AGARTALA)02.00 PM
	Sample Drawn on	: 24.04.2024
Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024		

ANALYSIS RESULT

SL. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	6.32	...	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	870	...	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	290	...	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	95	...	APHA(23rd Edition)2540D
5.	Temperature	25	...	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	45	...	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	19	...	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	37	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO4	134	...	APHA (24th Edition), 4500 SO42-E
10.	Iron	0.82	...	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	334	...	APHA (24th Edition) 4500-NH3- F
12.	Arsenic as As (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	No fish is survived in 100% effluent after 96 hours(TF=8)	...	IS 6582 (Part II) : 2001 (RA 2013)_(O)
14.	Cadmium (as Cd)	<0.001	...	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	...	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	0.11	...	APHA (23rd Edition)4500 CN- F 2017
17.	Fixed Solids	5202	...	APHA 24th Edition, 2023 2540E
18.	Fluoride (as F)	<0.1	...	APHA (24th Edition), 4500 F- C/D

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Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024

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19.	Hexavalent Chromium (as Cr+6)	<0.05	...	APHA 23rd Edtn-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	<0.02	...	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	...	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	...	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	0.7	...	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	5.4	...	APHA (24th Edition),5530D
26.	Selenium (as Se)	<0.005	...	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	0.34	...	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	353	...	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	...	IS 3025 (Part 26)- 1986 Rffmd 2014
30.	Vanadium as V	<0.05	...	APHA (24th Edition), 4500 Norg B
31.	Zinc (as Zn)	0.31	...	APHA (24th Edition), 3120 B

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TEST REPORT

Name & Address of the Customer :	Report No.	: MSK/GHY/2024-25/00341F
“Mott MacDonald Private Limited” 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00080
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P INLET(BUDUJUNG NAGAR NAGAR AGARTALA)05.30 PM
	Sample Drawn on	: 24.04.2024
Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024		

ANALYSIS RESULT

SL. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	6.52	...	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	860	...	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	269	...	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	99	...	APHA(23rd Edition)2540D
5.	Temperature	25	...	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	49	...	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	16	...	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	39	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO4	88	...	APHA (24th Edition), 4500 SO42-E
10.	Iron	0.25	...	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	320	...	APHA (24th Edition) 4500-NH3- F
12.	Arsenic as As (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	No fish is survived in 100% effluent after 96 hours(TF=8)	...	IS 6582 (Part II) : 2001 (RA 2013)_(O)
14.	Cadmium (as Cd)	<0.001	...	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	...	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	0.71	...	APHA (23rd Edition)4500 CN- F 2017
17.	Fixed Solids	2836	...	APHA 24th Edition, 2023 2540E
18.	Fluoride (as F)	<0.1	...	APHA (24th Edition), 4500 F- C/D

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Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024

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19.	Hexavalent Chromium (as Cr+6)	<0.05	...	APHA 23rd Edtn-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	<0.02	...	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	...	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	...	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	1.1	...	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	3.3	...	APHA (24th Edition),5530D
26.	Selenium (as Se)	<0.005	...	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	3.3	...	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	331	...	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	...	IS 3025 (Part 26)- 1986 Rfimd 2014
30.	Vanadium as V	<0.05	...	APHA (24th Edition), 4500 Norg B
31.	Zinc (as Zn)	0.53	...	APHA (24th Edition), 3120 B

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TEST REPORT

Name & Address of the Customer :	Report No.	: MSK/GHY/2024-25/00341G
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00081
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P INLET(BUDUJUNG NAGAR NAGAR AGARTALA)11.00 AM
	Sample Drawn on	: 25.04.2024
Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024		

ANALYSIS RESULT

SL. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	5.31	...	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	870	...	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	235	...	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	20	...	APHA(23rd Edition)2540D
5.	Temperature	25	...	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	18	...	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	22	...	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	41	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO ₄	175	...	APHA (24th Edition), 4500 SO42-E
10.	Iron	0.71	...	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	415	...	APHA (24th Edition) 4500-NH3- F
12.	Arsenic as As (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	No fish is survived in 100% effluent after 96 hours(TF=8)	...	IS 6582 (Part II) : 2001 (RA 2013)_(O)
14.	Cadmium (as Cd)	<0.001	...	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	...	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	0.22	...	APHA (23rd Edition)4500 CN- F 2017
17.	Fixed Solids	4180	...	APHA 24th Edition, 2023 2540E
18.	Fluoride (as F)	<0.1	...	APHA (24th Edition), 4500 F- C/D

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19.	Hexavalent Chromium (as Cr+6)	<0.05	...	APHA 23rd Edtn-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	<0.02	...	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	...	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	...	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	0.56	...	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	2.9	...	APHA (24th Edition),5530D
26.	Selenium (as Se)	<0.005	...	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	1.9	...	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	427	...	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	...	IS 3025 (Part 26)- 1986 Rffmd 2014
30.	Vanadium as V	<0.05	...	APHA (24th Edition), 4500 Norg B
31.	Zinc (as Zn)	0.13	...	APHA (24th Edition), 3120 B

Report Prepared By :



For Mitra S. K. Private Limited



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TEST REPORT

Name & Address of the Customer :	Report No.	: MSK/GHY/2024-25/00341H
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00082
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P INLET(BUDUJUNG NAGAR NAGAR AGARTALA)02.00 PM
	Sample Drawn on	: 25.04.2024
Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024		

ANALYSIS RESULT

SL. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	6.36	...	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	850	...	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	218	...	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	89	...	APHA(23rd Edition)2540D
5.	Temperature	25	...	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	51	...	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	20	...	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	33	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO4	132	...	APHA (24th Edition), 4500 SO42-E
10.	Iron	0.88	...	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	374	...	APHA (24th Edition) 4500-NH3- F
12.	Arsenic as As (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	No fish is survived in 100% effluent after 96 hours(TF=8)	...	IS 6582 (Part II) : 2001 (RA 2013)_ (O)
14.	Cadmium (as Cd)	<0.001	...	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	...	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	0.45	...	APHA (23rd Edition)4500 CN- F 2017
17.	Fixed Solids	3622	...	APHA 24th Edition, 2023 2540E
18.	Fluoride (as F)	<0.1	...	APHA (24th Edition), 4500 F- C/D

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Reference No.& Date: W.O. NO.- 457426661

Dated : 11.05.2024

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19.	Hexavalent Chromium (as Cr+6)	<0.05	...	APHA 23rd Edtn-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	<0.02	...	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	...	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	...	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	0.88	...	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	1.3	...	APHA (24th Edition),5530D
26.	Selenium (as Se)	<0.005	...	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	3.0	...	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	405	...	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	...	IS 3025 (Part 26)- 1986 Rfimd 2014
30.	Vanadium as V	<0.05	...	APHA (24th Edition), 4500 Noerg B
31.	Zinc (as Zn)	0.16	...	APHA (24th Edition), 3120 B

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TEST REPORT

Name & Address of the Customer :	Report No.	: MSK/GHY/2024-25/003411
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00083
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P INLET(BUDUJUNG NAGAR NAGAR AGARTALA)05.30 PM
	Sample Drawn on	: 25.04.2024
Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024		

ANALYSIS RESULT

Sl. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	6.59	...	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	840	...	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	262	...	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	93	...	APHA(23rd Edition)2540D
5.	Temperature	25	...	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	57	...	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	17	...	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	35	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO ₄	84	...	APHA (24th Edition), 4500 SO ₄ -E
10.	Iron	0.27	...	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	245	...	APHA (24th Edition) 4500-NH ₃ - F
12.	Arsenic as As (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	All fishes are survived in 100% effluent after 96 hours(TF=1)	...	IS 6582 (Part II) : 2001 (RA 2013)_(O)
14.	Cadmium (as Cd)	<0.001	...	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	...	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	0.23	...	APHA (23rd Edition)4500 CN- F 2017
17.	Fixed Solids	1068	...	APHA 24th Edition, 2023 2540E
18.	Fluoride (as F)	<0.1	...	APHA (24th Edition), 4500 F- C/D

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Dated : 11.05.2024

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19.	Hexavalent Chromium (as Cr+6)	<0.05	...	APHA 23rd Edtn-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	...	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	0.13	...	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	...	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	...	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	1.2	...	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	<0.001	...	APHA (24th Edition),5530D
26.	Selenium (as Se)	<0.005	...	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	1.0	...	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	262	...	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	...	IS 3025 (Part 26)- 1986 Rffind 2014
30.	Vanadium as V	<0.05	...	APHA (24th Edition), 4500 Norg B
31.	Zinc (as Zn)	0.19	...	APHA (24th Edition), 3120 B

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TEST REPORT

Name & Address of the Customer :	Report No.	: MSK/GHY/2024-25/00341J
“Mott MacDonald Private Limited” 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00084
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P OUTLET(BUDUJUNG NAGAR NAGAR AGARTALA)11.00 AM
	Sample Drawn on	: 23.04.2024
Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024		

ANALYSIS RESULT

SL. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	7.30	5.5-9.0	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	51	250	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	16	30	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	11	100	APHA(23rd Edition)2540D
5.	Temperature	25	shall not exceed 5 deg C above the receiving water temperature	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	9.6	10	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	<0.05	5	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	12	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO4	91	...	APHA (24th Edition), 4500 SO42-E
10.	Iron	<0.05	3 mg/l	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	52	50	APHA (24th Edition) 4500-NH3- F
12.	Arsenic as As (mg/l)	<0.005	0.2	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	All fishes are survived in 100% effluent after 96 hours(TF=1)	90% survival of fish after 96 hours in 100 % effluent	IS 6582 (Part II) : 2001 (RA 2013)_(O)
14.	Cadmium (as Cd)	<0.001	2	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	3	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	<0.02	0.2	APHA (23rd Edition)4500 CN- F 2017

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Reference No. & Date: W.O. NO.- 457426661 Dated : 11.05.2024


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17.	Fixed Solids	1458	...	APHA 24th Edition, 2023 2540E
18.	Fluoride (as F)	<0.1	2	APHA (24th Edition), 4500 F- C/D
19.	Hexavalent Chromium (as Cr+6)	<0.05	0.1	APHA 23rd Edtn-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	0.1	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	<0.02	2 mg/l	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	0.01	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	3	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	1.2	10 mg/l	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	<0.001	1	APHA (24th Edition),5530D
26.	Selenium (as Se)	<0.005	0.05	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	<0.1	2	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	71	100	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	1	IS 3025 (Part 26)- 1986 Rffmd 2014
30.	Vanadium as V	<0.05	0.2 mg/l	APHA (24th Edition), 4500 Norg B
31.	Zinc (as Zn)	<0.02	5	APHA (24th Edition), 3120 B

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TEST REPORT

Name & Address of the Customer :	Report No.	: MSK/GHY/2024-25/00341K
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00085
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P OUTLET(BUDUJUNG NAGAR NAGAR AGARTALA)02.00 PM
	Sample Drawn on	: 23.04.2024
Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024		

ANALYSIS RESULT

SL. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	7.46	5.5-9.0	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	46	250	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	12	30	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	13	100	APHA(23rd Edition)2540D
5.	Temperature	25	shall not exceed 5 deg C above the receiving water temperature	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	11	10	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	<0.05	5	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	9.6	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO4	143	...	APHA (24th Edition), 4500 SO42-E
10.	Iron	<0.05	3 mg/l	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	44	50	APHA (24th Edition) 4500-NH3- F
12.	Arsenic as As (mg/l)	<0.005	0.2	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	All fishes are survived in 100% effluent after 96 hours(TF=1)	90% survival of fish after 96 hours in 100 % effluent	IS 6582 (Part II) : 2001 (RA 2013)_(O)
14.	Cadmium (as Cd)	<0.001	2	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	3	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	<0.02	0.2	APHA (23rd Edition)4500 CN- F 2017

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17.	Fixed Solids	1476	...	APHA 24th Edition, 2023 2540E
18.	Fluoride (as F)	<0.1	2	APHA (24th Edition), 4500 F- C/D
19.	Hexavalent Chromium (as Cr+6)	<0.05	0.1	APHA 23rd Edtn-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	0.1	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	<0.02	2 mg/l	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	0.01	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	3	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	1.3	10 mg/l	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	<0.001	1	APHA (24th Edition), 5530D
26.	Selenium (as Se)	<0.005	0.05	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	<0.1	2	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	60	100	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	1	IS 3025 (Part 26)- 1986 Rflmsd 2014
30.	Vanadium as V	<0.05	0.2 mg/l	APHA (24th Edition), 4500 Norg B
31.	Zinc (as Zn)	<0.02	5	APHA (24th Edition), 3120 B

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TEST REPORT

Name & Address of the Customer :	Report No.	: MSK/GHY/2024-25/00341L
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00086
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P OUTLET(BUDUJUNG NAGAR NAGAR AGARTALA)05.30 PM
	Sample Drawn on	: 23.04.2024
Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024		

ANALYSIS RESULT

Sl. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	7.46	5.5-9.0	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	71	250	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	20	30	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	12	100	APHA(23rd Edition)2540D
5.	Temperature	25	shall not exceed 5 deg C above the receiving water temperature	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	13	10	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	0.17	5	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	15	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO4	204	...	APHA (24th Edition), 4500 SO42-E
10.	Iron	<0.05	3 mg/l	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	36	50	APHA (24th Edition) 4500-NH3- F
12.	Arsenic as As (mg/l)	<0.005	0.2	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	All fishes are survived in 100% effluent after 96 hours(TF=1)	90% survival of fish after 96 hours in 100 % effluent	IS 6582 (Part II) : 2001 (RA 2013)_(O)
14.	Cadmium (as Cd)	<0.001	2	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	3	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	<0.02	0.2	APHA (23rd Edition)4500 CN- F 2017

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17.	Fixed Solids	1308	...	APHA 24th Edition, 2023 2540E
18.	Fluoride (as F)	<0.1	2	APHA (24th Edition), 4500 F- C/D
19.	Hexavalent Chromium (as Cr+6)	<0.05	0.1	APHA 23rd Edtn-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	0.1	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	<0.02	2 mg/l	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	0.01	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	3	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	52	10 mg/l	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	<0.001	1	APHA (24th Edition),5530D
26.	Selenium (as Se)	<0.005	0.05	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	<0.1	2	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	45	100	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	1	IS 3025 (Part 26)- 1986 Rffmd 2014
30.	Vanadium as V	<0.05	0.2 mg/l	APHA (24th Edition), 4500 Norg B
31.	Zinc (as Zn)	<0.02	5	APHA (24th Edition), 3120 B

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TEST REPORT

Name & Address of the Customer :	Report No.	: MSK/GHY/2024-25/00341M
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00087
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P OUTLET(BUDUJUNG NAGAR NAGAR AGARTALA)11.00 AM
	Sample Drawn on	: 24.04.2024
Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024		

ANALYSIS RESULT

SL. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	7.25	5.5-9.0	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	52	250	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	15	30	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	12	100	APHA(23rd Edition)2540D
5.	Temperature	25	shall not exceed 5 deg C above the receiving water temperature	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	10	10	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	<0.05	5	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	14	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO4	89	...	APHA (24th Edition), 4500 SO42-E
10.	Iron	<0.05	3 mg/l	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	37	50	APHA (24th Edition) 4500-NH3- F
12.	Arsenic as As (mg/l)	<0.005	0.2	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	All fishes are survived in 100% effluent after 96 hours(TF=1)	90% survival of fish after 96 hours in 100 % effluent	IS 6582 (Part II) : 2001 (RA 2013)_(O)
14.	Cadmium (as Cd)	<0.001	2	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	3	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	<0.02	0.2	APHA (23rd Edition)4500 CN- F 2017

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17.	Fixed Solids	1550	...	APHA 24th Edition, 2540E
18.	Fluoride (as F)	<0.1	2	APHA (24th Edition), 4500 F- C/D
19.	Hexavalent Chromium (as Cr+6)	<0.05	0.1	APHA 23rd Edtn-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	0.1	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	<0.02	2 mg/l	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	0.01	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	3	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	20	10 mg/l	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	<0.001	1	APHA (24th Edition),5530D
26.	Selenium (as Se)	<0.005	0.05	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	<0.1	2	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	49	100	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	1	IS 3025 (Part 26)- 1986 Rffmd 2014
30.	Vanadium as V	<0.05	0.2 mg/l	APHA (24th Edition), 4500 Norg B
31.	Zinc (as Zn)	<0.02	5	APHA (24th Edition), 3120 B

Report Prepared By :



For Mitra S. K. Private Limited



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TEST REPORT

Name & Address of the Customer :	Report No.	: MSK/GHY/2024-25/00341N
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00088
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P OUTLET(BUDUJUNG NAGAR NAGAR AGARTALA)02.00 PM
	Sample Drawn on	: 24.04.2024
Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024		

ANALYSIS RESULT

SL. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	7.43	5.5-9.0	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	47	250	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	13	30	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	14	100	APHA(23rd Edition)2540D
5.	Temperature	25	shall not exceed 5 deg C above the receiving water temperature	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	12	10	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	<0.05	5	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	12	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO4	141	...	APHA (24th Edition), 4500 SO42-E
10.	Iron	<0.05	3 mg/l	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	41	50	APHA (24th Edition) 4500-NH3- F
12.	Arsenic as As (mg/l)	<0.005	0.2	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	All fishes are survived in 100% effluent after 96 hours(TF=1)	90% survival of fish after 96 hours in 100 % effluent	IS 6582 (Part II) : 2001 (RA 2013)_(O)
14.	Cadmium (as Cd)	<0.001	2	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	3	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	<0.02	0.2	APHA (23rd Edition)4500 CN- F 2017

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Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024

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17.	Fixed Solids	1526	...	APHA 24th Edition, 2023 2540E
18.	Fluoride (as F)	<0.1	2	APHA (24th Edition), 4500 F- C/D
19.	Hexavalent Chromium (as Cr+6)	<0.05	0.1	APHA 23rd Edtn-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	0.1	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	<0.02	2 mg/l	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	0.01	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	3	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	13	10 mg/l	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	<0.001	1	APHA (24th Edition),5530D
26.	Selenium (as Se)	<0.005	0.05	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	<0.1	2	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	56	100	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	1	IS 3025 (Part 26)- 1986 Rffind 2014
30.	Vanadium as V	<0.05	0.2 mg/l	APHA (24th Edition), 4500 Norg B
31.	Zinc (as Zn)	<0.02	5	APHA (24th Edition), 3120 B

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 Tel : 91 33 40143000 / 22650006 / 22650007 Fax : 91 33 22650008
 Email : info@mitrask.com. Website: www.mitrask.com

TEST REPORT

Name & Address of the Customer :	Report No.	: MSK/GHY/2024-25/003410
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00089
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P OUTLET(BUDUJUNG NAGAR NAGAR AGARTALA)05.30 PM
	Sample Drawn on	: 24.04.2024
Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024		

ANALYSIS RESULT

SL. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	7.45	5.5-9.0	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	72	250	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	19	30	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	13	100	APHA(23rd Edition)2540D
5.	Temperature	25	shall not exceed 5 deg C above the receiving water temperature	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	14	10	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	0.2	5	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	17	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO4	202	...	APHA (24th Edition), 4500 SO42-E
10.	Iron	<0.05	3 mg/l	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	60	50	APHA (24th Edition) 4500-NH3- F
12.	Arsenic as As (mg/l)	<0.005	0.2	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	All fishes are survived in 100% effluent after 96 hours(TF=1)	90% survival of fish after 96 hours in 100 % effluent	IS 6582 (Part II) : 2001 (RA 2013)_(O)
14.	Cadmium (as Cd)	<0.001	2	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	3	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	<0.02	0.2	APHA (23rd Edition)4500 CN- F 2017

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Email : info@mitrask.com. Website: www.mitrask.com

Reference No.& Date: W.O. NO.- 457426661

Dated : 11.05.2024

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17.	Fixed Solids	1468	...	APHA 24th Edition, 2023 2540E
18.	Fluoride (as F)	<0.1	2	APHA (24th Edition), 4500 F- C/D
19.	Hexavalent Chromium (as Cr+6)	<0.05	0.1	APHA 23rd Edtn-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	0.1	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	<0.02	2 mg/l	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	0.01	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	3	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	3	10 mg/l	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	<0.001	1	APHA (24th Edition),5530D
26.	Selenium (as Se)	<0.005	0.05	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	<0.1	2	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	74	100	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	1	IS 3025 (Part 26)- 1986 Rflmd 2014
30.	Vanadium as V	<0.05	0.2 mg/l	APHA (24th Edition), 4500 Norg B
31.	Zinc (as Zn)	<0.02	5	APHA (24th Edition), 3120 B

Report Prepared By :



For Mitra S. K. Private Limited



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TEST REPORT

Name & Address of the Customer :	Report No.	: MSK/GHY/2024-25/00341P
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00090
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P OUTLET(BUDUJUNG NAGAR NAGAR AGARTALA)11.00 AM
	Sample Drawn on	: 25.04.2024
Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024		

ANALYSIS RESULT

SL. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	7.21	5.5-9.0	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	50	250	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	14	30	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	10	100	APHA(23rd Edition)2540D
5.	Temperature	25	shall not exceed 5 deg C above the receiving water temperature	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	9.3	10	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	<0.05	5	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	9.6	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO4	87	...	APHA (24th Edition), 4500 SO42-E
10.	Iron	<0.05	3 mg/l	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	44	50	APHA (24th Edition) 4500-NH3- F
12.	Arsenic as As (mg/l)	<0.005	0.2	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	All fishes are survived in 100% effluent after 96 hours(TF=1)	90% survival of fish after 96 hours in 100 % effluent	IS 6582 (Part II) : 2001 (RA 2013)_(O)
14.	Cadmium (as Cd)	<0.001	2	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	3	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	<0.02	0.2	APHA (23rd Edition)4500 CN- F 2017

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Reference No.& Date: W.O. NO.- 457426661

Dated : 11.05.2024

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17.	Fixed Solids	1074	...	APHA 24th Edition, 2023 2540E
18.	Fluoride (as F)	<0.1	2	APHA (24th Edition), 4500 F- C/D
19.	Hexavalent Chromium (as Cr+6)	<0.05	0.1	APHA 23rd Edtn-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	0.1	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	<0.02	2 mg/l	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	0.01	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	3	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	42	10 mg/l	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	<0.001	1	APHA (24th Edition),5530D
26.	Selenium (as Se)	<0.005	0.05	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	<0.1	2	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	47	100	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	1	IS 3025 (Part 26)- 1986 Rfmd 2014
30.	Vanadium as V	<0.05	0.2 mg/l	APHA (24th Edition), 4500 Norg B
31.	Zinc (as Zn)	<0.02	5	APHA (24th Edition), 3120 B

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TEST REPORT

Name & Address of the Customer :	Report No.	: MSK/GHY/2024-25/00341Q
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00091
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P OUTLET(BUDUJUNG NAGAR NAGAR AGARTALA)02.00 PM
	Sample Drawn on	: 25.04.2024
Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024		

ANALYSIS RESULT

Sl. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	7.39	5.5-9.0	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	45	250	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	11	30	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	12	100	APHA(23rd Edition)2540D
5.	Temperature	25	shall not exceed 5 deg C above the receiving water temperature	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	10	10	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	<0.05	5	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	7.7	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO4	139	...	APHA (24th Edition), 4500 SO42-E
10.	Iron	<0.05	3 mg/l	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	41	50	APHA (24th Edition) 4500-NH3- F
12.	Arsenic as As (mg/l)	<0.005	0.2	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	All fishes are survived in 100% effluent after 96 hours(TP-1)	90% survival of fish after 96 hours in 100 % effluent	IS 6582 (Part II) : 2001 (RA 2013)_(O)
14.	Cadmium (as Cd)	<0.001	2	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	3	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	<0.02	0.2	APHA (23rd Edition)4500 CN- F 2017

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Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024

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17.	Fixed Solids	1074	...	APHA 24th Edition, 2023 2540E
18.	Fluoride (as F)	<0.1	2	APHA (24th Edition), 4500 F- C/D
19.	Hexavalent Chromium (as Cr+6)	<0.05	0.1	APHA 23rd Edtn-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	0.1	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	<0.02	2 mg/l	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	0.01	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	3	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	44	10 mg/l	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	<0.001	1	APHA (24th Edition),5530D
26.	Selenium (as Se)	<0.005	0.05	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	<0.1	2	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	55	100	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	1	IS 3025 (Part 26)- 1986 Rfimd 2014
30.	Vanadium as V	<0.05	0.2 mg/l	APHA (24th Edition), 4500 Norg B
31.	Zinc (as Zn)	<0.02	5	APHA (24th Edition), 3120 B

Report Prepared By :



For Mitra S. K. Private Limited


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TEST REPORT

Name & Address of the Customer :	Report No.	: MSK/GHY/2024-25/00341R
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 28.05.2024
	Sample No.	: MSKGL/ED/2024-25/05/00092
	Nature of Sample	: EFFLUENT WATER
	Sample mark	: E.T.P OUTLET(BUDUJUNG NAGAR NAGAR AGARTALA)05.30 PM
	Sample Drawn on	: 25.04.2024
Reference No.& Date: W.O. NO.- 457426661 Dated : 11.05.2024		

ANALYSIS RESULT

SL. NO	PARAMETER	RESULT	Limit as Per CPCB	METHOD
1.	pH value at 25 Deg C (Hazen)	7.42	5.5-9.0	APHA(23rd Edition) 4500-H-B
2.	Chemical Oxygen Demand COD (mg/l)	70	250	APHA (23rd Edition) 5220B, 2017
3.	Biochemical Oxygen Demand as BOD (mg/l)	20	30	APHA (23rd Edition) 5210B 2017
4.	Total Suspended Solid as TSS (mg/l)	14	100	APHA(23rd Edition)2540D
5.	Temperature	25	shall not exceed 5 deg C above the receiving water temperature	APHA (24th Edition), 2550B
6.	Oil and Grease (mg/l)	12	10	APHA (23rd Edition) 5520B 2017
7.	Phosphate as P (mg/l)	0.22	5	APHA (23rd Edition) 4500- P D, 2017
8.	Chlorides	14	...	APHA (24th Edition) 4500 -Cl B
9.	Sulphates as SO4	199	...	APHA (24th Edition), 4500 SO42-E
10.	Iron	<0.05	3 mg/l	APHA (24th Edition), 3500 Fe B
11.	Ammoniacal Nitrogen (as N)	32	50	APHA (24th Edition) 4500-NH3- F
12.	Arsenic as As (mg/l)	<0.005	0.2	APHA (23rd Edition)3120B 2017 (ICP OES)
13.	Bio-assay	All fishes are survived in 100% effluent after 96 hours(TF=1)	90% survival of fish after 96 hours in 100 % effluent	IS 6582 (Part II) : 2001 (RA 2013)_(O)
14.	Cadmium (as Cd)	<0.001	2	APHA (24th Edition), 3120 B
15.	Copper (as Cu)	<0.02	3	APHA (24th Edition), 3120 B
16.	Cyanide (as CN)	<0.02	0.2	APHA (23rd Edition)4500 CN- F 2017

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Reference No.& Date: W.O. NO.- 457426661

Dated : 11.05.2024

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17.	Fixed Solids	1212	...	APHA 24th Edition, 2023 2540E
18.	Fluoride (as F)	<0.1	2	APHA (24th Edition), 4500 F- C/D
19.	Hexavalent Chromium (as Cr+6)	<0.05	0.1	APHA 23rd Edtm-2017, 3500 Cr B
20.	Lead as Pb (mg/l)	<0.005	0.1	APHA (23rd Edition)3120B 2017
21.	Manganese (as Mn)	<0.02	2 mg/l	APHA (24th Edition), 3120 B
22.	Mercury as Hg (mg/l)	<0.001	0.01	APHA (24th Edition) 3112 B
23.	Nickel (as Ni)	<0.02	3	APHA (24th Edition), 3120 B
24.	Nitrate Nitrogen as N-	43	10 mg/l	APHA (24th Edition), 4500 NO3-E
25.	Phenolic Compounds (as C6H5OH)	<0.001	1	APHA (24th Edition),5530D
26.	Selenium (as Se)	<0.005	0.05	APHA (24th Edition)3120 B
27.	Sulphide (as H2S)	<0.1	2	APHA (23rd Edition)4500 S2- D,2017
28.	Total Kjeldahl Nitrogen as N	41	100	APHA (24th Edition), 4500 Norg B
29.	Total residual chlorine	<0.1	1	IS 3025 (Part 26)- 1986 Rffmd 2014
30.	Vanadium as V	<0.05	0.2 mg/l	APHA (24th Edition), 4500 Norg B
31.	Zinc (as Zn)	<0.02	5	APHA (24th Edition), 3120 B

Report Prepared By :



For Mitra S. K. Private Limited



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Enclosure-6

Extracts of TSPCB/ CPCB and NGT observations on the functioning of the CETP and actions identified for rectification by DIC/ TIDCL, Govt. of Tripura

C. NAME AND DESIGNATION OF DESIGNATED OFFICER FOR ENSURING COMPLIANCE:

Dr. Sandeep N. Mahatme, IAS, Director, Urban Development Department,
Government of Tripura.

14. STATUS OF CETPs/ETPs INCLUDING PERFORMANCE

INITIATIVES TAKEN BY THE STATE

- In compliance of the Order of Hon'ble NGT dated 03.08.2018 in the said matter, TSPCB is regularly submitting the said Status Report in a time bound manner.
 - **ETP:** In the state of Tripura, there are 41 numbers of ETPs have been installed by the different industries as on date. Water quality monitoring of the treated water through Steps has been done by Tripura State Pollution Control Board. Direction has been issued to all the industries running without ETP.
 - **CETP:** There is only one (01) CETP of 500 KLD capacities setup at Bodhjurnagar Industrial Complex in the State of Tripura. At present the plant is running smoothly. The CETP is connected with Effluent generating Units through common pipe line for transportation of Effluent to the plant for treatment purpose. Effluent is being treated in CETP at different stage so as to make the content of impurities up to a permissible limit as per guide line of Tripura State Pollution Control Board (TSPCB). It is complying with the effluent standards. Online Continuous Effluent Monitoring System (OCEMS) has been installed.
- In addition, a new Mega Food Park has been set up by M/s Sikaria Mega Food Park (P) Ltd. and they are also in the process of starting Operation of a CETP. As of now, there is only one industrial unit is almost ready to operate in Food Park.
- **OCEMS :** Presently, there are 5 industrial units (basically gas-based power plants and CETP) which have OCEMS. The contributors of these units are directly providing data to CPCB portal.

B. The TSPCB is being submitting the Status Reports regarding STP, ETP, CETP & OCEMS on monthly basis (by 10th of every month) to CPCB. (Annexure-41).

C. PROPOSAL OF ATTENDING THE GAP WITH TIME LINE:

- For attending the gap, the non complying units having no ETP have already been directed to construct the same within next 6 months and make it functional within the stipulated period.
- The unit which are having ETP but the quality of effluent generated from ETP are not conforming to the prescribed standard / not using their ETP may be asked to take necessary measures to rectify the problem.
- TSPCB has already communicated TIDC to install OCEMS immediately and to make connectivity to CPCB & SPCB server.

- An Action Plan has been prepared for Operation of CETP/ETPs Including Performance. The Action Plan for Operation of CETP/ETPs Including Performance are as follows:

Sl No	Action Areas	Responsible Department	Time line
1.	Identification and Inventorisation of waste water generating units for the State	Department of Industries & Commerce / Tripura State Pollution Control Board	1 year
2.	Operation & Maintenance of CETP at Budhjungnagar Industrial Cluster for effective management of industrial wastewater.	Department of Industries & Commerce	Continuous process
3.	Ensure to set up OCEMS at CETP of Budhjungnagar Industrial Cluster	Department of Industries & Commerce	6(Six) months
4.	Ensure to set up ETP for waste water generating industrial units throughout the State	Health Department/ Tripura State Pollution Control Board	Continuous process
5.	Environmental monitoring of waste water and treated water of CETP/ETP of waste water generating units for effective management of industrial wastewater.	Tripura State Pollution Control Board	Continuous process
6.	Action to be taken against the non complying industrial units with respect to environmental standard of Wastewater	Tripura State Pollution Control Board	Continuous process
7.	Public Reddressal portal to be developed for attending the complaints related to industrial pollution	Tripura State Pollution Control Board	1 Year

D. NAME AND DESIGNATION OF DESIGNATED OFFICER FOR ENSURING COMPLIANCE:

Director, Industries & Commerce Department Lichu bagan, Capital Complex, Agartala.

15. GROUND WATER EXTRACTION/CONTAMINATION AND RE-CHARGE

INITIATIVES TAKEN BY THE STATE :

- For drinking water, rural area in Tripura State is mostly dependent on underground water sources. The underground water is lifted through the schemes like Deep Tube Well, Small Bore Tube Well, Mark-11 /III, Ordinary Hand Pump etc. In rural areas, where flow of water in river and cherra is adequate, many surface water treatment plants have already been setup and works of many other plants are in progress.
- Scenario of Rural Water Supply Source in Tripura State as on 30.09.2019 is as follows:

a)	Deep Tube Well (DTW) in Nos	:	1828
b)	Small Bore Tube Well (SBTW) in Nos	:	3603
c)	Surface Water Treatment Plant (SWTP) in Nos	:	36
d)	Ground Water Treatment Plant(GWTP) in Nos	:	35

Sl No	Responsible Departments/ Organizations	Decision taken in meeting of 17 th State Level Committee held on 27.05.2022	Action Taken Report of the Decision Taken in 17 th SLC Meeting	Decision taken in meeting of 18 th State Level Committee held on 02.09.2022
	TSPCB	monthly basis.		submit ATR on monthly basis to TSPCB.
32.	UDD/ Horticulture Department/ ULBs	The Horticulture Department may take initiative to cover the unpaved roadside by planting grass in urban areas. Initiative may also be taken to plant creeper species on the high-rise government building which will act as noise barriers.	Works not been initiated	All ULBs shall take initiatives to cover the unpaved roadside by planting grass in urban areas in consultation with Horticulture Department.
Issue : 100 industrial clusters/ CETPs/ ETPs Ref : NGT Order dated 14.11.2019 in OA No. 1038 of 2018				
33.	Industries & Commerce Department	<ul style="list-style-type: none"> The TIDC shall complete the work of laying pipelines from effluent generating units for connection to the Common Effluent Treatment Plant (CETP) at Budhjungnagar Industrial Estate within June, 2022. Initiatives to be taken for necessary maintenance work of the existing CETP at Budhjungnagar Industrial Growth Centre. The Online Continuous Emission Monitoring System (OCEMS) installed at the CETP Budhjungnagar shall be connected to CPCB as well as TSPCB server within July, 2022. 	<ul style="list-style-type: none"> An agency namely M/s Enviro Chem has been engaged for maintenance of existing system as well as its operation. The said agency has completed a survey of industries having potential of wastewater generation and also to connect pipeline to CETP. The OCEMS system is under maintenance and it will be operated and connected to CPCB server within September, 2022. 	<ul style="list-style-type: none"> TIDC shall ensure to connect pipeline of industrial wastewater with CETP. Necessary initiatives shall be taken to make the existing <u>CETP operational.</u> The Online Continuous Emission Monitoring System (OCEMS) of the CETP shall be made operational and also be connected with CPCB as well as TSPCB server within <u>October, 2022.</u>
Issue : Identification, Protection & Restoration of water bodies Ref : NGT Order dated 01.06.2020 & 18.11.2020 in M.A. No. 26/2019 in OA No. 325/2015 (The application is disposed on 18.11.2020)				
34.	Forest Department/ State Level Committee (STF)	The State Level Committee (Nodal Agency) for restoration of water bodies may monitor the identification, protection and restoration works of the identified water bodies.	The existing State Level Committee under the Chairmanship of the Chief Wildlife Warden, Tripura (Nodal Agency for restoration of water bodies) are regularly monitoring the compliance made by the different stakeholders as per the direction of Hon'ble NGT.	The State Level Committee (Nodal Agency) for restoration of water bodies under the chairmanship of Chief Wildlife Warden shall monitor the identification, protection and restoration works of the water bodies.
35.	DMs/TSPCB	TSPCB shall take initiative for collection of water samples from the remaining districts in	Till date 350 water bodies have been physically identified and water sample	TSPCB shall take initiative for collection of water samples from



ENVIROCHEM LABORATORIES PRIVATE LIMITED

THOZHUTHUMGAL BUILDING,
TUDA ROAD, KOVILAKATHUMPADAM,
THRISSUR – 680 020, PHONE: 0487 2321645.

(APPROVED LABORATORY OF KERALA STATE POLLUTION CONTROL BOARD)

TEST REPORT

Effluent Water Analysis		DATE	15-09-2022	
Source of Sample	ETP-Treated water		NAME OF PARTY	
Mode of Sampling	Collected by us		M/s.CETP, Tripura	
Date of Collection	03-09-2022			
Ref. No.	ELPL/TCR/LAB/64/2022			
Sl.No	Parameters	Method of Analysis	Unit	Value
1.	pH	Electrometric Method (IS 3025 1964)	-	7.6
2.	Suspended Solids	Gravimetric Method With filtration (IS 3025 1964 part 15)	Mg/L	21.5
3.	COD	Open Reflux Method (APHA 19 th Edition 1995,5220 B)	Mg/L	96.0
4.	BOD for 3 days at 27oC	Incubation Method(IS 3025 1993 Part 44)	Mg/L	28.0
5.	Oil & Grease	Solvent Extraction Method (IS 3025 1964 part 39)	Mg/L	0.9
ANALYSED BY				
CHECKED BY				

**ANALYTICAL RESULTS OF TREATED WASTE WATER SAMPLE COLLECTED FROM
CETP, BODHJUNGNAGAR, AGARTALA**

Date of Collection: 20.04.2021

Sl. No	Parameters	S-1	Standards <i>(Into inland surface water)</i>
1.	pH	7.33	5.5-9.0
2.	Conductivity ($\mu\text{S/cm}$)	7060	-
3.	Turbidity (NTU)	169	-
4.	Total Suspended Solids (mg/L)	256	100
5.	Total Dissolved Solids (mg/L)	4484	2100
6.	Bio-Chemical Oxygen Demand (mg/l)	36	30
7.	Total Hardness (mg/l)	137	-
8.	Chemical oxygen Demand (mg/l)	142	250
9.	Chlorides (mg/l)	31.7	1000
10.	Iron (mg/l)	0.43	3
11.	Ammunical Nitrogen (mg/l)	6.94	50
12.	Sulphide (mg/l)	0.11	2
13.	Oil and Grease (mg/l)	21	10
14.	Fluorides (mg/l)	BDL	2
15.	Arsenic (mg/l)	BDL	0.2

**BDL (Below Detectable Limit)*

Site of collection:

S-1: Treated Waste Water from Common Effluent Treatment Plant, Bodhjunnagar, Agartala.

**ANALYTICAL RESULTS OF TREATED WASTE WATER SAMPLE COLLECTED FROM
EFFLUENT TREATMENT PLANT OF BRITE RUBBER, BODJUNGNAGAR, AGARTALA**

Date of Collection: 20.04.2021

Sl. No	Parameters	S-1	Standards (Into inland surface water)
1.	pH	7.3	5.5-9.0
2.	Conductivity (μ S/cm)	1090	-
3.	Turbidity (NTU)	15.1	-
4.	Total Suspended Solids (mg/L)	64	100
5.	Total Dissolved Solids (mg/L)	620	2100
6.	Bio-Chemical Oxygen Demand (mg/l)	43	30
7.	Total Hardness (mg/l)	65.9	-
8.	Chemical oxygen Demand (mg/l)	184	250
9.	Chlorides (mg/l)	31.5	1000
10.	Iron (mg/l)	0.19	3
11.	Ammunical Nitrogen (mg/l)	5.44	50
12.	Sulphide (mg/l)	BDL	2
13.	Oil and Grease (mg/l)	9	10
14.	Fluorides (mg/l)	BDL	2
15.	Arsenic (mg/l)	BDL	0.2

*BDL (Below Detectable Limit)

Site of collection:

S-1: Treated Waste Water from Effluent Treatment Plant of *Brite Rubber* Bodhjunnagar, Agartala.

**ANALYTICAL RESULTS OF TREATED WASTE WATER SAMPLE COLLECTED FROM
EFFLUENT TREATMENT PLANT OF PRAN BEVERAGE, BODJUNGNAGAR, AGARTALA**

Date of Collection: 20.04.2021

Sl. No	Parameters	S-1	Standards (Into inland surface water)
1.	pH	6.92	5.5-9.0
2.	Conductivity ($\mu\text{S/cm}$)	560	-
3.	Turbidity (NTU)	36.8	-
4.	Total Suspended Solids (mg/L)	38	100
5.	Total Dissolved Solids (mg/L)	182	2100
6.	Bio-Chemical Oxygen Demand (mg/l)	22	30
7.	Total Hardness (mg/l)	53.7	-
8.	Chemical oxygen Demand (mg/l)	96	250
9.	Chlorides (mg/l)	45.3	1000
10.	Iron (mg/l)	0.09	3
11.	Ammunical Nitrogen (mg/l)	5.22	50
12.	Sulphide (mg/l)	BDL	2
13.	Oil and Grease (mg/l)	6	10
14.	Fluorides (mg/l)	BDL	2
15.	Arsenic (mg/l)	BDL	0.2

*BDL (Below Detectable Limit)

Site of collection:

S-1: Treated Waste Water from Effluent Treatment Plant of Pran Beverage, Bodhjungnagar, Agartala.



TRIPURA STATE POLLUTION CONTROL BOARD

(A Statutory Organisation Under Government of Tripura)

Department of Science Technology & Environment

F.19 (7)/TSPCB/RRC/ 7916-19

September 28, 2021.

To

Shri D. P. Mathuria

Executive Director- Technical

National Mission for Clean Ganga

Ministry of Jal Shakti (MoJS)

1st floor, Major Dhyan Chand National Stadium

India gate, New Delhi-110002.

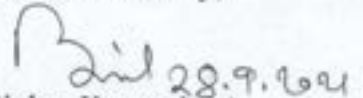
Sub. : Submission of monthly progress report of six identified river stretches of Tripura for the month of August, 2021.

Sir,

In compliance to Hon'ble National Green Tribunal Order dated 6.12.2019 in O.A No.673/2018 in the matter of news item published in 'The Hindu' titled "More River Stretches are now critically polluted: CPCB", please find enclosed the monthly progress report for six identified river stretches of Tripura for the month of August, 2021 in the prescribed format for kind information.

Enclosed: as stated

Yours Sincerely,


(Bishu Karmakar)
Member Secretary

Copy to:

1. PS to the Secretary, Science, Technology and Environment, Government of Tripura for kind information of the Secretary.
2. The Director, Science, Technology and Environment, Govt. of Tripura for kind information.
3. Mr. A. Sudhakar, DH, WQM-1 Division, Central Pollution Control Board, Parivesh Bhawan, East Arjun Nagar, Delhi-110032.

			effluent		
Nil	Nil	Nil	Nil	Nil	--

- **Quantity of Hazardous Sludge generated from the Industries in TPD:** 0.077 MTPD
- **Number of industrial units having ETPs:** In the State of Tripura, there are 46 Nos. of Industries equipped with ETP. However, within the 500 meter of the catchment area of the 6 identified river stretches, there are 18 ETPs has been installed.
- **Number of industrial units connected to CETP:** 7 Nos.
- **Number and total capacity of ETPs (details of existing/ under construction / proposed) :** 46 nos. of ETPs were installed in the State. However, within the 500 meter of the catchment area of the 6 identified river stretches, there are 18 ETPs has been installed.
- **Compliance status of the ETPs:** 46 nos. of ETPs were installed in the State. However, within the 500 meter of the catchment area of the 6 identified river stretches, there are 18 ETPs has been installed and all are functional.
- **Number and total capacity of CETPs (details of existing/ under construction / proposed) :** 1 nos. CETP has been installed with capacity of 500 KLD at Bodhjunnagar, Agartala. Another CETP of 1 MLD capacity has been installed and commissioned at Sikaria Mega Food Park, west Tripura.
- **Status of compliance and operation of the CETPs:**

Town	No. of industries	Industrial discharge	Status of ETPs	Status of CETPs (existing, under construction & proposed)
Bodhjunnagar, Agartala	7	Rubber Processing Units, Food Processing units, beverage etc.	After primary treatment through the ETPs of the concerned industrial units the effluent goes to the CETP.	Complying with the standards.

Speed Post

CPCB/IPC-VII/CETPs/Direction/2019

August 13, 2019

To

~~The Chairman~~
Tripura State Pollution Control Board
Parivesh Bhawan, Pandit Nehru Complex
P.O. Kumjaban, Gorkhabasti
Agartala, Tripura-799 006

Directions under Section 18 (1) (b) of water (Prevention and Control of Pollution) Act, 1974, regarding non-compliance status of common effluent treatment plants (CETPs).

WHEREAS, amongst others, under Section 17 of Water (Prevention and Control of Pollution) Act, 1974, one of the functions of State Pollution Control Boards (SPCBs) (or Pollution Control Committee for Union Territories), constituted under the Water (Prevention and Control of Pollution) Act, 1974, is to plan a comprehensive programme for the prevention, control and abatement of pollution of streams and wells in the concerned State/UT and to secure the execution thereof; and

WHEREAS, amongst others, under Section 16 of the Water (Prevention and Control of Pollution) Act, 1974, one of the functions of the Central Pollution Control Board (CPCB) constituted under the Water (Prevention and Control of Pollution) Act, 1974, is to coordinate activities of the State Pollution Control Boards (SPCBs)/Pollution Control Committees (PCCs) and to provide technical assistance and guidance to SPCBs/PCCs; and

WHEREAS, amongst others, under Section 16 of the Water (Prevention and Control of Pollution) Act, 1974, one of the functions of the CPCB is to promote cleanliness of streams and wells in different areas of the States; and

WHEREAS, under Section 25 of the Water (Prevention and Control of Pollution) Act, 1974, no person shall without the previous consent of the State Board establish or take step to establish any industry, operation or process of any treatment or disposal system or an extension or addition thereto, which is likely to discharge sewage or trade effluent into a stream or well or sewer or on land; and

WHEREAS, the Central Government has specified the standards for discharge of environmental pollutants from industries and CETPs under Environment (Protection) Act, 1986 and the rules framed there under; and

WHEREAS, CPCB has been interacting with SPCBs regarding implementing effective monitoring mechanism to ensure compliance of effluent standards by CETPs and to stop direct discharge of untreated industrial effluent from industries/industrial area by-passing the CETP for the area; and

WHEREAS, in order to improve the status of compliance of the stipulated effluent standards by CETPs, Central Pollution Control Board (CPCB) has issued directions under section 18 (1) (b) of the Water (Prevention and Control of Pollution) Act, 1974, to SPCBs/PCCs, vide letter No. B-22013/2/PCI-III/2008, dated 2/9/2008 and modified directions vide letter no. PCI-SSI/CETPs Monitoring/Direction/2016, dated 31/3/2016 as follow:

1. *Carry out monitoring of all CETPs and the associated industrial areas at least every quarter:*
 - a) *To check compliance of inlet quality parameters of CETP*
 - b) *To check compliance of the effluent standards for CETPs notified on 1st January 2016, or if any more stringent standards for ZLD condition specified by the SPCB*
 - c) *To check maintenance and calibration status of the OCEMS in the CETP*
 - d) *To check occurrence of any bypass of untreated effluents from industries/industrial area wherever applicable*
2. *Upload the performance status of all CETPs in respect of each monitoring on SPCB website regularly, starting from April 2016*
3. *Not permit establishment/expansion of industrial units in the areas where the associated CETPs are not complying with the specified standards or where such CETPs do not have adequate hydraulic capacities except for such cases which do not impact performance of CETP, such as*
 - a) *Not resulting in increase in pollution load such as industries generating nil effluent, 100% effluent recycling units, industries generating only concentrated stream disposed at Common Hazardous Waste Treatment and Disposal Facility*
 - b) *CETP has unutilized hydraulic capacity and the effluent of new industry/expansion will help in improving the performance of CETP (in all such cases the SPCB shall provide details and justification for granting permission to new units/expansion of existing units to CPCB every quarter)*
4. *Take suitable action against industries/CETPs not complying with the prescribed standard*


5. To take suitable action to stop bypass of untreated industrial effluents from industries/industrial estates wherever applicable.

AND WHEREAS, Hon'ble NGT in the matter of 'Paryavaran Suraksha Samiti & Anr. Applicant (s) vs Union of India & Ors (OA No. 593/2017) has directed CPCB in the order dated 19/2/2019 as below:

"The CPCB may also compile its monitoring report with reference to 97 CETPs installed in different states after undertaking study about the status of their efficient functioning and remedial steps required in this matter".

WHEREAS, to comply the order of Hon'ble NGT, CPCB carried out inspection cum monitoring of 1 CETPs located in Tripura during May, 2019. The observations and recommendations as well as analysis reports are enclosed at **Annexure-I** and **Annexure-II**, respectively.

AND NOW THEREFORE, in exercise of powers conferred under Section 18 (1) (b) of the Water (Prevention and Control of Pollution) Act, 1974, TSPCB is hereby directed to take appropriate action for compliance of the following directions:

- 
1. TSPCB shall direct non-complying CETPs to take immediate corrective actions to comply with the environmental standards.
 2. CETPs should be directed to take action as per the recommendations provided at **Annexure-I** within stipulated time frame.
 3. In case of non-complying CETPs, action as deemed fit including levying of environmental compensation may be taken.
 4. In case, OCEMS are not connected with CPCB & SPCB servers, ensure a robust system of physical inspections to verify compliance by drawing samples.

Compliance of the directions shall be submitted to CPCB within 15 days.


(S.P. Singh Parihar)
Chairman

Encl: As above

Copy to:

The Joint Secretary (CP Division) : For information, please.
Ministry of Environment, Forest & Climate Change
Indira Paryavaran Bhawan, Jorbagh Road
Ali Ganj, Lodi Colony
New Delhi-110 013

The Regional Director,
Regional Directorate (North-East),
Central Pollution Control Board
"TUM-SIR", Lower Motinagar,
Near Fire Brigade H.Q.,
Shillong-793014 (Meghalaya)

: For follow-up, please.

✓ The In-charge, IT Division, CPCB

: With a request to upload
the directions on CPCB
website.


(Prashant Gargava)
Member Secretary

Report on Common Effluent Treatment Plants (CETPs) in Tripura as per the Inspection of Central Pollution Control Board (CPCB) during 2019

Sl. No.	Name & Address of CETP	Date of Inspection	Observations/ Compliance status	Recommendations/Action Points
1.	CETP, Industrial Growth Centre, Bodhjungnagar, Tripura Industrial Development Corporation Ltd. (A Government of Tripura Undertaking), Agartala, Tripura, Pin-799008	18/5/2019	<ul style="list-style-type: none"> • CETP is not complying with prescribed discharge limits w.r.t BOD and Oil & Grease. • CETP is for Rubber units (8 units). • CETP does not have valid Consents since 2016 and did not apply for HW Authorization. • CETP treats effluent of 100 KLD as against the designed capacity of 500 KLD. • Inlet to CETP standards is prescribed. • OCEMS are not installed. 	<ul style="list-style-type: none"> • The operator shall improve operation of CETP so as to meet discharge standards immediately. Thereafter performance evaluation study of CETP is to be conducted through Government institution within four month. • CETP should obtain valid CCA within two month.



Monitoring Characteristics of treated effluent being discharged from Common Effluent Treatment Plants in Tripura

Sl. No.	Name of CETP	pH	TKN	TSS	O & G	TDS/ FDS	F	S	SO ₂	BOD	COD	NH ₄ -N	Phenol	NO ₃ -N	P	Cl	CN	TRC	B	Fe	Mn	Cr	Cd	Cu	Pb	Ni	As	Hg	Zn
I.	CETP- Industrial Growth Centre, Agartala, Tripura.	7.68	-	3	44.4	1219	-	-	-	47	75.6	-	-	-	-	0.43	-	-	-	-	0.01	-	BDL	BDL	0.09	-	-	-	0.03
	Standard prescribed	6-9	-	100	10	2100	-	-	-	30	250	-	-	-	-	1000	-	-	-	-	2.0	-	0.05	3.0	0.1	-	-	-	5.0

*All parameters are expressed in mg/l except pH.

**ACTION TAKEN REPORT
FOR
THE STATE OF TRIPURA**



[Compliance of the Directions of Hon'ble National Green Tribunal, New Delhi in Order dated 23.01.2023 M.A. No.98 /2022 in connection with OA No. 180/2021, Mukul Kumar Vs State of Uttar Pradesh & Ors.]

**Submitted by:
GOVERNMENT OF TRIPURA**

Minutes of 18th meeting of State Level Committee held under the Chief Secretary, Tripura on 02/09/2022 at 12:00 noon in Video Conference Room of the Civil Secretariat to review the progress of implementation on the Directions dated 16/01/2019, 07/05/2019, 28.02.2020, 02.07.2020 & 14.12.2020 of Hon'ble National Green Tribunal in OA No.606/2018 in the matter of Compliance of Solid Waste Management Rules, 2016 and other environment related issues of State.

The 18th meeting of the State Level Committee was held under the Chairmanship of the Chief Secretary, Tripura on 02/09/2022 at 12.00 noon in the Video Conference Room of the Civil Secretariat to review the progress of implementation on the Directions dated 16/01/2019, 07/05/2019 & 28.02.2020, 02.07.2020 & 14.12.2020 of Hon'ble National Green Tribunal in O.A. No.606/2018 in the matter of Compliance of Solid Waste Management Rules, 2016 and other environment related issues of State.

The list of officers attended the VC meeting as mentioned at **Annexure-I**. The District Magistrate and Collectors of 8 (eight) Districts, DFOs of all 8 (Eight) Districts, Sub-Divisional Magistrates, BDOs of all RD Blocks and Commissioners/CEOs/EOs of all Urban Local Bodies participated in the meeting through Video Conferencing.

The discussions were held on progress made on each issue in the meeting. The decisions taken in respect of each of the issues are as follows:

Sl No	Responsible Departments/ Organizations	Decision taken in meeting of 17 th State Level Committee held on 27.05.2022	Action Taken Report of the Decision Taken in 17 th SLC Meeting	Decision taken in meeting of 18 th State Level Committee held on 02.09.2022
Issue : Solid Waste Management & Legacy Waste Management				
Ref : NGT Orders dated 28.02.2020, 02.07.2020, 14.12.2020 and 30.11.2021 in O.A. No : 606/2018				
1.	UDD/ULBs	<ul style="list-style-type: none"> The Tertiary Waste Treatment Plant (TWTP) of Jirania will not be set up and its waste will be treated in the treatment facility of Ranirbazar. Setting up of Tertiary Waste Treatment Plant for 16 ULBs may be completed within August, 2022. All the Secondary Centres shall be made operational within August, 2022 	<ul style="list-style-type: none"> Jirania will utilize the TWTP of Ranirbazar MC. The Tertiary Waste Treatment Plant (TWTP) to treat organic/wet waste & to store segregated dry waste of Sabroom NP was inaugurated by Hon'ble CM on 11-08-2022. Operationalization of the following 7 ULBs (Dharmanagar, Udaipur, Ranirbazar, Sonamura, Ambassa, Khowai, & Mohanpur) are targeted for completion by September 2022. The remaining construction works of TWTP of 8 ULBs will be completed by December 2022. In Amarpur construction works halted due to public protest. Bishalgarh is using the existing plant of AMC at D.C Nagar & Kamalpur 	<ul style="list-style-type: none"> All the TWTP shall be made operational within December, 2022 DM shall visit the proposed TWTP site at Amarpur and resolve the issue. 82 nos. Secondary Centres shall be made Operational within October, 2022. Setting up of the remaining 12 nos. Secondary Centres shall be completed within November, 2022.

Sl No	Responsible Departments/ Organizations	Decision taken in meeting of 17 th State Level Committee held on 27.05.2022	Action Taken Report of the Decision Taken in 17 th SLC Meeting	Decision taken in meeting of 18 th State Level Committee held on 02.09.2022
	TSPCB	monthly basis.		submit ATR on monthly basis to TSPCB.
32.	UDD/ Horticulture Department/ ULBs	The Horticulture Department may take initiative to cover the unpaved roadside by planting grass in urban areas. Initiative may also be taken to plant creeper species on the high-rise government building which will act as noise barriers.	Works not been initiated	All ULBs shall take initiatives to cover the unpaved roadside by planting grass in urban areas in consultation with Horticulture Department.
Issue : 100 industrial clusters/ CETPs/ ETPs				
Ref : NGT Order dated 14.11.2019 in OA No. 1038 of 2018				
33.	Industries & Commerce Department	<ul style="list-style-type: none"> The TIDC shall complete the work of laying pipelines from effluent generating units for connection to the Common Effluent Treatment Plant (CETP) at Budhjungnagar Industrial Estate within June, 2022. Initiatives to be taken for necessary maintenance work of the existing CETP at Budhjungnagar Industrial Growth Centre. The Online Continuous Emission Monitoring System (OCEMS) installed at the CETP Budhjungnagar shall be connected to CPCB as well as TSPCB server within July, 2022. 	<ul style="list-style-type: none"> An agency namely M/s Enviro Chem has been engaged for maintenance of existing system as well as its operation. The said agency has completed a survey of industries having potential of wastewater generation and also to connect pipeline to CETP. The OCEMS system is under maintenance and it will be operated and connected to CPCB server within September, 2022. 	<ul style="list-style-type: none"> TIDC shall ensure to connect pipeline of industrial wastewater with CETP. Necessary initiatives shall be taken to make the existing CETP operational. The Online Continuous Emission Monitoring System (OCEMS) of the CETP shall be made operational and also be connected with CPCB as well as TSPCB server within October, 2022.
Issue : Identification, Protection & Restoration of water bodies				
Ref : NGT Order dated 01.06.2020 & 18.11.2020 in M.A. No. 26/2019 in OA No. 325/2015 (The application is disposed on 18.11.2020)				
34.	Forest Department/ State Level Committee (STE)	The State Level Committee (Nodal Agency) for restoration of water bodies may monitor the identification, protection and restoration works of the identified water bodies.	The existing State Level Committee under the Chairmanship of the Chief Wildlife Warden, Tripura (Nodal Agency for restoration of water bodies) are regularly monitoring the compliance made by the different stakeholders as per the direction of Hon'ble NGT.	The State Level Committee (Nodal Agency) for restoration of water bodies under the chairmanship of Chief Wildlife Warden shall monitor the identification, protection and restoration works of the water bodies.
35.	DMs/TSPCB	TSPCB shall take initiative for collection of water samples from the remaining districts in	Till date 350 water bodies have been physically identified and water sample	TSPCB shall take initiative for collection of water samples from

Sl No	Responsible Departments/ Organizations	Decision taken in meeting of 17 th State Level Committee held on 27.05.2022	Action Taken Report of the Decision Taken in 17 th SLC Meeting	Decision taken in meeting of 18 th State Level Committee held on 02.09.2022
		<p>Hearing is 12.09.2022.</p> <ul style="list-style-type: none"> A committee shall have to be constituted with (i) Senior Scientist from CPCB, Shillong; (ii) Senior Scientist from TSPCB (iii) DM, West (iv) Municipal Commissioner, AMC. The Committee shall examine all issues relating to environmental violations, Bio Mining procedure; segregation of waste etc. 	<p>Commissioner, AMC already submitted affidavit on behalf of the committee to the advocate for filling before NGT.</p> <ul style="list-style-type: none"> TSPCB has already filed the affidavit before NGT on 29.08.2022. DSTE has communicated the UDD to file the affidavit on behalf of the State of Tripura. AMC has submitted para wise comments to the advocate for preparation of Affidavit. 	<p>take initiatives to file affidavit on behalf of committee and AMC.</p> <ul style="list-style-type: none"> UDD shall take initiatives to file affidavit on behalf of State of Tripura, UDD, DSTE and DM, West Tripura.



(Animesh Das, IAS)
 Director
 Science, Technology & Environment
 Government of Tripura

APPENDIX-4

**TEST REPORT OF BASELINE MONITORING OF
BODHJUNGNAGAR IE
(AIR, NOISE, WATER & SOIL)**

**TEST REPORT OF BASELINE MONITORING
(AIR, NOISE, WATER & SOIL)
Air Quality Test Report**

Mitra S. K. Private Limited



TEST REPORT

Name & Address of the Customer "Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799096	Report No.	: MSK/GHY/2023-24/0588
	Report Date	: 09.11.2023
	Nature of Sample	: Ambient Air
	Sample Mark	: BODHJUNGNAGAR
	Sampling Date	: 16.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00059-00061
Reference No. & Date: RD/AK/426681/10357, Dated : 22.08.2023		

ANALYSIS RESULT

SL. NO.	Location	Concentration of Pollutants					Latitude	Longitude
		PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)	SO ₂ (µg/m ³)	NO ₂ (µg/m ³)	CO (µg/m ³)		
1.	BODHJUNGNAGAR, Location 1	90.3	56.4	11.5	30.7	0.94	23° 53' 11.4396" N	91° 21' 55.944" E
2.	BODHJUNGNAGAR, Location 2	82.7	45.9	9.2	26.1	0.84	23° 53' 3.2748" N	91° 21' 39.5388" E
3.	BODHJUNGNAGAR, Location 3	79.2	46.6	8.3	24.5	0.82	23° 53' 7.1448" N	91° 21' 34.9508" E
Limit as per CPCB notification, New Delhi, 18th Nov, 2009, for Ambient air quality		100	60	80	80	2		
Sampling and Analysis done according to		IS 5182: Part 2:2006 (Reaff.2012)	IS : 5182 (PT-24),2019	IS 5182 : Part 2 :2001 (Reaff.2012)	IS 5182 : Part 6 :2006 (Reaff.2012)	IS5182:(Part 10):1999		
Limit as per CPCB notification, New Delhi, 18th Nov, 2009, for Ambient air quality								

Report Prepared By:

Mitra S. K. Private Limited

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TEST REPORT

Name & Address of the Customer "Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report No.	: MSK/GHY/2023-24/0590
	Report Date	: 09.11.2023
	Nature of Sample	: Ambient Air
	Sample Mark	: BODHJUNGNAGAR
	Sampling Date	: 21.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00065-00067
Reference No.& Date: RD/AK/426661/10357, Dated : 22.08.2023		

ANALYSIS RESULT

SL. NO.	Location	Concentration of Pollutants					Latitude	Longitude
		PM ₁₀ ($\mu\text{g}/\text{m}^3$)	PM _{2.5} ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)	CO ($\mu\text{g}/\text{m}^3$)		
1.	BODHJUNGNAGAR, Location 1	78.5	41.3	8.1	24.7	0.80	23° 53' 11.4396" N	91° 21' 55.944" E
2.	BODHJUNGNAGAR, Location 2	82.7	45.9	9.0	25.6	0.84	23° 53' 3.2748" N	91° 21' 39.5388" E
3.	BODHJUNGNAGAR, Location 3	74.2	43.6	7.8	23.5	0.76	23° 53' 7.1448" N	91° 21' 14.9508" E
Limit as per CPCB notification, New Delhi, 18th Nov, 2009. for Ambient air quality		100	60	80	80	2		
Sampling and Analysis done according to		IS 5182: Part 23:2006 (Reaff.2012)	IS : 5182 (PT-24),2019	IS 5182 : Part 2 :2001 (Reaff.2012)	IS 5182 : Part 6 :2006 (Reaff.2012)	IS5182:(Part 10):1999		
Limit as per CPCB notification, New Delhi, 18th Nov, 2009. for Ambient air quality								

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TEST REPORT

Name & Address of the Customer	Report No.	: MSK/GHY/2023-24/0591
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 09.11.2023
	Nature of Sample	: Ambient Air
	Sample Mark	: BODHJUNGNAGAR
	Sampling Date	: 22.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00068-00070
Reference No.& Date: RD/AK/426661/10357, Dated : 22.08.2023		


ANALYSIS RESULT

SL. NO.	Location	Concentration of Pollutants					Latitude	Longitude
		PM ₁₀ ($\mu\text{g}/\text{m}^3$)	PM _{2.5} ($\mu\text{g}/\text{m}^3$)	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)	CO ($\mu\text{g}/\text{m}^3$)		
1.	BODHJUNGNAGAR, Location 4	89.2	42.5	9.3	29.2	0.90	23° 52' 58.6956" N	91° 21' 15.8616" E
2.	BODHJUNGNAGAR, Location 5	79.5	44.2	8.1	25.3	0.80	23° 53' 23.3124" N	91° 21' 50.868" E
3.	BODHJUNGNAGAR, Location 6	75.0	39.5	7.6	23.8	0.76	23° 53' 22.6356" N	91° 21' 17.1468" E
Limit as per CPCB notification, New Delhi, 18th Nov, 2009, for Ambient air quality		100	60	80	80	2		
Sampling and Analysis done according to		IS 5182: Part 23:2006 (Reaff.2012)	IS : 5182 (PT-24),2019	IS 5182 : Part 2 :2001 (Reaff.2012)	IS 5182 : Part 6 :2006 (Reaff.2012)	IS5182:(Part 10):1999		
Limit as per CPCB notification, New Delhi, 18th Nov, 2009, for Ambient air quality								

Report Prepared By:



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Ambient Noise Level Report

Mitra S. K. Private Limited



TEST REPORT

Name & Address of the Customer "Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of Land C Department, Gorkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report No.	: MSK/GHY/2023-24/0669
	Report Date	: 09.11.2023
	Nature of Sample	: Noise
	Sample Mark	: BODHJUNGNAGAR, NOISE-1
	Sample Drawn On	: 16.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00498
Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023		

ANALYSIS RESULT

Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
	Time (In Hrs.)	Hourly Leq dB(A)
Day Time	6.00 am	49.9
	7.00 am	52.4
	8.00 am	54.4
	9.00 am	54.3
	10.00 am	53.2
	11.00 am	54.0
	12.00 pm	53.8
	13.00 pm	52.3
	14.00 pm	52.1
	15.00 pm	53.4
	16.00 pm	53.4
	17.00 pm	51.6
	18.00 pm	51.5
	19.00 pm	51.3
	20.00 pm	51.5
	21.00 pm	47.8
	Lday	52.6
MAX(day)	54.4	
MIN(day)	47.8	
Average(day)	49.9	

Count. To Page-2

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Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023

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Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
Night Time	Time (In Hrs.)	Hourly Leq dB(A)
	22.00 pm	45.6
	23.00 am	45.5
	24.00 am	44.0
	1.00 am	42.1
	2.00 am	43.8
	3.00 am	45.4
	4.00 am	43.7
	5.00 am	44.2
	Lnight	44.4
	MAX(Night)	45.6
	MIN(Night)	42.1
	Average(Night)	45.6

Noise Limit as per CPCB		
Category of Area/Zone	Leq dB(A) Day Time	Leq dB(A) Night Time
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence	50	40

NOTE :
Day Time : 06.00 Hr.-22.00 Hr.
Night Time:22.00 Hr.-06.00 Hr.

Report Prepared By :



for Mitra S. K. Private Limited


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TEST REPORT

Name & Address of the Customer "Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report No.	: MSK/GHY/2023-24/0670
	Report Date	: 09.11.2023
	Nature of Sample	: Noise
	Sample Mark	: BODIJUNG NAGAR, NOISE-2
	Sample Drawn On	: 16.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00499
Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023		

ANALYSIS RESULT

Report of Noise Quality (BODIJUNG NAGAR -Industrial)		
	Time (In Hrs.)	Hourly Leq dB(A)
Day Time	6.00 am	48.0
	7.00 am	50.3
	8.00 am	53.2
	9.00 am	52.9
	10.00 am	53.4
	11.00 am	56.3
	12.00 pm	55.7
	13.00 pm	57.3
	14.00 pm	56.4
	15.00 pm	59.3
	16.00 pm	57.4
	17.00 pm	56.7
	18.00 pm	53.9
	19.00 pm	53.6
	20.00 pm	52.5
	21.00 pm	51.4
	Lday	55.1
	MAX(day)	59.3
	MIN(day)	48.0
	Average(day)	48.0

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Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023

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Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
Night Time	Time (In Hrs.)	Hourly Leq dB(A)
	22.00 pm	50.8
	23.00 am	48.3
	24.00 am	45.0
	1.00 am	42.6
	2.00 am	42.5
	3.00 am	44.4
	4.00 am	44.1
	5.00 am	45.0
	Lnight	46.3
	MAX(Night)	50.8
	MIN(Night)	42.5
	Average(Night)	50.8

Noise Limit as per CPCB			
Category of Area/Zone	Leq dB(A) Day Time	Leq dB(A) Night Time	NOTE : Day Time : 06.00 Hr.-22.00 Hr. Night Time:22.00 Hr.-06.00 Hr.
Industrial	75	70	
Commercial	65	55	
Residential	55	45	
Silence	50	40	

Report Prepared By :



for Mitra S.K. Private Limited



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TEST REPORT

Name & Address of the Customer	Report No.	: MSK/GHY/2023-24/0671
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 09.11.2023
	Nature of Sample	: Noise
	Sample Mark	: BODHJUNGNAGAR, NOISE-3
	Sample Drawn On	: 16.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00500
Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023		

ANALYSIS RESULT

Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
	Time (In Hrs.)	Hourly Leq dB(A)
Day Time	6.00 am	44.6
	7.00 am	47.5
	8.00 am	46.1
	9.00 am	47.6
	10.00 am	51.3
	11.00 am	53.5
	12.00 pm	55.3
	13.00 pm	54.0
	14.00 pm	54.7
	15.00 pm	54.1
	16.00 pm	54.6
	17.00 pm	55.1
	18.00 pm	54.8
	19.00 pm	55.1
	20.00 pm	50.3
	21.00 pm	47.2
	Lday	52.9
	MAX(day)	55.3
	MIN(day)	44.6
Average(day)	44.6	

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Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023

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Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
Night Time	Time (In Hrs.)	Hourly Leq dB(A)
	22.00 pm	45.8
	23.00 am	44.8
	24.00 am	44.0
	1.00 am	44.1
	2.00 am	42.2
	3.00 am	41.6
	4.00 am	42.2
	5.00 am	42.5
	Lnight	43.6
	MAX(Night)	45.8
	MIN(Night)	41.6
	Average(Night)	45.8

Noise Limit as per CPCB			
Category of Area/Zone	Leq dB(A) Day Time	Leq dB(A) Night Time	NOTE : Day Time : 06.00 Hr.-22.00 Hr. Night Time:22.00 Hr.-06.00 Hr.
Industrial	75	70	
Commercial	65	55	
Residential	55	45	
Silence	50	40	

Report Prepared By :



for Mitra S. K. Private Limited



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TEST REPORT

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	Report Date	: 09.11.2023
	Nature of Sample	: Noise
	Sample Mark	: BODHJUNGNAGAR, NOISE-4
	Sample Drawn On	: 16.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00501
Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023		

ANALYSIS RESULT

Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
	Time (In Hrs.)	Hourly Leq dB(A)
Day Time	6.00 am	44.0
	7.00 am	43.5
	8.00 am	44.6
	9.00 am	45.9
	10.00 am	43.9
	11.00 am	42.5
	12.00 pm	42.5
	13.00 pm	49.9
	14.00 pm	50.4
	15.00 pm	51.5
	16.00 pm	52.5
	17.00 pm	50.5
	18.00 pm	52.5
	19.00 pm	52.4
	20.00 pm	54.3
	21.00 pm	51.4
	Lday	49.9
	MAX(day)	54.3
	MIN(day)	42.5
	Average(day)	44.0

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Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023

Page-2

Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
	Time (In Hrs.)	Hourly Leq dB(A)
Night Time	22.00 pm	52.2
	23.00 am	52.2
	24.00 am	53.8
	1.00 am	48.7
	2.00 am	48.5
	3.00 am	43.6
	4.00 am	45.7
	5.00 am	41.4
	Lnight	50.0
	MAX(Night)	53.8
	MIN(Night)	41.4
	Average(Night)	52.2

Noise Limit as per CPCB			
Category of Area/Zone	Leq dB(A) Day Time	Leq dB(A) Night Time	NOTE : Day Time : 06.00 Hr.-22.00 Hr. Night Time:22.00 Hr.-06.00 Hr.
Industrial	75	70	
Commercial	65	55	
Residential	55	45	
Silence	50	40	

Report Prepared By :



for Mitra S. K. Private Limited



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TEST REPORT

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	Report Date	: 09.11.2023
	Nature of Sample	: Noise
	Sample Mark	: BODHJUNGNAGAR, NOISE-5
	Sample Drawn On	: 17.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00502
Reference No. & Date: RD/AK/426661/10357, Dated : 31.08.2023		

ANALYSIS RESULT

Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
	Time (In Hrs.)	Hourly Leq dB(A)
Day Time	6.00 am	45.3
	7.00 am	46.0
	8.00 am	46.8
	9.00 am	46.8
	10.00 am	51.5
	11.00 am	54.2
	12.00 pm	52.2
	13.00 pm	53.1
	14.00 pm	52.3
	15.00 pm	51.2
	16.00 pm	50.2
	17.00 pm	50.3
	18.00 pm	49.3
	19.00 pm	49.5
	20.00 pm	49.0
	21.00 pm	48.5
	Lday	50.5
	MAX(day)	54.2
	MIN(day)	45.3
	Average(day)	45.3

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Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023

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Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
	Time (In Hrs.)	Hourly Leq dB(A)
Night Time	22.00 pm	49.0
	23.00 am	49.0
	24.00 am	47.9
	1.00 am	45.3
	2.00 am	44.4
	3.00 am	43.9
	4.00 am	47.9
	5.00 am	43.4
	L_{night}	46.9
	MAX(Night)	49.0
	MIN(Night)	43.4
	Average(Night)	49.0

Noise Limit as per CPCB			
Category of Area/Zone	Leq dB(A) Day Time	Leq dB(A) Night Time	
Industrial	75	70	NOTE : Day Time : 06.00 Hr.-22.00 Hr. Night Time:22.00 Hr.-06.00 Hr.
Commercial	65	55	
Residential	55	45	
Silence	50	40	

Report Prepared By :



for Mitra S. K. Private Limited



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TEST REPORT

Name & Address of the Customer "Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report No.	: MSK/GHY/2023-24/0674
	Report Date	: 09.11.2023
	Nature of Sample	: Noise
	Sample Mark	: BODHJUNGNAGAR, NOISE-6
	Sample Drawn On	: 17.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00503
Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023		

ANALYSIS RESULT

Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
	Time (In Hrs.)	Hourly Leq dB(A)
Day Time	6.00 am	44.2
	7.00 am	46.3
	8.00 am	45.5
	9.00 am	48.6
	10.00 am	51.0
	11.00 am	54.1
	12.00 pm	55.6
	13.00 pm	57.1
	14.00 pm	56.0
	15.00 pm	55.6
	16.00 pm	59.1
	17.00 pm	61.9
	18.00 pm	64.9
	19.00 pm	54.6
	20.00 pm	49.7
	21.00 pm	48.3
	Lday	57.0
	MAX(day)	64.9
	MIN(day)	44.2
	Average(day)	44.2

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Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023

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Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
	Time (In Hrs.)	Hourly Leq dB(A)
Night Time	22.00 pm	50.5
	23.00 am	47.1
	24.00 am	46.4
	1.00 am	46.6
	2.00 am	44.7
	3.00 am	46.4
	4.00 am	44.7
	5.00 am	44.0
	Lnight	46.8
	MAX(Night)	50.5
	MIN(Night)	44.0
	Average(Night)	50.5

Noise Limit as per CPCB			
Category of Area/Zone	Leq dB(A) Day Time	Leq dB(A) Night Time	NOTE : Day Time : 06.00 Hr.-22.00 Hr. Night Time:22.00 Hr.-06.00 Hr.
Industrial	75	70	
Commercial	65	55	
Residential	55	45	
Silence	50	40	

Report Prepared By :



for Mitra S. K. Private Limited


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TEST REPORT

Name & Address of the Customer	Report No.	: MSK/GHY/2023-24/0675
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 09.11.2023
	Nature of Sample	: Noise
	Sample Mark	: BODHJUNGNAGAR, NOISE-7
	Sample Drawn On	: 17.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00504
Reference No. & Date: RD/AK/426661/10357, Dated : 31.08.2023		

ANALYSIS RESULT

Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
	Time (In Hrs.)	Hourly Leq dB(A)
Day Time	6.00 am	47.1
	7.00 am	47.6
	8.00 am	45.8
	9.00 am	48.1
	10.00 am	49.8
	11.00 am	51.2
	12.00 pm	53.1
	13.00 pm	53.5
	14.00 pm	53.4
	15.00 pm	53.5
	16.00 pm	54.2
	17.00 pm	54.4
	18.00 pm	49.1
	19.00 pm	48.2
	20.00 pm	46.6
	21.00 pm	46.4
	Lday	51.1
	MAX(day)	54.4
	MIN(day)	45.8
Average(day)	47.1	

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Reference No. & Date: RD/AK/426661/10357, Dated : 31.08.2023

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Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
	Time (In Hrs.)	Hourly Leq dB(A)
Night Time	22.00 pm	42.7
	23.00 am	41.9
	24.00 am	45.0
	1.00 am	43.6
	2.00 am	44.6
	3.00 am	46.0
	4.00 am	43.6
	5.00 am	42.0
	Lnight	43.9
	MAX(Night)	46.0
	MIN(Night)	41.9
	Average(Night)	42.7

Noise Limit as per CPCB			
Category of Area/Zone	Leq dB(A) Day Time	Leq dB(A) Night Time	NOTE : Day Time : 06.00 Hr.-22.00 Hr. Night Time:22.00 Hr.-06.00 Hr.
Industrial	75	70	
Commercial	65	55	
Residential	55	45	
Silence	50	40	

Report Prepared By :



for Mitra S. K. Private Limited



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TEST REPORT

Name & Address of the Customer “Mott MacDonald Private Limited” 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report No.	: MSK/GHY/2023-24/0676
	Report Date	: 09.11.2023
	Nature of Sample	: Noise
	Sample Mark	: BODHJUNGNAGAR, NOISE-8
	Sample Drawn On	: 17.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00505
Reference No. & Date: RD/AK/426661/10357, Dated : 31.08.2023		

ANALYSIS RESULT

Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
Day Time	Time (In Hrs.)	Hourly Leq dB(A)
		6.00 am
	7.00 am	45.3
	8.00 am	48.1
	9.00 am	47.5
	10.00 am	49.4
	11.00 am	48.2
	12.00 pm	48.4
	13.00 pm	47.4
	14.00 pm	50.8
	15.00 pm	51.8
	16.00 pm	52.5
	17.00 pm	52.5
	18.00 pm	53.7
	19.00 pm	54.0
	20.00 pm	51.3
	21.00 pm	48.1
	Lday	50.5
	MAX(day)	54.0
	MIN(day)	45.3
	Average(day)	46.0

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Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023

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Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
	Time (In Hrs.)	Hourly Leq dB(A)
Night Time	22.00 pm	45.9
	23.00 am	45.9
	24.00 am	43.5
	1.00 am	45.1
	2.00 am	43.1
	3.00 am	41.8
	4.00 am	42.1
	5.00 am	43.4
	Lnight	44.1
	MAX(Night)	45.9
	MIN(Night)	41.8
	Average(Night)	45.9

Noise Limit as per CPCB			
Category of Area/Zone	Leq dB(A) Day Time	Leq dB(A) Night Time	
Industrial	75	70	NOTE : Day Time : 06.00 Hr.-22.00 Hr. Night Time:22.00 Hr.-06.00 Hr.
Commercial	65	55	
Residential	55	45	
Silence	50	40	

Report Prepared By :



for Mitra S. K. Private Limited


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TEST REPORT

Name & Address of the Customer "Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gorkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report No.	: MSK/GHY/2023-24/0677
	Report Date	: 09.11.2023
	Nature of Sample	: Noise
	Sample Mark	: BODIJUNG NAGAR, NOISE-9
	Sample Drawn On	: 21.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00506
Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023		

ANALYSIS RESULT

Report of Noise Quality (BODIJUNG NAGAR -Industrial)		
	Time (In Hrs.)	Hourly Leq dB(A)
Day Time	6.00 am	42.9
	7.00 am	44.8
	8.00 am	48.9
	9.00 am	53.7
	10.00 am	54.3
	11.00 am	54.8
	12.00 pm	55.2
	13.00 pm	55.7
	14.00 pm	55.0
	15.00 pm	53.7
	16.00 pm	55.9
	17.00 pm	53.8
	18.00 pm	57.2
	19.00 pm	54.9
	20.00 pm	52.8
	21.00 pm	53.1
	Lday	54.0
	MAX(day)	57.2
	MIN(day)	42.9
	Average(day)	42.9

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Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023

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Report of Noise Quality (BODIJUNG NAGAR -Industrial)		
Night Time	Time (In Hrs.)	Hourly Leq dB(A)
	22.00 pm	48.2
	23.00 am	45.0
	24.00 am	43.6
	1.00 am	43.2
	2.00 am	43.9
	3.00 am	43.5
	4.00 am	42.6
	5.00 am	43.6
	Leight	44.6
	MAX(Night)	48.2
	MIN(Night)	42.6
	Average(Night)	43.2

Noise Limit as per CPCB			
Category of Area/Zone	Leq dB(A) Day Time	Leq dB(A) Night Time	NOTE : Day Time : 06.00 Hr.-22.00 Hr. Night Time:22.00 Hr.-06.00 Hr.
Industrial	75	70	
Commercial	65	55	
Residential	55	45	
Silence	50	40	

Report Prepared By :



for Mitra S. K. Private Limited



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TEST REPORT

Name & Address of the Customer "Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurukhasti, Agartala, West Tripura, Tripura, Pin-799006	Report No.	: MSK/GHY/2023-24/0678
	Report Date	: 09.11.2023
	Nature of Sample	: Noise
	Sample Mark	: BODHJUNGNAGAR, NOISE-10
	Sample Drawn On	: 21.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00507
Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023		

ANALYSIS RESULT

Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
	Time (In Hrs.)	Hourly Leq dB(A)
Day Time	6.00 am	47.6
	7.00 am	46.5
	8.00 am	51.5
	9.00 am	51.7
	10.00 am	53.4
	11.00 am	54.5
	12.00 pm	54.0
	13.00 pm	52.6
	14.00 pm	53.8
	15.00 pm	52.9
	16.00 pm	52.9
	17.00 pm	53.9
	18.00 pm	53.2
	19.00 pm	53.4
	20.00 pm	44.7
	21.00 pm	45.9
	Lday	52.3
	MAX(day)	54.5
	MIN(day)	44.7
	Average(day)	47.6

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Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023

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Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
Night Time	Time (In Hrs.)	Hourly Leq dB(A)
	22.00 pm	45.6
	23.00 am	45.1
	24.00 am	44.2
	1.00 am	44.0
	2.00 am	41.8
	3.00 am	43.0
	4.00 am	42.3
	5.00 am	43.0
	Lnight	43.8
	MAX(Night)	45.6
	MIN(Night)	41.8
	Average(Night)	45.6

Noise Limit as per CPCB			
Category of Area/Zone	Leq dB(A) Day Time	Leq dB(A) Night Time	NOTE : Day Time : 06.00 Hr.-22.00 Hr. Night Time:22.00 Hr.-06.00 Hr.
Industrial	75	70	
Commercial	65	55	
Residential	55	45	
Silence	50	40	

Report Prepared By :



for Mitra S. K. Private Limited



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TEST REPORT

Name & Address of the Customer "Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report No.	: MSK/GHY/2023-24/0679
	Report Date	: 09.11.2023
	Nature of Sample	: Noise
	Sample Mark	: BODHJUNGNAGAR, NOISE-11
	Sample Drawn On	: 21.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00508
Reference No. & Date: RD/AK/426661/10357, Dated : 31.08.2023		

ANALYSIS RESULT

Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
Day Time	Time (In Hrs.)	Hourly Leq dB(A)
		6.00 am
	7.00 am	45.3
	8.00 am	48.8
	9.00 am	50.6
	10.00 am	52.7
	11.00 am	53.8
	12.00 pm	52.7
	13.00 pm	51.5
	14.00 pm	52.8
	15.00 pm	53.6
	16.00 pm	49.7
	17.00 pm	48.4
	18.00 pm	45.6
	19.00 pm	48.1
	20.00 pm	49.3
	21.00 pm	47.0
	Lday	50.6
	MAX(day)	53.8
	MIN(day)	45.2
	Average(day)	45.2

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Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023

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Report of Noise Quality (BODHJUNGNAGAR -Industrial)		
Night Time	Time (In Hrs.)	Hourly Leq dB(A)
	22.00 pm	48.3
	23.00 am	46.0
	24.00 am	44.0
	1.00 am	44.2
	2.00 am	43.7
	3.00 am	46.6
	4.00 am	48.5
	5.00 am	45.3
	Lnight	46.2
	MAX(Night)	48.5
	MIN(Night)	43.7
	Average(Night)	48.3

Noise Limit as per CPCB			
Category of Area/Zone	Leq dB(A) Day Time	Leq dB(A) Night Time	NOTE : Day Time : 06.00 Hr.-22.00 Hr. Night Time:22.00 Hr.-06.00 Hr.
Industrial	75	70	
Commercial	65	55	
Residential	55	45	
Silence	50	40	

Report Prepared By :



for Mitra S. K. Private Limited



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Surface Water Quality Test Report

Mitra S. K. Private Limited



TEST REPORT

Name & Address of the Customer "Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report No.	: MSK/GHY/2023-24/0567
	Report Date	: 09.11.2023
	Nature of Sample	: Surface Water
	Sample Mark	: SURFACE WATER-1, BODHJUNAGAR
	Sample Drawn On	: 19.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00178
Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023		

Chemical Analysis Result as per IS 10500 : 2012

Sl. No.	Parameter	UOM	Standards	Test Method	Result
1.	Ammonia	mg/l	---	APHA (24th Edition) 4500-NH ₂ - F	0.12
2.	Arsenic(as As)	mg/l	---	APHA (24th Edition), 3120 B	<0.005
3.	Biochemical Oxygen Demand (as BOD)	mg/l	---	APHA (23rd Edition) 5210B : 2017	3.2
4.	Boron (as B)	mg/l	---	APHA (24th Edition), 4500 - B C	<0.5
5.	Cadmium (as Cd)	mg/l	---	APHA (24th Edition), 3120 B	<0.001
6.	Calcium (as Ca)	mg/l	0.01	IS 3025 (Part 40)-1991 Rffmd 2014	15
7.	Chemical Oxygen Demand (COD)	mg/l	---	APHA (23rd Edition) 5210B : 2017	11
8.	Chloride (as Cl)	mg/l	0.01	IS 3025 (Part 32)- 1988 Rffmd 2014	7.7
9.	Chromium as Cr		---	APHA (24th Edition), 3120 B	<0.01
10.	Colour	Hazen	No noticeable colour	APHA (24th Edition), 2120B	<0.01
11.	Copper (as Cu)	mg/l	0.01	APHA (24th Edition), 3120 B	<0.02
12.	DO	mg/l	5.0	APHA 23rd Ed. 2017-4500-O-C/G (O)	5.4
13.	Dissolved Iron	mg/l	---	APHA (24th Edition), 3500 Fe-B	0.50
14.	Electrical conductivity	mg/l	---	APHA (24th Edition), 2510B	249
15.	Fluoride (as F)	mg/l	---	APHA (24th Edition), 4500 F- C/D	<0.1
16.	Lead (as Pb)	mg/l		APHA (24th Edition), 3120 B	<0.005
17.	Magnesium (as Mg)	mg/l	0.01	IS 3025 (Part 46)- 1994 Rffmd 2014	3.3

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Sl. No.	Parameter	UOM	Standards	Test Method	Result
18.	Manganese (as Mn)	mg/l	---	APHA (24th Edition), 3120 B	<0.02
19.	Mercury (as Hg)	mg/l	0.01	APHA (24th Edition) 3112 B	<0.001
20.	Nitrate (as NO ₃)	mg/l	---	APHA (24th Edition), 4500 NO ₃ -E	0.52
21.	Odour	mg/l	No offensive odour	IS 3025 (Part 5)-1983 Rflin: 2018	Unobjectionable
22.	Phenol	mg/l	---	APHA (24th Edition), 5530C (Chloroform Extraction)	<0.001
23.	Phosphate (as PO ₄)	mg/l	---	APHA (23rd Edition) 4500 -P D, 2017	<0.05
24.	Potassium (as K)	mg/l	1.0	APHA (24th Edition), 3500 K B	3.6
25.	Salinity	mg/l	---	APHA (24th Edition), 2520B	6.13
26.	Sodium (as Na)	mg/l	1.0	APHA (24th Edition), 3500 Na B	1.9
27.	Sulphate (as SO ₄)	Hazen	---	IS 3025 (Part 24) - 1986 Rflin: 2014	7.3
28.	Surfactants (LAS)	mg/l	---	APHA (24th Edition), 5540 C	<0.02
29.	Temperature	Deg C	---	APHA (24th Edition), 2120B	25
30.	Total Alkalinity	mg/l	None	IS 3025 (Part 23)- 1986 Rflin: 2009	28
31.	Total Dissolved Solids (as TDS)	mg/l	None	IS 3025(Part 16)- 1984 Rflin: 2012	149
32.	Total Hardness (as CaCO ₃)	mg/l	None	IS 3025 (Part 21)-2013	51
33.	Total Suspended Solid (as TSS)	mg/l	None	IS 3025(Part 16)- 1984 Rflin: 2012	<2.5
34.	Turbidity	mg/l	None	IS 3025 (Part 10)-1984 Rflin: 2012	<1.0
35.	Zinc (as Zn)	mg/l	0.01	APHA (24th Edition), 3120 B	<0.02
36.	pH value	mg/l	6.5-8.5	IS 3025 (Part 11)-1984 Rflin: 2012	6.91 at 25 Deg C

Bacteriological Analysis Result as per IS 10500 : 2012

Sl. No.	Characteristic	UOM	Method of Test	Result
1.	Faecal coliform	MPN/100ml	APHA 23rd Edition 9221 E (O)	<1.8
2.	Phytoplankton	/litr	APHA 23rd Edition, 10200 (O)	Present
3.	Total coliform bacteria/100ml	MPN/100ml	APHA 23rd Edition 9221 B (O)	<1.8

Report Prepared By:



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TEST REPORT

Name & Address of the Customer	Report No.	: MSK/GHY/2023-24/0568
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gorkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 09.11.2023
	Nature of Sample	: Surface Water
	Sample Mark	: SURFACE WATER-2, BODHJUNAGAR
	Sample Drawn On	: 19.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00179
Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023		

Chemical Analysis Result as per IS 10500 : 2012

Sl. No.	Parameter	UOM	Standards	Test Method	Result
1.	Ammonia	mg/l	---	APHA (24th Edition) 4500-NH ₃ - F	30
2.	Arsenic(as As)	mg/l	---	APHA (24th Edition), 3120 B	<0.005
3.	Biochemical Oxygen Demand (as BOD)	mg/l	---	APHA (23rd Edition) 5210B : 2017	4.1
4.	Boron (as B)	mg/l	---	APHA (24th Edition), 4500 - B C	<0.5
5.	Cadmium (as Cd)	mg/l	---	APHA (24th Edition), 3120 B	<0.001
6.	Calcium (as Ca)	mg/l	0.01	IS 3025 (Part 40)-1991 Rffmd 2014	20
7.	Chemical Oxygen Demand (COD)	mg/l	---	APHA (23rd Edition) 5210B : 2017	13
8.	Chloride (as Cl)	mg/l	0.01	IS 3025 (Part 32)- 1988 Rffmd 2014	50
9.	Chromium as Cr		---	APHA (24th Edition), 3120 B	<0.01
10.	Colour	Hazen	No noticeable colour	APHA (24th Edition), 2120B	<0.01
11.	Copper (as Cu)	mg/l	0.01	APHA (24th Edition), 3120 B	<0.02
12.	DO	mg/l	5.0	APHA 23rd Ed. 2017-4500-O-C/G_(O)	5.8
13.	Dissolved Iron	mg/l	---	APHA (24th Edition), 3500 Fe-B	0.16
14.	Electrical conductivity	mg/l	---	APHA (24th Edition), 2510B	1020
15.	Fluoride (as F)	mg/l	---	APHA (24th Edition), 4500 F- C/D	0.31
16.	Lead (as Pb)	mg/l		APHA (24th Edition), 3120 B	<0.005
17.	Magnesium (as Mg)	mg/l	0.01	IS 3025 (Part 46)- 1994 Rffmd 2014	11

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Sl. No.	Parameter	UOM	Standards	Test Method	Result
18.	Manganese (as Mn)	mg/l	---	APHA (24th Edition), 3120 B	<0.02
19.	Mercury (as Hg)	mg/l	0.01	APHA (24th Edition) 3112 B	<0.001
20.	Nitrate (as NO ₃)	mg/l	---	APHA (24th Edition), 4500 NO ₃ -E	<0.5
21.	Odour	mg/l	No offensive odour	IS 3025 (Part 5)-1983 Rffm: 2018	Unobjectionable
22.	Phenol	mg/l	---	APHA (24th Edition), 5530C (Chloroform Extraction)	<0.001
23.	Phosphate (as PO ₄)	mg/l	---	APHA (23rd Edition) 4500 -P D, 2017	<0.05
24.	Potassium (as K)	mg/l	1.0	APHA (24th Edition), 3500 K B	21
25.	Salinity	mg/l	---	APHA (24th Edition), 2520B	6.54
26.	Sodium (as Na)	mg/l	1.0	APHA (24th Edition), 3500 Na B	19
27.	Sulphate (as SO ₄)	Hazen	---	IS 3025 (Part 24) - 1986 Rffmd 2014	27
28.	Surfactants (LAS)	mg/l	---	APHA (24th Edition), 5540 C	<0.02
29.	Temperature	Deg C	---	APHA (24th Edition), 2120B	25
30.	Total Alkalinity	mg/l	None	IS 3025 (Part 23)- 1986 Rffm: 2009	77
31.	Total Dissolved Solids (as TDS)	mg/l	None	IS 3025(Part 16)- 1984 Rffm: 2012	612
32.	Total Hardness (as CaCO ₃)	mg/l	None	IS 3025 (Part 21)-2013	95
33.	Total Suspended Solid (as TSS)	mg/l	None	IS 3025(Part 16)- 1984 Rffm: 2012	<2.5
34.	Turbidity	mg/l	None	IS 3025 (Part 10)-1984 Rffm: 2012	<1.0
35.	Zinc (as Zn)	mg/l	0.01	APHA (24th Edition), 3120 B	<0.02
36.	pH value	mg/l	6.5-8.5	IS 3025 (Part 11)-1984 Rffm: 2012	7.50 at 25 Deg C

Bacteriological Analysis Result as per IS 10500 : 2012

Sl. No.	Characteristic	UOM	Method of Test	Result
1.	Faecal coliform	MPN/100ml	APHA 23rd Edition 9221 E_(O)	<1.8
2.	Phytoplankton	/lit	APHA 23rd Edition, 10200_(O)	Absent
3.	Total coliform bacteria/100ml	MPN/100ml	APHA 23rd Edition 9221 B_(O)	<1.8

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TEST REPORT

Name & Address of the Customer	Report No.	: MSK/GHY/2023-24/0569
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 09.11.2023
	Nature of Sample	: Surface Water
	Sample Mark	: SURFACE WATER-3, BODHJUNAGAR
	Sample Drawn On	: 20.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00180
Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023		

Chemical Analysis Result as per IS 10500 : 2012

Sl. No.	Parameter	UOM	Standards	Test Method	Result
1.	Ammonia	mg/l	---	APHA (24th Edition) 4500-NH3- F	102
2.	Arsenic(as As)	mg/l	---	APHA (24th Edition), 3120 B	<0.005
3.	Biochemical Oxygen Demand (as BOD)	mg/l	---	APHA (23rd Edition) 5210B : 2017	19
4.	Boron (as B)	mg/l	---	APHA (24th Edition) ,4500 - B C	<0.5
5.	Cadmium (as Cd)	mg/l	---	APHA (24th Edition), 3120 B	<0.001
6.	Calcium (as Ca)	mg/l	0.01	IS 3025 (Part 40)-1991 Rffind 2014	29
7.	Chemical Oxygen Demand (as COD)	mg/l	---	APHA (23rd Edition) 5210B : 2017	71
8.	Chloride (as Cl)	mg/l	0.01	IS 3025 (Part 32)- 1988 Rffind 2014	143
9.	Chromium as Cr	mg/l	---	APHA (24th Edition), 3120 B	<0.01
10.	Colour	Hazen	No noticeable colour	APHA (24th Edition), 2120B	<0.01
11.	Copper (as Cu)	mg/l	0.01	APHA (24th Edition), 3120 B	<0.02
12.	DO	mg/l	5.0	APHA 23rd Ed. 2017-4500-O-C/G (O)	5.5
13.	Dissolved Iron	mg/l	---	APHA (24th Edition), 3500 Fe-B	0.52
14.	Electrical conductivity	mg/l	---	APHA (24th Edition), 2510B	1776
15.	Fluoride (as F)	mg/l	---	APHA (24th Edition), 4500 F- C/D	0.30
16.	Lead (as Pb)	mg/l	---	APHA (24th Edition), 3120 B	<0.005
17.	Magnesium (as Mg)	mg/l	0.01	IS 3025 (Part 46)- 1994 Rffind 2014	15

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Sl. No.	Parameter	UOM	Standards	Test Method	Result
18.	Manganese (as Mn)	mg/l	---	APHA (24th Edition), 3120 B	<0.02
19.	Mercury (as Hg)	mg/l	0.01	APHA (24th Edition) 3112 B	<0.001
20.	Nitrate (as NO ₃)	mg/l	---	APHA (24th Edition), 4500 NO ₃ -E	<0.5
21.	Odour	mg/l	No offensive odour	IS 3025 (Part 5)-1983 Rflin: 2018	Objectionable
22.	Phenol	mg/l	---	APHA (24th Edition), 5530C (Chloroform Extraction)	<0.001
23.	Phosphate (as PO ₄)	mg/l	---	APHA (23rd Edition) 4500 -P D, 2017	0.54
24.	Potassium (as K)	mg/l	1.0	APHA (24th Edition), 3500 K B	115
25.	Salinity	mg/l	---	APHA (24th Edition), 2520B	0.96
26.	Sodium (as Na)	mg/l	1.0	APHA (24th Edition), 3500 Na B	51
27.	Sulphate (as SO ₄)	Hazen	---	IS 3025 (Part 24) - 1986 Rflim: 2014	34
28.	Surfactants (LAS)	mg/l	---	APHA (24th Edition), 5540 C	<0.02
29.	Temperature	Deg C	---	APHA (24th Edition), 2120B	25
30.	Total Alkalinity	mg/l	None	IS 3025 (Part 23)- 1986 Rflin: 2009	286
31.	Total Dissolved Solids (as TDS)	mg/l	None	IS 3025(Part 16)- 1984 Rflin: 2012	1065
32.	Total Hardness (as CaCO ₃)	mg/l	None	IS 3025 (Part 21)-2013	135
33.	Total Suspended Solid (as TSS)	mg/l	None	IS 3025(Part 16)- 1984 Rflin: 2012	41
34.	Turbidity	mg/l	None	IS 3025 (Part 10)-1984 Rflin: 2012	14
35.	Zinc (as Zn)	mg/l	0.01	APHA (24th Edition), 3120 B	<0.02
36.	pH value	mg/l	6.5-8.5	IS 3025 (Part 11)-1984 Rflin: 2012	7.13 at 25 Deg C

Bacteriological Analysis Result as per IS 10500 : 2012

Sl. No.	Characteristic	UOM	Method of Test	Result
1.	Faecal coliform	MPN/100ml	APHA 23rd Edition 9221 E_(O)	11
2.	Phytoplankton	/lit	APHA 23rd Edition, 10200_(O)	Present
3.	Total coliform bacteria/100ml	MPN/100ml	APHA 23rd Edition 9221 B_(O)	26

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TEST REPORT

Name & Address of the Customer "Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report No.	: MSK/GHY/2023-24/0570
	Report Date	: 09.11.2023
	Nature of Sample	: Surface Water
	Sample Mark	: SURFACE WATER-4, BODHJUNAGAR
	Sample Drawn On	: 20.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00181
Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023		

Chemical Analysis Result as per IS 10500 : 2012

Sl. No.	Parameter	UOM	Standards	Test Method	Result
1.	Ammonia	mg/l	---	APHA (24th Edition) 4500-NH ₃ - F	33
2.	Arsenic(as As)	mg/l	---	APHA (24th Edition), 3120 B	<0.005
3.	Biochemical Oxygen Demand (as BOD)	mg/l	---	APHA (23rd Edition) 5210B : 2017	14
4.	Boron (as B)	mg/l	---	APHA (24th Edition), 4500 - B C	<0.5
5.	Cadmium (as Cd)	mg/l	---	APHA (24th Edition), 3120 B	<0.001
6.	Calcium (as Ca)	mg/l	0.01	IS 3025 (Part 40)-1991 Rfimd 2014	32
7.	Chemical Oxygen Demand (as COD)	mg/l	---	APHA (23rd Edition) 5210B : 2017	56
8.	Chloride (as Cl)	mg/l	0.01	IS 3025 (Part 32)- 1988 Rfimd 2014	187
9.	Chromium as Cr	mg/l	---	APHA (24th Edition), 3120 B	<0.01
10.	Colour	Hazen	No noticeable colour	APHA (24th Edition), 2120B	<0.01
11.	Copper (as Cu)	mg/l	0.01	APHA (24th Edition), 3120 B	<0.02
12.	DO	mg/l	5.0	APHA 23rd Ed. 2017-4500-O-C/G (O)	5.6
13.	Dissolved Iron	mg/l	---	APHA (24th Edition), 3500 Fe-B	0.64
14.	Electrical conductivity	mg/l	---	APHA (24th Edition), 2510B	1098
15.	Fluoride (as F)	mg/l	---	APHA (24th Edition), 4500 F- C/D	0.25
16.	Lead (as Pb)	mg/l	---	APHA (24th Edition), 3120 B	<0.005
17.	Magnesium (as Mg)	mg/l	0.01	IS 3025 (Part 46)- 1994 Rfimd 2014	12

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Sl. No.	Parameter	UOM	Standards	Test Method	Result
18.	Manganese (as Mn)	mg/l	---	APHA (24th Edition), 3120 B	<0.02
19.	Mercury (as Hg)	mg/l	0.01	APHA (24th Edition) 3112 B	<0.001
20.	Nitrate (as NO ₃)	mg/l	---	APHA (24th Edition), 4500 NO ₃ -E	<0.5
21.	Odour	mg/l	No offensive odour	IS 3025 (Part 5)-1983 Rffm: 2018	Objectionable
22.	Phenol	mg/l	---	APHA (24th Edition), 5530C (Chloroform Extraction)	<0.001
23.	Phosphate (as PO ₄)	mg/l	---	APHA (23rd Edition) 4500 - P D, 2017	0.63
24.	Potassium (as K)	mg/l	1.0	APHA (24th Edition), 3500 K B	38
25.	Salinity	mg/l	---	APHA (24th Edition), 2520B	0.58
26.	Sodium (as Na)	mg/l	1.0	APHA (24th Edition), 3500 Na B	5.3
27.	Sulphate (as SO ₄)	Hazen	---	IS 3025 (Part 24) - 1986 Rffmd 2014	17
28.	Surfactants (LAS)	mg/l	---	APHA (24th Edition), 5540 C	<0.02
29.	Temperature	Deg C	---	APHA (24th Edition), 2120B	25
30.	Total Alkalinity	mg/l	None	IS 3025 (Part 23)- 1986 Rffm: 2009	202
31.	Total Dissolved Solids (as TDS)	mg/l	None	IS 3025(Part 16)- 1984 Rffm: 2012	659
32.	Total Hardness (as CaCO ₃)	mg/l	None	IS 3025 (Part 21)-2013	129
33.	Total Suspended Solid (as TSS)	mg/l	None	IS 3025(Part 16)- 1984 Rffm: 2012	49
34.	Turbidity	mg/l	None	IS 3025 (Part 10)-1984 Rffm: 2012	28
35.	Zinc (as Zn)	mg/l	0.01	APHA (24th Edition), 3120 B	<0.02
36.	pH value	mg/l	6.5-8.5	IS 3025 (Part 11)-1984 Rffm: 2012	6.91 at 25 Deg C

Bacteriological Analysis Result as per IS 10500 : 2012

Sl. No.	Characteristic	UOM	Method of Test	Result
1.	Faecal coliform	MPN/100ml	APHA 23rd Edition 9221 E_(O)	11
2.	Phytoplankton	/litre	APHA 23rd Edition, 10200_(O)	Present
3.	Total coliform bacteria/100ml	MPN/100ml	APHA 23rd Edition 9221 B_(O)	22

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Groundwater Quality Test Report

Mitra S. K. Private Limited



TEST REPORT

Name & Address of the Customer	Report Number	: MSK/GHY/2023-24/0548
"Mott Mac Donald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate Of I And C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 09.11.2023
	Nature of Sample	: Ground Water
	Sample Mark	: GROUND WATER-01, BODHJUNAGAR
	Sample Drawn On	: 20.09.2023
	Sample Number	: MSKGL/FD/2023-24/10/00213
Reference No. & Date: RD/AK/426661/10357, Dated : 31.08.2023		

CHEMICAL ANALYSIS RESULT (As per IS: 10500-2012)

Sl. No.	Test Parameters	UOM	Desr Limit	Permissible Limit	Method	Result
1.	Alkalinity (as CaCO ₃)	mg/l	200	600	IS 3025 (Part-25)1986 Rffm:2009)	73
2.	Ammonia	mg/l	0.5	No Relaxation	APHA (24 th Edition) 4500-NH ₃ -F	<0.1
3.	Arsenic (as As)	mg/l	0.01	0.05	APHA (24 th Edition), 3210 B	<0.005
4.	Boron (as B)	mg/l	0.5	1.0	APHA (24 th Edition), 4500-B C	<0.5
5.	Cadmium (as Cd)	mg/l	0.003	No Relaxation	APHA (24 th Edition), 3210 B	<0.001
6.	Calcium (as Ca)	mg/l	75	200	IS 3025 (Part 40)-1991 Rffind 2014	22.97
7.	Chloride (as Cl)	mg/l	250	1000	IS 3025 (Part 32)-1998 Rffind-2014	23
8.	Chromium as Cr ⁺⁺	mg/l	0.1	<0.01	APHA (23 rd Edition)3120B:2017	<0.01
9.	Colour	mg/l	5	15	APHA (24 th Edition), 2120B	<5.0
10.	Copper (as Cu)	mg/l	0.05	1.5	APHA (24 th Edition), 3120B	<0.02
11.	Dissolved Iron	mg/l	0.3	No Relaxation	APHA (24 th Edition), 3500 Fe-B	<0.05
12.	Electrical Conductivity	mg/l	---	---	APHA (24 th Edition), 2510B	249
13.	Fluoride (as F)	mg/l	1.0	1.5	APHA (24 th Edition), 4500 F-C/D	0.42
14.	Lead (as Pb)	mg/l	0.01	No Relaxation	APHA (24 th Edition), 3120 B	<0.005
15.	Magnesium (as Mg)	mg/l	30	100	IS 3025 (Part 46)-1994 Rffind 2014	8.55
16.	Manganese (as Mn)	mg/l	0.1	0.3	APHA (24 th Edition), 3120 B	<0.02

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Sl. No.	Test Parameters	UOM	Desr Limit	Permissible Limit	Method	Result
17.	Mercury (as Hg)	mg/l	0.001	No Relaxation	APHA (24 th Edition) 3112 B	<0.001
18.	Nitrate (as NO ₃)	mg/l	45	No Relaxation	APHA (24 th Edition), 4500 NO ₃ -E	<0.5
19.	Odour	None	Agreeable	Agreeable	IS 3025 (Part 5)-1983 Rffm: 2018	Agreeable
20.	Phenol	mg/l	0.001	No Relaxation	APHA (24 th Edition), 5530C (Chloroform Extraction)	<0.001
21.	Phosphate (as PO ₄)	mg/l	---	---	APHA (23 th Edition) 4500-P D, 2017	<0.05
22.	Potassium (as K)	mg/l	---	---	APHA (24 th Edition), 3500 K B	3.1
23.	Salinity	mg/l	---	---	APHA (24 th Edition), 2520 B	0.13
24.	Sodium (as Na)	mg/l	---	200	APHA (24 th Edition), 3500 Na B	9.1
25.	Sulphate (as SO ₄)	mg/l	200	400	IS 3025 (Part 24)-1986 Rffmd 2014	15.4
26.	Total Dissolved Solids (as TDS)	mg/l	500	2000	IS 3025 (Part 16)-1984 Rffm:2012	149
27.	Total Hardness (as CaCO ₃)	mg/l	200	600	IS 3025 (Part 21)-2013	93.06
28.	Turbidity	mg/l	1	5	IS 3025 (Part 10)-1984 Rffm:2012	1.3
29.	Zn (as Zn)	mg/l	5	15	APHA (24 th Edition), 3120 B	<0.02
30.	pH value	mg/l	6.5-8.5	No Relaxation	IS 3025 (Part 11)-1984 Rffm:2012	7.32 at 25 Deg C

Report Prepared By :



For Mitra S. K. Private Limited



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TEST REPORT

Name & Address of the Customer	Report Number	: MSK/GHY/2023-24/0549
"Mott Mac Donald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate Of J And C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 09.11.2023
	Nature of Sample	: Ground Water
	Sample Mark	: GROUND WATER-02, BODHJUNAGAR
	Sample Drawn On	: 20.09.2023
	Sample Number	: MSKGL/FD/2023-24/10/00214
Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023		

CHEMICAL ANALYSIS RESULT (As per IS: 10500-2012)

Sl. No.	Test Parameters	UOM	Desr Limit	Permissible Limit	Method	Result
1.	Alkalinity (as CaCO ₃)	mg/l	200	600	IS 3025 (Part-23)1986 Rflm:2009)	89
2.	Ammonia	mg/l	0.5	No Relaxation	APHA (24 th Edition) 4500-NH ₃ -F	<0.1
3.	Arsenic (as As)	mg/l	0.01	0.05	APHA (24 th Edition), 3210 B	<0.005
4.	Boron (as B)	mg/l	0.5	1.0	APHA (24 th Edition), 4500-B C	<0.5
5.	Cadmium (as Cd)	mg/l	0.003	No Relaxation	APHA (24 th Edition), 3210 B	<0.001
6.	Calcium (as Ca)	mg/l	75	200	IS 3025 (Part 40)-1991 Rflmd 2014	24.55
7.	Chloride (as Cl)	mg/l	250	1000	IS 3025 (Part 32)-1998 Rflmd-2014	25
8.	Chromium as Cr ⁺⁺	mg/l	0.1	<0.01	APHA (23 rd Edition)3120B:2017	<0.01
9.	Colour	mg/l	5	15	APHA (24 th Edition), 2120B	<5.0
10.	Copper (as Cu)	mg/l	0.05	1.5	APHA (24 th Edition), 3120B	<0.02
11.	Dissolved Iron	mg/l	0.3	No Relaxation	APHA (24 th Edition), 3500 Fe-B	<0.05
12.	Electrical Conductivity	mg/l	---	---	APHA (24 th Edition), 2510B	270
13.	Fluoride (as F)	mg/l	1.0	1.5	APHA (24 th Edition), 4500 F-C/D	0.54
14.	Lead (as Pb)	mg/l	0.01	No Relaxation	APHA (24 th Edition), 3120 B	<0.005
15.	Magnesium (as Mg)	mg/l	30	100	IS 3025 (Part 46)-1994 Rflmd 2014	10.45
16.	Manganese (as Mn)	mg/l	0.1	0.3	APHA (24 th Edition), 3120 B	<0.02

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Sl. No.	Test Parameters	UOM	Desr Limit	Permissible Limit	Method	Result
17.	Mercury (as Hg)	mg/l	0.001	No Relaxation	APHA (24 th Edition) 3112 B	<0.001
18.	Nitrate (as NO3)	mg/l	45	No Relaxation	APHA (24 th Edition), 4500 NO3-E	<0.5
19.	Odour	None	Agreeable	Agreeable	IS 3025 (Part 5)-1983 Rffin: 2018	Agreeable
20.	Phenol	mg/l	0.001	No Relaxation	APHA (24 th Edition), 5530C (Chloroform Extraction)	<0.001
21.	Phosphate (as PO4)	mg/l	---	---	APHA (23 th Edition) 4500-P D, 2017	<0.05
22.	Potassium (as K)	mg/l	---	---	APHA (24 th Edition), 3500 K B	3.5
23.	Salinity	mg/l	---	---	APHA (24 th Edition), 2520 B	0.14
24.	Sodium (as Na)	mg/l	---	200	APHA (24 th Edition), 3500 Na B	9.3
25.	Sulphate (as SO4)	mg/l	200	400	IS 3025 (Part 24)-1986 Rffind 2014	16.2
26.	Total Dissolved Solids (as TDS)	mg/l	500	2000	IS 3025 (Part 16)-1984 Rffin:2012	162
27.	Total Hardness (as CaCO3)	mg/l	200	600	IS 3025 (Part 21)-2013	10494
28.	Turbidity	mg/l	1	5	IS 3025 (Part 10)-1984 Rffin:2012	1.7
29.	Zn (as Zn)	mg/l	5	15	APHA (24 th Edition), 3120 B	<0.02
30.	pH value	mg/l	6.5-8.5	No Relaxation	IS 3025 (Part 11)-1984 Rffin:2012	7.26 at 25 Deg C

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For Mitra S. K. Private Limited



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TEST REPORT

Name & Address of the Customer "Mott Mac Donald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate Of I And C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Number	: MSK/GHY/2023-24/0544
	Report Date	: 09.11.2023
	Nature of Sample	: Ground Water
	Sample Mark	: GROUND WATER-03, BODHJUNAGAR
	Sample Drawn On	: 20.09.2023
	Sample Number	: MSKGL/FD/2023-24/10/00177
Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023		

CHEMICAL ANALYSIS RESULT (As per IS: 10500-2012)

Sl. No.	Test Parameters	UOM	Desr Limit	Permissible Limit	Method	Result
1.	Alkalinity (as CaCO ₃)	mg/l	200	600	IS 3025 (Part-23)1986 Rffm:2009)	81
2.	Ammonia	mg/l	0.5	No Relaxation	APHA (24 th Edition) 4500-NH ₃ -F	<0.1
3.	Arsenic (as As)	mg/l	0.01	0.05	APHA (24 th Edition), 3210 B	<0.005
4.	Boron (as B)	mg/l	0.5	1.0	APHA (24 th Edition), 4500-B C	<0.5
5.	Cadmium (as Cd)	mg/l	0.003	No Relaxation	APHA (24 th Edition), 3210 B	<0.001
6.	Calcium (as Ca)	mg/l	75	200	IS 3025 (Part 40)-1991 Rffmd 2014	22.18
7.	Chloride (as Cl)	mg/l	250	1000	IS 3025 (Part 32)-1998 Rffmd-2014	17
8.	Chromium as Cr ⁺⁺	mg/l	0.1	<0.01	APHA (23 rd Edition)3120B:2017	<0.01
9.	Colour	mg/l	5	15	APHA (24 th Edition), 2120B	<5.0
10.	Copper (as Cu)	mg/l	0.05	1.5	APHA (24 th Edition), 3120B	<0.02
11.	Dissolved Iron	mg/l	0.3	No Relaxation	APHA (24 th Edition), 3500 Fe-B	<0.05
12.	Electrical Conductivity	mg/l	---	---	APHA (24 th Edition), 2510B	255
13.	Fluoride (as F)	mg/l	1.0	1.5	APHA (24 th Edition), 4500 F-C/D	0.28
14.	Lead (as Pb)	mg/l	0.01	No Relaxation	APHA (24 th Edition), 3120 B	<0.005
15.	Magnesium (as Mg)	mg/l	30	100	IS 3025 (Part 46)-1994 Rffmd 2014	9.98
16.	Manganese (as Mn)	mg/l	0.1	0.3	APHA (24 th Edition), 3120 B	<0.02

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Sl. No.	Test Parameters	UOM	Desr Limit	Permissible Limit	Method	Result
17.	Mercury (as Hg)	mg/l	0.001	No Relaxation	APHA (24 th Edition) 3112 B	<0.001
18.	Nitrate (as NO ₃)	mg/l	45	No Relaxation	APHA (24 th Edition), 4500 NO ₃ -E	<0.5
19.	Odour	None	Agreeable	Agreeable	IS 3025 (Part 5)-1983 Rffim: 2018	Agreeable
20.	Phenol	mg/l	0.001	No Relaxation	APHA (24 th Edition), 5530C (Chloroform Extraction)	<0.001
21.	Phosphate (as PO ₄)	mg/l	---	---	APHA (23 th Edition) 4500-P D, 2017	<0.05
22.	Potassium (as K)	mg/l	---	---	APHA (24 th Edition), 3500 K B	2.9
23.	Salinity	mg/l	---	---	APHA (24 th Edition), 2520 B	0.13
24.	Sodium (as Na)	mg/l	---	200	APHA (24 th Edition), 3500 Na B	9.9
25.	Sulphate (as SO ₄)	mg/l	200	400	IS 3025 (Part 24)-1986 Rffim: 2014	15.8
26.	Total Dissolved Solids (as TDS)	mg/l	500	2000	IS 3025 (Part 16)-1984 Rffim: 2012	154
27.	Total Hardness (as CaCO ₃)	mg/l	200	600	IS 3025 (Part 21)-2013	97.02
28.	Turbidity	mg/l	1	5	IS 3025 (Part 10)-1984 Rffim: 2012	1.5
29.	Zn (as Zn)	mg/l	5	15	APHA (24 th Edition), 3120 B	<0.02
30.	pH value	mg/l	6.5-8.5	No Relaxation	IS 3025 (Part 11)-1984 Rffim: 2012	7.47 at 25 Deg C

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For Mitra S. K. Private Limited



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TEST REPORT

Name & Address of the Customer	Report Number	: MSK/GHY/2023-24/0550
"Mott Mac Donald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate Of I And C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 09.11.2023
	Nature of Sample	: Ground Water
	Sample Mark	: GROUND WATER-04, BODILJUNAGAR
	Sample Drawn On	: 20.09.2023
	Sample Number	: MSKGL/FD/2023-24/10/00215
Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023		

CHEMICAL ANALYSIS RESULT (As per IS: 10500-2012)

Sl. No.	Test Parameters	UOM	Desr Limit	Permissible Limit	Method	Result
1.	Alkalinity (as CaCO ₃)	mg/l	200	600	IS 3025 (Part-23)1986 Rffm:2009)	52
2.	Ammonia	mg/l	0.5	No Relaxation	APHA (24 th Edition) 4500-NH ₃ -F	<0.1
3.	Arsenic (as As)	mg/l	0.01	0.05	APHA (24 th Edition), 3210 B	<0.005
4.	Boron (as B)	mg/l	0.5	1.0	APHA (24 th Edition), 4500-B C	<0.5
5.	Cadmium (as Cd)	mg/l	0.003	No Relaxation	APHA (24 th Edition), 3210 B	<0.001
6.	Calcium (as Ca)	mg/l	75	200	IS 3025 (Part 40)-1991 Rffmd 2014	17.42
7.	Chloride (as Cl)	mg/l	250	1000	IS 3025 (Part 32)-1998 Rffmd-2014	19
8.	Chromium as Cr ⁺⁺	mg/l	0.1	<0.01	APHA (23 rd Edition)3120B:2017	<0.01
9.	Colour	mg/l	5	15	APHA (24 th Edition), 2120B	<5.0
10.	Copper (as Cu)	mg/l	0.05	1.5	APHA (24 th Edition), 3120B	<0.02
11.	Dissolved Iron	mg/l	0.3	No Relaxation	APHA (24 th Edition), 3500 Fe-B	<0.05
12.	Electrical Conductivity	mg/l	---	---	APHA (24 th Edition), 2510B	102
13.	Fluoride (as F)	mg/l	1.0	1.5	APHA (24 th Edition), 4500 F-C/D	0.36
14.	Lead (as Pb)	mg/l	0.01	No Relaxation	APHA (24 th Edition), 3120 B	<0.005
15.	Magnesium (as Mg)	mg/l	30	100	IS 3025 (Part 46)-1994 Rffmd 2014	9.03
16.	Manganese (as Mn)	mg/l	0.1	0.3	APHA (24 th Edition), 3120 B	<0.02

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Sl. No.	Test Parameters	UOM	Desr Limit	Permissible Limit	Method	Result
17.	Mercury (as Hg)	mg/l	0.001	No Relaxation	APHA (24 th Edition) 3112 B	<0.001
18.	Nitrate (as NO ₃)	mg/l	45	No Relaxation	APHA (24 th Edition), 4500 NO ₃ -E	<0.5
19.	Odour	None	Agreeable	Agreeable	IS 3025 (Part 5)-1983 Rffro: 2018	Agreeable
20.	Phenol	mg/l	0.001	No Relaxation	APHA (24 th Edition), 5530C (Chloroform Extraction)	<0.001
21.	Phosphate (as PO ₄)	mg/l	---	---	APHA (23 rd Edition) 4500-P D, 2017	<0.05
22.	Potassium (as K)	mg/l	---	---	APHA (24 th Edition), 3500 K B	2.3
23.	Salinity	mg/l	---	---	APHA (24 th Edition), 2520 B	0.10
24.	Sodium (as Na)	mg/l	---	200	APHA (24 th Edition), 3500 Na B	6.3
25.	Sulphate (as SO ₄)	mg/l	200	400	IS 3025 (Part 24)-1986 Rffmd 2014	14.6
26.	Total Dissolved Solids (as TDS)	mg/l	500	2000	IS 3025 (Part 16)-1984 Rffm:2012	115
27.	Total Hardness (as CaCO ₃)	mg/l	200	600	IS 3025 (Part 21)-2013	81.18
28.	Turbidity	mg/l	1	5	IS 3025 (Part 10)-1984 Rffm:2012	1.2
29.	Zn (as Zn)	mg/l	5	15	APHA (24 th Edition), 3120 B	<0.02
30.	pH value	mg/l	6.5-8.5	No Relaxation	IS 3025 (Part 11)-1984 Rffm:2012	7.52 at 25 Deg C

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For Mitra S. K. Private Limited



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TEST REPORT

Name & Address of the Customer	Report Number	: MSK/GHY/2023-24/0551
"Mott Mac Donald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate Of I And C Department, Gurkhabasti, Agartala, West Tripura, Tripura. Pin-799006	Report Date	: 09.11.2023
	Nature of Sample	: Ground Water
	Sample Mark	: GROUND WATER-05, BODIJUNAGAR
	Sample Drawn On	: 20.09.2023
	Sample Number	: MSKGL/FD/2023-24/10/00216
Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023		

CHEMICAL ANALYSIS RESULT (As per IS: 10500-2012)

Sl. No.	Test Parameters	UOM	Desr Limit	Permissible Limit	Method	Result
1.	Alkalinity (as CaCO ₃)	mg/l	200	600	IS 3025 (Part-23)1986 Rffm:2009)	56
2.	Ammonia	mg/l	0.5	No Relaxation	APHA (24 th Edition) 4500-NH ₃ -F	<0.1
3.	Arsenic (as As)	mg/l	0.01	0.05	APHA (24 th Edition), 3210 B	<0.005
4.	Boron (as B)	mg/l	0.5	1.0	APHA (24 th Edition), 4500-B C	<0.5
5.	Cadmium (as Cd)	mg/l	0.003	No Relaxation	APHA (24 th Edition), 3210 B	<0.001
6.	Calcium (as Ca)	mg/l	75	200	IS 3025 (Part 40)-1991 Rffmd 2014	19.80
7.	Chloride (as Cl)	mg/l	250	1000	IS 3025 (Part 32)-1998 Rffmd-2014	21
8.	Chromium as Cr ⁺⁺	mg/l	0.1	<0.01	APHA (23 rd Edition)3120B:2017	<0.01
9.	Colour	mg/l	5	15	APHA (24 th Edition), 2120B	<5.0
10.	Copper (as Cu)	mg/l	0.05	1.5	APHA (24 th Edition), 3120B	<0.02
11.	Dissolved Iron	mg/l	0.3	No Relaxation	APHA (24 th Edition), 3500 Fe-B	<0.05
12.	Electrical Conductivity	mg/l	---	---	APHA (24 th Edition), 2510B	201
13.	Fluoride (as F)	mg/l	1.0	1.5	APHA (24 th Edition), 4500 F-C/D	0.32
14.	Lead (as Pb)	mg/l	0.01	No Relaxation	APHA (24 th Edition), 3120 B	<0.005
15.	Magnesium (as Mg)	mg/l	30	100	IS 3025 (Part 46)-1994 Rffmd 2014	9.98
16.	Manganese (as Mn)	mg/l	0.1	0.3	APHA (24 th Edition), 3120 B	<0.02

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Sl. No.	Test Parameters	UOM	Desr Limit	Permissible Limit	Method	Result
17.	Mercury (as Hg)	mg/l	0.001	No Relaxation	APHA (24 th Edition) 3112 B	<0.001
18.	Nitrate (as NO3)	mg/l	45	No Relaxation	APHA (24 th Edition), 4500 NO3-E	<0.5
19.	Odour	None	Agreeable	Agreeable	IS 3025 (Part 5)-1983 Rffm: 2018	Agreeable
20.	Phenol	mg/l	0.001	No Relaxation	APHA (24 th Edition), 5530C (Chloroform Extraction)	<0.001
21.	Phosphate (as PO4)	mg/l	---	---	APHA (23 th Edition) 4500-P D, 2017	<0.05
22.	Potassium (as K)	mg/l	---	---	APHA (24 th Edition), 3500 K B	2.5
23.	Salinity	mg/l	---	---	APHA (24 th Edition), 2520 B	0.10
24.	Sodium (as Na)	mg/l	---	200	APHA (24 th Edition), 3500 Na B	6.8
25.	Sulphate (as SO4)	mg/l	200	400	IS 3025 (Part 24)-1986 Rffind 2014	15
26.	Total Dissolved Solids (as TDS)	mg/l	500	2000	IS 3025 (Part 16)-1984 Rffm:2012	121
27.	Total Hardness (as CaCO3)	mg/l	200	600	IS 3025 (Part 21)-2013	91.08
28.	Turbidity	mg/l	1	5	IS 3025 (Part 10)-1984 Rffm:2012	1.3
29.	Zn (as Zn)	mg/l	5	15	APHA (24 th Edition), 3120 B	<0.02
30.	pH value	mg/l	6.5-8.5	No Relaxation	IS 3025 (Part 11)-1984 Rffm:2012	7.36 at 25 Deg C

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For Mitra S. K. Private Limited



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Soil Quality Test Report

Mitra S. K. Private Limited



TEST REPORT

Name & Address of the Customer	Report No.	: MSK/GHY/2023-24/0804
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 16.11.2023
	Nature of Sample	: SOIL
	Sample Mark	: BODHJUNAGAR, SOIL-1
	Sample Drawn On	: 19.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00138
Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023		

Chemical Analysis Result

Sl. No.	Parameter	UOM	Standards	Test Method	Result
1.	Bulk Density	g/cc	---	IS 2720(Part 29) 1975 RA 2015_(O)	1.39
2.	Clay	%	---	TPM/MSK/P&E/1/36A_(O)	12
3.	Electrical conductivity	us/cm	---	IS 14767:2000,RA 2016_(O)	92 (1:2) at 25 deg C
4.	Iron (as Fe)	mg/kg	---	TPM/MSK/P&E/1/13	5.1
5.	Lead (as Pb)	mg/kg	---	EPA 6010D_(O)	9.2
6.	Moisture Retention capacity	%	---	TPM/MSK/P&E/1/17_(O)	32
7.	Organic Matter	%	---	IS 2720 (Part 22)-1972; Rffm:2015_(O)	0.50
8.	Phosphorus	mg/kg	---	TPM/MSK/P&E/1/12_(O)	Available Phosphorus (as P)-3.4
9.	Porosity	%	---	TPM/MSK/P&E/1/30_(O)	44
10.	Potassium	mg/kg	---	TPM/MSK/P&E/1/5, Referr Issue date- April 02, Issue no-03: 2018	Available Potassium=30
11.	Sand	%	---	TPM/MSK/P&E/1/36A_(O)	72
12.	Silt	%	---	TPM/MSK/P&E/1/36A_(O)	16
13.	Texture	None	---	TPM/MSK/P&E/1/36A, Issue date- April 02 Issue no-03: 2018	Sandy Loam
14.	Total Nitrogen (as N)	mg/kg	---	IS 14684 (1999); Rffm:2014_(O)	342
15.	Total Organic Carbon	%	---	IS 2720 (Part 22)-1972;Rffm:2015_(O)	0.29
16.	Infiltration rate	mm/Hr	---	TPM/MSK/P&E/1/42_(O)	21
17.	pH value	None	6.5-8.5	IS 2720 (Part 26) - 1987	5.54 (1:2.5) at 25 deg C

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for Mitra S. K. Private Limited

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TEST REPORT

Name & Address of the Customer	Report No.	: MSK/GHY/2023-24/0803
"Mott MacDonald Private Limited" 1st Floor, Pandit Nehru Complex, Earlier Directorate of I and C Department, Gurkhabasti, Agartala, West Tripura, Tripura, Pin-799006	Report Date	: 16.11.2023
	Nature of Sample	: SOIL
	Sample Mark	: BODHJUNAGAR, SOIL-2
	Sample Drawn On	: 19.09.2023
	Sample Number	: MSKGL/ED/2023-24/10/00137
Reference No.& Date: RD/AK/426661/10357, Dated : 31.08.2023		

Chemical Analysis Result

Sl. No.	Parameter	UOM	Standards	Test Method	Result
1.	Bulk Density	g/cc	---	IS 2720(Part 29) 1975 RA 2015_(O)	1.37
2.	Clay	%	---	TPM/MSK/P&E/1/36A_(O)	12
3.	Electrical conductivity	us/cm	---	IS 14767:2000,RA 2016_(O)	189 (1.2) at 25 deg C
4.	Iron (as Fe)	mg/kg	---	TPM/MSK/P&E/1/13	5.7
5.	Lead (as Pb)	mg/kg	---	EPA 6010D (O)	7.9
6.	Moisture Retention capacity	%	---	TPM/MSK/P&E/1/17_(O)	31
7.	Organic Matter	%	---	IS 2720 (Part 22)-1972; Rflm:2015_(O)	0.64
8.	Phosphorus	mg/kg	---	TPM/MSK/P&E/1/12_(O)	Available Phosphorus (as P)-4.0
9.	Porosity	%	---	TPM/MSK/P&E/1/30_(O)	45
10.	Potassium	mg/kg	---	TPM/MSK/P&E/1/5, Referr Issue date-April 02, Issue no-03: 2018	Available Potassium-61
11.	Sand	%	---	TPM/MSK/P&E/1/36A_(O)	75
12.	Silt	%	---	TPM/MSK/P&E/1/36A_(O)	13
13.	Texture	None	---	TPM/MSK/P&E/1/36A, Issue date- April 02 Issue no-03: 2018	Sandy Loam
14.	Total Nitrogen (as N)	mg/kg	---	IS 14684 (1999); Rflm:2014_(O)	509
15.	Total Organic Carbon	%	---	IS 2720 (Part 22)-1972;Rflm:2015_(O)	0.37
16.	Infiltration rate	mm/Hr	---	TPM/MSK/P&E/1/42_(O)	23
17.	pH value	None	6.5-8.5	IS 2720 (Part 26) - 1987	5.36 (1.2.5) at 25 deg C

Report Prepared By:



for Mitra S. K. Private Limited



Authorized Signatory

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APPENDIX-5

Biodiversity Assessment of Bodhjungnagar Industrial Estates
Final Report EB-1123



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Biodiversity Impact Assessment for Bodhjung Nagar Industrial area in Agartala, Tripura.

Executive summary

The present biodiversity and ecological assessment study encompassed the core area and five distinct buffer areas, ranging from areas in the immediate proximities of the core (0–500 m) to areas farther away from the site, up to 20km. The purpose was to understand the major habitat types and critical species, estimate the total species and their populations, and evaluate threats and conservation opportunities for each zone.

The core area, sampled through 8 quadrats, is primarily characterised by moist deciduous and subtropical habitats. The key concerns for this zone are the encroachments from rubber plantations, settlement effluents, industrial waste, and compromised air quality. The buffer areas ranged from immediate vicinities to larger radial expanses. Habitat varied from terrestrial, moist deciduous to riverine and subtropical woodlands. The number of species observed expanded as we moved further from the core, reaching a peak of approximately 58 species in the 15-20 km buffer. Some predominant species across these zones include the common myna, the black-hooded oriole, and the Rufous Treepie. The threats, however, remain consistent and alarming, with rubber plantations, human settlements, and a lack of green cover being the most dominant.

Rubber plantations have become a significant threat to local biodiversity, affecting the core and buffer areas. The adverse effects on biodiversity due to human settlements, especially with industrial and settlement effluents, are evident in most zones. In the farther buffer regions, limited green covers and plantations in reserve forests further intensify these threats. The study highlights the richness of biodiversity that spans across the core and buffer regions, emphasising the need for its conservation. It is evident that anthropogenic activities, particularly rubber plantations and human settlements, exert immense pressure on local ecosystems. There's a critical need to address these threats, safeguard sensitive habitats, and promote sustainable practices to ensure the long-term well-being of the area's flora and fauna.

Key points:

- **Rich Biodiversity:** The core and buffer regions showcase a diverse range of habitats and species, from the red-vented bulbul in the core to the Rufous Treepie in the outer buffers.
- **Significant Threats:** Rubber plantations, human settlements, and industrial effluents pose major challenges, affecting habitats and species across the study area.
- **Anthropogenic Pressure:** Human-induced activities, especially in buffer regions, lead to habitat fragmentation and biodiversity loss, with specific zones experiencing reduced green cover.

- **Conservation Imperative:** Given the evident biodiversity richness and the looming threats, there's an urgent need for focused conservation efforts and sustainable practices to protect the area's ecological integrity.

TABLE 1: QUADRAT DETAILS IN CORE AREA

Name of Industrial estate			Bodjung Nangar (91°21'42.22"E, 23°53'13.83"N)
District			West Tripura
State			Tripura
Quadrat ID	Latitude	Longitude	Key Insights
Q1	23.8918	91.3372	Rubber plantation habitat with diverse avian and arachnid life. Conservation concerns due to habitat pressure from human activities.
Q2	23.8861	91.3312	Area with varied shrubbery and significant bird life, facing similar biodiversity pressures as Q1.
Q3	23.8852	91.3382	Habitat with bamboo and Ficus, home to diverse bird and reptile species. Peripheral areas threatened by industrial waste.
Q4	23.8855	91.3366	Bamboo patches supporting bird diversity. Conservation challenges mirror those of Q3.
Q5	23.8853	91.3357	Dominated by bamboo, birds, and butterflies prevalent. Ecological concerns due to industrial impact.
Q6	23.8805	91.3369	Woodland with bamboo, teak, and diverse fauna. Industrial and habitat pressures are a concern.
Q7	23.883535	91.334312	Area with varied Trees, shrubbery and significant bird life, facing similar biodiversity pressures as Q1.
Q8	23.890209	91.336052	Dominated by Rubber Plantation with negligible biodiversity

1. INTRODUCTION AND BACKGROUND

In an era marked by escalating environmental challenges, safeguarding biodiversity serves not merely as a conservation imperative, but also as a socio-economic necessity. Understanding the intricate balance between ecosystems and human enterprise forms the cornerstone of ALIGN Consulting Engineers mission. We are pleased to embark on this Biodiversity Assessment Study, as specified in the TOR provided by the client.

The study will focus on industrial estates in Tripura and their project areas of influence (PAI), a region characterised by its rich biodiversity. The aim is to delineate critical habitats, evaluate flora and fauna, and assess the potential environmental impacts—both direct and indirect—of industrial activities. Special emphasis will be placed on species classified as Critically

Endangered (CR), Endangered (EN), and Vulnerable (VU) according to the IUCN Red List, as well as on the regional specificities of Northeast India.

ALIGN Consulting Engineers has developed a methodological framework to comprehensively meet the project objectives. The framework combines scientific rigor through literature review with ground-level engagement and employs a suite of ecological and GIS tools, ranging from Quadrat and Line Transect for ecological sampling to Remote Sensing via Google Earth Engine (GEE) and R software and QGIS for landscape analysis. Our approach is undergirded by a thorough literature review, inclusive of government records, forest management strategies, and previously published ecological studies, to provide a robust baseline for our primary research.

Funding for this undertaking will adhere to a phased approach as outlined in our proposal, assuring resource availability at each critical juncture. The budget has been thoughtfully allocated to cover extensive fieldwork, data analysis, and report writing. The final deliverable a Biodiversity Assessment Report coupled with a Biodiversity Management Plan will encapsulate our findings and recommendations for mitigation measures and conservation strategies.

In summary, this project aims to create a meticulous and actionable roadmap for sustainable development in Tripura's industrial estates. Through a multi-disciplinary and consultative approach, ALIGN Consulting Engineers aspires to deliver a report that serves as a touchstone for balancing industrial growth with ecological integrity.

2. METHODOLOGY

2.0 IBAT and Nature-Map tools:

We used Integrated Biodiversity Assessment Tool (IBAT) and Nature-Map for rapid analysis and detailed assessment of conservation status and area prioritisation. IBAT is an online platform designed to provide key information on biodiversity priorities at specific locations. It is an interface that combines data from multiple trusted sources, such as the World Database on Protected Areas (WDPA), the IUCN Red List of Threatened Species, and the World Database of Key Biodiversity Areas. IBAT allows for the generation of tailored biodiversity reports, which can be critical for impact assessment and decision-making processes.

2.1 Nature-Map

This is a decision-support tool that allows users to explore and analyze spatial data regarding natural resources and biodiversity. It incorporates satellite imagery, topographical maps, and other datasets to provide a comprehensive view of the land and its biological richness. Users can overlay various types of data such as soil quality, water availability, and land use patterns to get a holistic understanding of an area. In the context of our project, Nature-Map will be employed to gather a broader ecological perspective of the industrial estates in Tripura. Its advanced mapping and analytical capabilities will assist us in understanding how industrial

activities interact with the natural landscape. It helps us in planning field surveys and provides key insights into habitat fragmentation and land-use change that could affect biodiversity.

2.2 Biodiversity and literature review:

We adopted a multi-pronged methodology to assess in Tripura's Industrial Estates. For data collection, field surveys recorded various species of flora and fauna, employing a team of specialized botanists, zoologists, GIS experts, and landscape ecologists. The area was stratified based on core area (the industrial estate) and buffer (5-20 km from core), different habitat types and random samples are drawn for biodiversity evaluation.

High-resolution satellite images were collected and scrutinized using R, Google Earth Engine, and QGIS software for remote sensing data, providing an analysis of land-use changes over the past five to ten years. Secondary data from academic journals, governmental reports, and databases were collected to supplement the primary data, enriching our understanding of the area.

2.3 Remote Sensing via GEE and QGIS:

We adopted a multi-pronged methodology to assess in Tripura's Industrial Estates. For data collection, field surveys recorded various species of flora and fauna, employing a team of specialized botanists, zoologists, GIS experts, and landscape ecologists. The area was stratified based on core area (the industrial estate) and buffer (5-20 km from core), different habitat types and random samples are drawn for biodiversity evaluation.

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TABLE 2: DETAILS OF WORKING METHODOLOGY FOR BIODIVERSITY ASSESSMENT

Methodology	Component	Description	Utility
Stage 1: Literature review, tools and planning			
IBAT	Biodiversity reports based on existing data for impact assessment And decision-making processes	An online tool that integrates data from multiple sources like the WDPA, IUCN Red List, and others to provide key biodiversity information at specific locations.	Enables quick identification of high-priority conservation areas and threatened species; supports risk assessment and aids in resource allocation for field studies.
Nature maps	Incorporates satellite imagery, topographical maps, and other datasets to provide comprehensive view of	A decision-support tool that incorporates spatial data like satellite imagery and topographical maps to analyze natural resources	Offers a comprehensive ecological perspective; helps in planning field surveys and provides insights into habitat fragmentation and land-use

	the land	and biodiversity.	change affecting the project.
Literature Review and Data Analysis	Secondary data Sources	Review of existing datasets, maps, government records, reports, etc.	Comprehensive understanding of existing knowledge and data gaps identification.
IUCN and Schedule Species Comparison	Conservation Significance	Comparison of identified species with IUCN and Schedule species lists.	Identification of species of conservation significance.
Stage 2 (a) : Sampling Ecology and Biodiversity			
Quadrat and Line Transect	Plant and Bird Surveys	Systematic sampling of vegetation and birds Population	Evaluates species identification, relative abundance, and community structure.
Bioacoustics	Bird, Insect, and Amphibian Surveys	Recording and analysis of sounds produced by various organisms.	Non-invasive identification of species, population size estimation, and behavioural studies.
Observation-based Sampling	Reptiles and Amphibians	Direct field observations of these species.	Facilitates species identification, behaviour study, and abundance estimation.
Stage 2 (b) : Mapping and Remote Sensing			
Remote Sensing via GEE and QGIS	Landscape Analysis	Analysis of Landsat and Sentinel satellite images, Drone imagery (if needed)	Evaluation of land-use land cover and biomass changes over time and habitat impact assessment.
Stage 3: Data analysis and Report Writing			
The collected data will be systematically analyzed using statistical techniques. We will interpret these findings to draft a comprehensive report that includes detailed insights on the biodiversity, ecological impacts, management plans, and compensatory measures.			
Final review: Our team of experts will review the final report for quality assurance before submission			

3. BIODIVERSITY ASSESSMENT BASED ON PRIMARY DATA

3.0 Species checklists – qualitative sampling.

In Bodhjung Nagar, our biodiversity survey—employing both random pathways and structured quadrat sampling—has painted a vivid picture of how industrial activity, urbanization, and human impact shape the ecological landscape. In the core area, amidst the hustle of industrial operations and the resultant environmental stressors, we catalogued 208 species. This is a resilient count given the context, but the pervasive influence of the industrial milieu, including

effluent discharge into the local water body, is evident. This contamination poses a risk to water quality and has cascading effects on species richness, particularly affecting those dependent on aquatic ecosystems, such as amphibians and certain insects, and also indirectly impacting birds and mammals through the food chain. Flora, while still present with 32 tree species and other vegetation, is noticeably curtailed in diversity and abundance compared to less disturbed areas.

Contrastingly, the buffer zone, characterized by forest patches and less intensive human activity, showcased a more robust biodiversity with 406 species identified. These forested areas act as ecological buffers and corridors, facilitating gene flow and providing refuge for wildlife, thus enhancing species richness. Trees (79 species), shrubs (38 species), and herbs (64 species) in these patches contribute to ecological resilience, offering a spectrum of habitats and food sources. Birds, with 119 species observed, and butterflies (36 species) are particularly abundant, indicating healthier ecosystems where natural processes can proceed with minimal human interference.

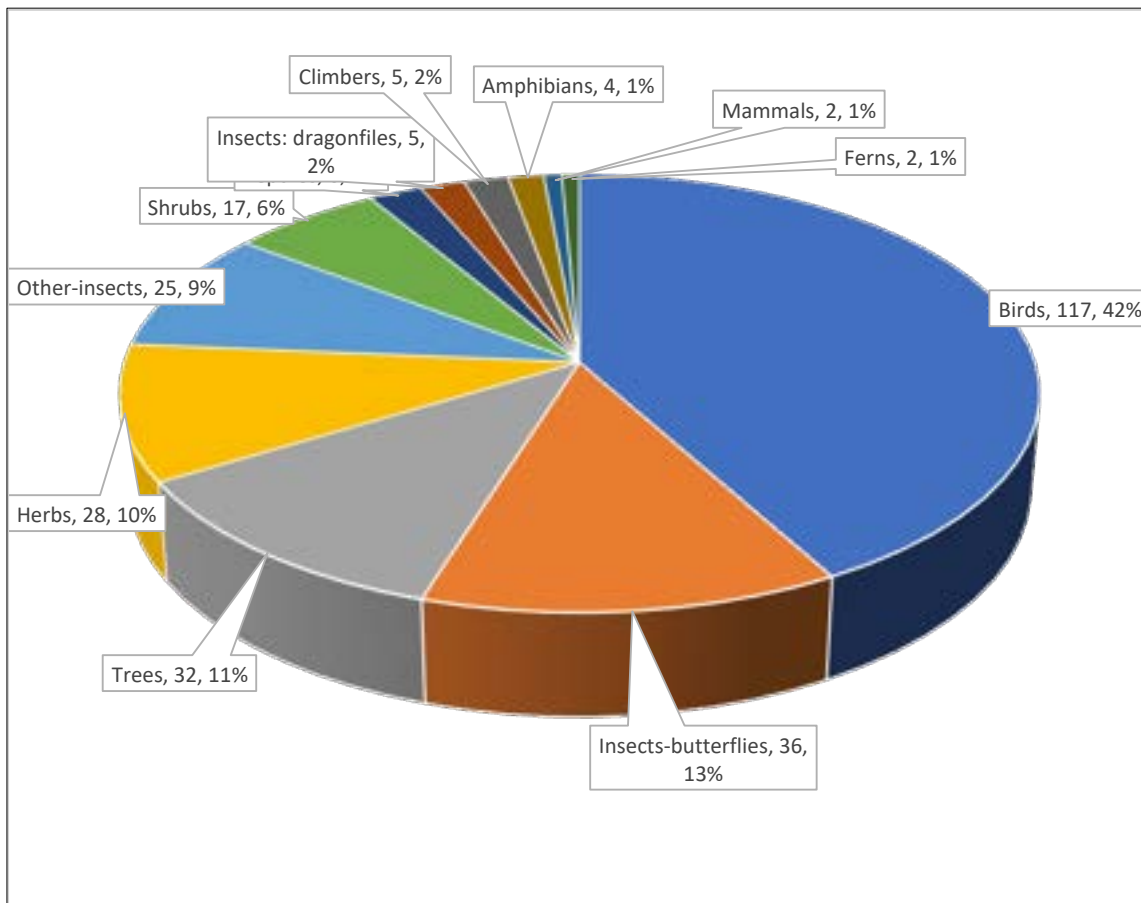


FIGURE 1: DISTRIBUTION OF OBSERVED SPECIES GROUPS IN THE CORE AREA

The difference in biodiversity between the core and buffer zones underscores the impact of human activities on ecological health. The core area's industrial activities lead to habitat fragmentation and pollution, significantly altering the natural environment and reducing habitat quality. In contrast, the forest patches within the buffer zone provide a vital sanctuary for

biodiversity, underscoring the importance of preserving and expanding these green spaces to maintain ecological balance and biodiversity in the face of urban expansion.

Waterbody in the core:

The water body in Bodhjung Nagar, while being a potential habitat for various species, is subjected to the stress of industrial effluents, which pose a significant threat to its biodiversity. The release of untreated or inadequately treated industrial waste can lead to the degradation of water quality, affecting the delicate balance of aquatic ecosystems. Such contamination not only impacts the direct water dwellers, like certain species of amphibians and specialized aquatic plants, but also the larger food web including insects, birds, and mammals that rely on the water body for sustenance. The presence of pollutants can alter the reproductive cycles of aquatic fauna, reduce oxygen levels, and introduce harmful substances into the food chain, leading to bioaccumulation and potential biomagnification. The impact on flora includes inhibiting growth and photosynthesis in aquatic plants and algae, which are critical to maintaining the ecosystem's oxygen supply and serving as a food source for other organisms. The overall potential impact is a reduction in species richness and a shift in the community composition, favoring species that can tolerate higher levels of pollution over those that cannot, thus leading to a less diverse and possibly less resilient ecosystem.

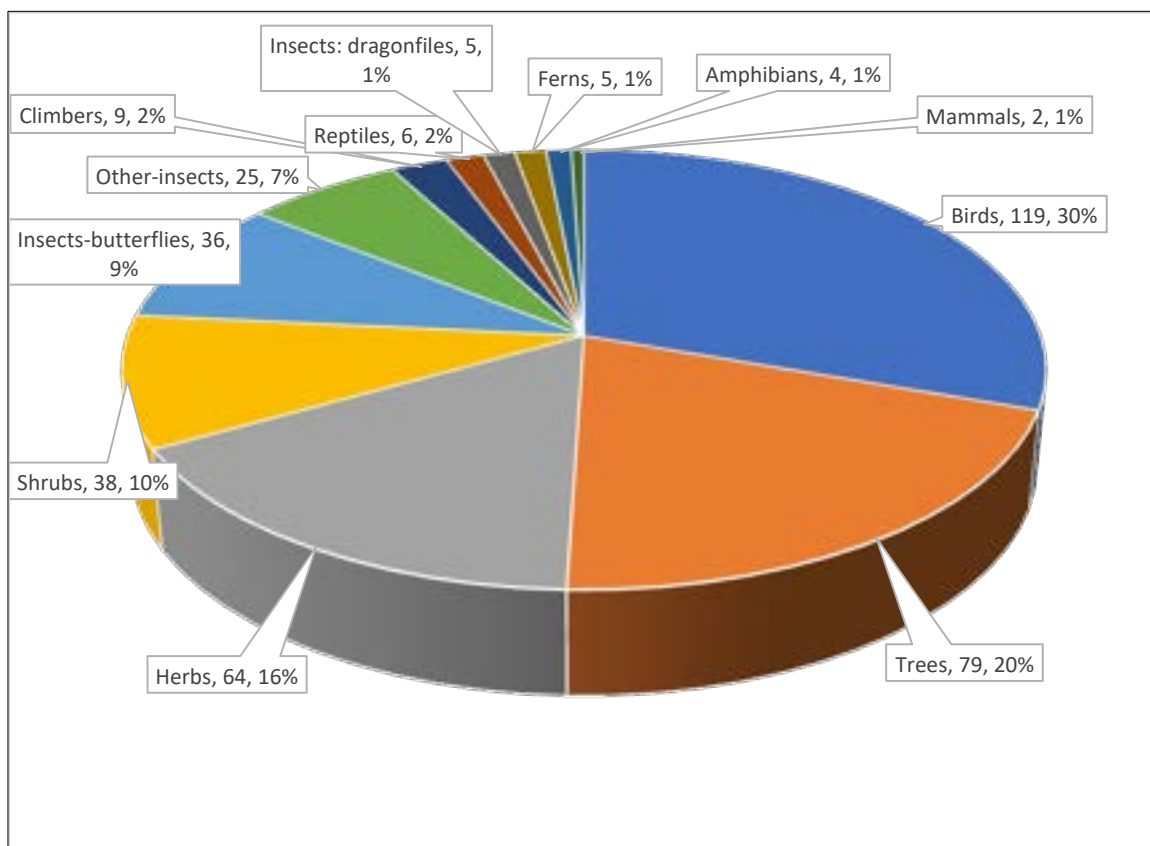


FIGURE 2: DISTRIBUTION OF OBSERVED SPECIES GROUPS IN THE BUFFER AREA

The notable variance between the core area and the buffer (table 1) can be primarily attributed to the profound human influence on the core. This region has been significantly affected by human activities, making it a hotspot for environmental impact. In contrast, the buffer zone

retains several patches of vegetation. These green pockets play a crucial role in sustaining diverse species, offering them habitats and resources for survival. Such an environment promotes a richer biodiversity compared to the core. For an in-depth understanding of the species present, a comprehensive list has been compiled and can be found in the supporting document database (Annexure 1:Species checklist).

TABLE 3: SPECIES AND THEIR TAXONOMIC GROUPS FOUND IN CORE AND BUFFER

Groups	Buffer	Core
Flora	119	84
Tree	79	32
Shrub	38	17
Herb	64	28
Climber	9	5
Fern	5	2
Fauna	197	195
Aves	119	117
Insect-Butterfly	36	36
Insect-Odonata	5	5
Other-Insects	25	25
Mammal	2	2
Reptile	6	6
Amphibian	4	4

The study also revealed distinctions in the type of species distributions between the buffer and core areas. The Buffer zone has approximately 25.86% exotic species, whereas the Core zone has a slightly higher proportion of around 30.12% exotic species compared to native vegetation (Figure 3). Native species are crucial because they have evolved with the local biodiversity, playing a pivotal role in the ecosystem by providing habitat for various species, including resident birds. Native vegetation is also more resilient to local climatic conditions, pests, and diseases.

The higher percentage of exotic species in the Core might be due to human interventions, such as urbanisation, agriculture, or horticultural practices, introducing non-native species for ornamental or practical purposes. Once introduced, these species, without their natural restrictions, can sometimes outcompete native species, reducing biodiversity. Such shifts can have cascading effects on the ecology, affecting food webs and making ecosystems more

susceptible to pests and diseases and less resilient to climate shocks. Exotic species can also alter habitat structures, nutrient cycling, and hydrology. Their aggressive growth can overshadow or replace native species, reducing available habitat for wildlife dependent on native species.

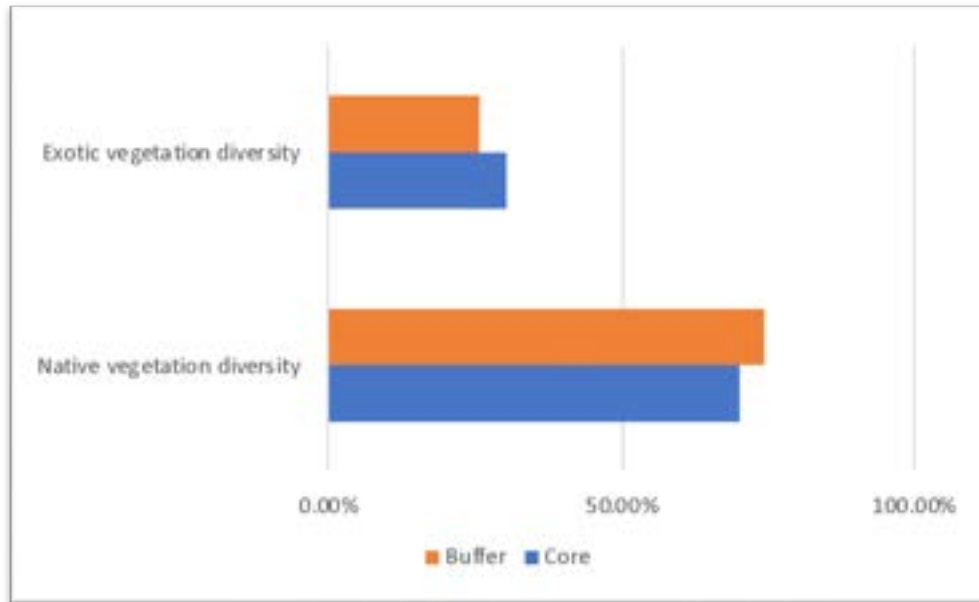


FIGURE 3: NATIVE VS EXOTIC SPECIES IN CORE VS BUFFER

We make specific recommendations for better management of local ecology:

- Regular monitoring of exotic species and their impact on native vegetation.
- Initiating restoration programs focusing on planting and nurturing native species.
- Educating the local community about the importance of native vegetation and the threats of exotic species.
- Implementing strict regulations on the import and planting of non-native species.
- Encouraging research on sustainable agricultural practices that align with native vegetation conservation.
- By adopting these measures, we can hope to strike a balance and ensure the healthy coexistence of both native and exotic species while prioritising ecological integrity.

3.1 Quadrata quantitative sampling.

Our ecological survey in Bodhjung Nagar implemented a radius-based approach to measure biodiversity richness across various distances from a central point of urban activity, known as the core area.

- At 0km, within the core itself, we observed a flora richness of 53 species and a fauna richness of 80 species across 10 quadrats. This baseline provides insight into the biodiversity that persists amidst the most intense urban and industrial activities.

- Expanding our radius to 500 meters from the core, the surrounding areas revealed slightly higher biodiversity levels, with 66 flora species and 147 fauna species recorded in 8 sampled quadrats, suggesting that even a small distance from the core begins to show a lessening human footprint.
- At a 5km distance, the sites including Oxygen park, Fatikcherra, Baidhya Kobra, and Khayerpur showed a notable increase in biodiversity, with flora richness climbing to 81 species and fauna richness to 149 species. Here, 16 quadrats were sampled, reflecting the importance of these green spaces and less urbanized areas as reservoirs of biodiversity.
- Further afield at a 10km radius, encompassing Ranjit Nagar, Bamutia, Purba Noagaon, and Jogendranagar, flora richness peaked at 88 species while fauna richness slightly decreased to 146 species. This was observed over 16 sampled quadrats and suggests that certain species may thrive in or are restricted to intermediate urban-natural interfaces.
- At the 15km mark, in locations such as Mohanpur, Kathiram bari, and Prabhapur, there was a dip in flora richness to 43 species, with fauna richness also dropping to 132 species across 12 quadrats. This decrease could indicate localized environmental factors or agricultural practices that may influence biodiversity.
- At the periphery of our survey area, a 20km radius that includes Jirania, Dakshin Champamura, Paschim Takarjala, Tuichamankuri, and ICnagar, we observed an increase in both flora and fauna richness, with 68 and 164 species respectively, sampled across 20 quadrats. This resurgence in species richness suggests these outlying areas may provide critical habitats and support a high level of biodiversity possibly due to lower human disturbance and the presence of more intact natural habitats.

These observations collectively indicate that biodiversity in Bodhjung Nagar is influenced by the gradient of urbanization, with certain areas serving as crucial biodiversity hotspots that warrant conservation efforts, especially those at intermediate distances that may offer unique ecological niches.

TABLE 4: SPECIES RICHNESS OBSERVATIONS BETWEEN CORE AND BUFFER

Radius range	Flora richness	Fauna richness	Quadrates sampled	location sampled	Location names
0km	53	80	10	1	Core
0-500m	66	147	8	1	Surroundings
5km	81	149	16	4	Oxygen park, Fatikcherra, Baidhya Kobra, Khayerpur
10km	88	146	16	4	Ranjit nagar, Bamutia, Purba Noagaon, Jogendranagar
15km	43	132	12	3	Mohanpur, Kathiram bari, Prabhapur
20km	68	164	20	5	Jirania, Dakshin Champamura, Paschim takarjala, Tuichamankuri, ICnagar

The biodiversity survey of Bodhjung Nagar paints a detailed picture of ecological variation across different locations. In the core industrial area, the foundational biodiversity levels were recorded, with a flora richness of 53 species and fauna richness of 80 species. This reflects the resilience of certain species to urban stresses.

Moving away from the core, we find varying levels of biodiversity richness. Baidhya Kobra and Bamutia showed moderate levels of fauna richness at 57 and 65 species, respectively, with similar flora richness of 30 and 32 species. In stark contrast, Jirania exhibited a high fauna richness with 111 species but a lower flora richness of 30 species, indicating a possible fauna-centric habitat.

In Dakshin Champamura, both fauna and flora richness were low, with 25 and 8 species, respectively, suggesting an environment under considerable ecological strain or with limited habitat diversity. Fatikcherra, with equal flora and fauna richness at 31 species each, suggests a balanced but constrained ecosystem. ICnagar and Kathiram bari presented an interesting contrast with fauna richness at 51 and 98 species, and flora richness at 22 and 25 species, respectively. This might reflect a variation in habitat types and ecological resources available within these locations.

Jogendranagar and Tuichamankuri both showed high fauna richness at 95 and 96 species, respectively, with Tuichamankuri having a notably lower flora richness of 22 species, which may indicate a fauna-dominated environment or less vegetative diversity. The surroundings area, not specified but likely representing the collective peripheral areas around the core, showed the highest fauna richness at 147 species and a strong flora presence with 66 species. This might be due to a composite of less disturbed habitats and more extensive green spaces. Oxygen park, with 69 fauna species and 19 flora species, along with Prabhapur, with the lowest recorded flora richness at 19 species and fauna richness at 14 species, showcase the extremes in biodiversity, possibly influenced by human recreation activities and smaller habitat sizes.

Collectively, these location-based observations underscore the complex interplay between urban development and biodiversity. They highlight the importance of maintaining a variety of habitats within urban and peri-urban areas to support ecological diversity and resilience.

TABLE 5: LOCATIONS AND TOTAL SPECIES RICHNESS

Location name	Fauna richness	Flora richness
Core	80	53
Baidhya Kobra	57	30
Bamutia	65	32
Dakshin Champamura	25	8
Fatikcherra	31	31
ICnagar	51	22
Jirania	111	30
Jogendranagar	95	33
Kathiram bari	98	25

Khayerpur	44	36
Mohanpur	59	24
Oxygen park	69	19
Paschim takarjala	25	20
Prabhapur	14	19
Purba Noagaon	79	43
Ranjit nagar	65	34
surroundings	147	66
Tuichamankuri	96	22

4. VEGETATION DIVERSITY

4.0 Flora in the Core area – the project site



FIGURE 4 CORE AREA OF THE BODHJUNG NAGAR INDUSTRIAL SITE

The core area of Bodhjung Nagar, subjected to a detailed vegetation diversity study, reveals a mixed landscape dominated by both native and invasive species. The study was conducted across ten quadrates, each representing a unique subset of the local ecology, with a significant emphasis on terrestrial, moist deciduous habitats.

Quadrates 1, 3, and 9 were characterized by a dominance of invasive shrubs and herbs, indicating a disturbed ecosystem often found in urbanized or industrial areas. Notably, these quadrates lacked the diversity seen in others, potentially due to the proximity to settlements

or the residual effects of human activity. Quadrate 4 provided a stark contrast, with a substantial canopy cover provided by important native trees like Arjun (*Terminalia arjuna*), Shisham (*Dalbergia sissoo*), Neem (*Azadirachta indica*), Champa (*Plumeria alba*), and Amla (*Phyllanthus emblica*). These species are not only ecologically significant but also hold immense value in traditional medicine and local culture.

Wetland conditions were observed in Quadrate 5, signified by the presence of wetland grasses, suggesting a microhabitat within the core area that supports a distinct flora, likely including species adapted to water-logged conditions.

Quadrate 6 was notable for its sparse tree presence, instead featuring a rich array of climbers and shrubs, which might indicate a regenerating ecosystem or one that has adapted to frequent disturbance.

The introduction of planted trees was exclusively observed in Quadrate 7, which, while contributing to the green cover, may not support the same biodiversity as naturally occurring vegetation due to the homogeneity of species. Quadrate 8 was unique in its swamp-like characteristics, being adjacent to a water body covered with duckweed and surrounded by bamboo patches, creating a rich and specialized habitat for a variety of flora and fauna.

Lastly, Quadrate 10 highlighted the industrial influence on local vegetation, with the establishment of a rubber plantation (*Hevea brasiliensis*), which contributes to the local economy but also represents a monoculture with lower ecological diversity compared to natural forests.

The diversity of trees ranged from the common Indian Charcoal Tree (*Trema orientalis*), with an abundance of 10 and a tree density of 0.011222337 per hectare, to the valuable Agar (*Aquilaria malaccensis* Lamk.), with an abundance of 11 and a notable tree density of 0.024689141 per hectare. The occurrence of species like the Bullet Wood (*Mimusops elengi*) and the widespread presence of shrubs such as Jack In The Bush (*Chromolaena odorata*) and Wireweed (*Sida acuta*) reflect a robust undergrowth, despite the encroaching urbanization.

This vegetational analysis of the Bodjung Nagar core area underscores the impact of human activities on native vegetation, while also highlighting areas of rich biodiversity that could be leveraged for conservation efforts. The presence of both native and invasive species paints a complex picture of an ecosystem in flux, offering opportunities for ecological restoration and sustainable urban planning. Site photos attached as Annexure -3

4.1 Flora in the Buffer areas

Immediate vicinity - 0-500m



FIGURE 5 IMMEDIATE VICINITY - 0-500M

TABLE 7: QUADRAT DETAILS IMMEDIATE VICINITY - 0-500M

Sr. No.	Location	Latitude	Longitude	Habitat
1	Bodhjung Nagar immediate buffer 1	23.899157	91.359570	Disturbed habitat with the area dominated by Invasive Herb & Shrubs with some forest plants & rubber plantation
2	Bodhjung Nagar immediate buffer 2	23.883574	91.369544	Settlement area dominated by teak plantation
3	Bodhjung Nagar immediate buffer 3	23.881029	91.346817	Area dominated by Rubber plantation
4	Bodhjung Nagar immediate buffer 4	23.877410	91.355685	Area dominated by Rubber plantation

In the immediate vicinity of Bodhjung Nagar, within a radius of 0-500m, the environment is marked by terrestrial moist deciduous surroundings and subtropical woodlands. The region is home to a variety of vegetation including white teak forests, rubber, and litchi plantations. Plants such as *Microcos paniculata*, *Chromolaena odorata*, and *Solanum sisymbriifolium* contribute to the region's ecological diversity.

Within a 500m radius, the forest stands tall and dense with dominant trees like *Microcos paniculata*, holding the highest biomass and abundance. This tree plays an essential role in forest ecology as it provides habitats for various species and contributes to carbon

sequestration. Then there's *Hevea brasiliensis*, commonly known as the rubber tree, and it is no surprise that humans have planted this tree extensively due to its economic significance in rubber production. *Gmelina arborea*, also known as the beechwood tree, has timber that's valuable for making furniture, while *Tectona grandis* or teak is highly valued for its excellent quality wood. The understory has shrubs like *Clerodendrum infortunatum*, which has medicinal properties, followed by *Chromolaena odorata*, often considered a weed but has its own ecological role in soil fertility and *Urena lobata*, a traditional medicinal plant. The forest floor is a carpet of herbs, with *Paspalum botteri* and *Chrysopogon aciculatus* being the most abundant. These herbs help in soil stabilisation and play a role in ground cover. Among climbers, *Pueraria phaseoloides* stands out, known for its use in traditional medicine and as a cover crop in agroforestry systems.

Inner buffer - 5km radius



FIGURE 6 INNER BUFFER - 5KM RADIUS

TABLE 8: QUADRAT DETAILS INNER BUFFER - 5KM RADIUS

Sr. No.	Location	Latitude	Longitude	Habitat
1	Khayerpur	23.846334	91.345901	Riverine ecosystem dominated by Bamboo forest
2	RK Nagar	23.887134	91.335146	Area dominated by Industrial area with plantation like bamboo, Rubber for industrial purpose
3	Oxygen park	23.88364	91.289276	Dominated by Sal forest
4	Fatikcherra	23.924822	91.343864	Mixed forest dominated by Teak, bamboo, <i>Microcos paniculata</i> & Rubber plantation

Moving to the 5km radius, *Microcos paniculata* remains a dominant tree, but it's accompanied by *Shorea robusta*, a tree sacred to many communities and is a primary timber species in several regions. *Tectona grandis* again graces this radius with its presence, its timber a crucial economic commodity. *Hevea brasiliensis* continues to be a human-favoured tree for rubber production in this wider region. The understory witnesses *Clerodendrum infortunatum* and *Chromolaena odorata*, just like in the 500m zone, providing ecological benefits like soil enrichment and medicinal uses. In this radius, herbs like *Paspalum botterii* are still dominant, highlighting their widespread distribution. *Mikania micrantha* is a prominent climber here, which, though invasive, is sometimes used to treat wounds and cuts traditionally. Both zones distinctly highlight the balance between nature's choice of dominant species and human interference for economic gains.

Central buffer - 10km radius



FIGURE 7 CENTRAL BUFFER - 10KM RADIUS

TABLE 9: QUADRAT DETAILS CENTRAL BUFFER - 10KM RADIUS

Sr.No.	Location	Latitude	Longitude	Habitat
1	Ranjit nagar	23.847431	91.266098	Degraded riverine ecosystem due to human settlement dominated by domesticated plants like moringa, bamboo, jackfruit etc.
2	Jogendranagar	23.824471	91.304214	Fragmented mixed forest enclosed by a settlement with major plants like Teak, Schima wallici, <i>Microcos paniculata</i> etc.
3	Bamutia	23.952457	91.296448	Subtropical habitat with a small stream dominated by plants like Jujubi, <i>Trema orientalis</i> , <i>Ficus hipsida</i> , <i>Microcos paniculata</i> etc.

4	Purba noagaon	23.804892	91.377678	Settlement area with waterbody dominated by plants like Bamboo, Microcos paniculata , Ficus religiosa , Alocasia etc. along with domesticatd plants like Betel nut, Jackfruit, mango etc.
5	Baidhya kobra	23.864408	91.399261	Agricultural habitat with dominated trees like Albizia procera , Ficus hipsida , Microcos paniculata, Teak, Toona ciliata , Cassia obtusifolia etc.

Within the 5-10km buffer zone, several terrestrial habitats have showcased a plethora of plant species in the areas surveyed. Specifically, Microcos paniculata predominantly occupies the forest canopy at this distance with a biomass of 78.32 tonnes per ha. Areca catechu, the "Areca Palm " or "Betel Nut Tree ", has an abundance of 19. Lagerstroemia speciosa or the "Queen's Crape Myrtle " is another prominent species, followed by Schima wallichii. Among the locations we surveyed, the terrestrial habitats of the Ranjit Nagar area, especially along the riverine terrains, are adorned with flora that includes Ipomoea carnea, Persicaria hydropiper, bamboo, Parthenium hysterophorus, and Commelina benghalensis.

In the Jogendranagar locality there exists a diverse plant life within its moist deciduous forests and subtropical woodlands. Predominant species include Teak, Schima wallici, Microcos paniculata, and bamboo. Located near small streams, Bamutia is surrounded by subtropical vegetation. Major plants identified here encompass jujubi, Trema orientalis, Ficus hipsida, and Microcos paniculata. Dominated by water bodies and moist deciduous regions, the Purba Naogaon area prominently features bamboo, Microcos paniculata, Ficus religiosa, and Alocasia.

Outer buffer - 15km radius



FIGURE 8 OUTER BUFFER - 15KM RADIUS**TABLE 10: QUADRAT DETAILS CENTRAL BUFFER - 10KM RADIUS**

Sr.No	Location	Latitude	Longitude	Habitat
1	Prabhapur	23.760365	91.329002	Degraded ecosystem due to monoculture plantation of Rubber & Cashew
2	Kathiram bari	23.880733	91.461906	Dominated by Teak, Bamboo & Rubber plantation
3	Mohanpur	23.979065	91.396782	Fragmented Mixed forest near agriculture land with major plants like Microcos paniculata, Melastoma affine , Schima wallici etc.

This region is a mix of moist deciduous terrains and subtropical landscapes. Rubber plantations dominate large parts of this area and have been found to be harmful to the native plants. On the contrary, areas with teak, mango, Albizia procera, and Adathoda vasica trees support a diverse range of plant life. Bamboo plantations and flat lands, especially those near settlements, show decreased vegetation.

Among the locations we studied, Prabhapur is characterised by moist deciduous terrains interspersed with subtropical regions. The dominance of rubber plantations here has unfortunately dampened plant diversity. Interestingly, while Kaju plantations are also prevalent, they've only mildly affected the local flora. Moving to Kathiram bari, the landscape is a blend of rubber and teak plantations punctuated with bamboo patches. Much like Prabhapur, rubber plantations here aren't beneficial for diverse plant life.

In contrast, the teak-rich zones and other wooded areas offer a more conducive habitat for various plant species. However, the bamboo regions, especially closer to settlements, are witnessing a diminishing green cover. Further, in Mohanpur, the terrain predominantly leans towards moist deciduous types, boasting a plethora of plants like Microcos paniculata, Melastoma affine, and Schima wallichii. Yet, akin to the patterns in Kathiram bari, bamboo expanses and areas near human settlements here too exhibit a dwindling vegetative presence.

In this buffer zone, the dominant trees in terms of biomass tonnes per hectare are Hevea brasiliensis, Microcos paniculata, Tectona grandis, and Schima wallichii, with Hevea brasiliensis leading at over 30 tonnes per hectare. On the other hand, trees such as Acacia auriculiformis, Melia azedarach, and Ficus hispida are present but with less than one tonne per hectare. Shrubs within this range, such as Chromolaena odorata, Melastoma affine, and Clerodendrum infortunatum, all have a biomass close to 9 tonnes per hectare. Among the herbs, Paspalum botterii stands out with a biomass of over 10 tonnes per hectare. The climbers in this radius include species like Pueraria phaseoloides and Dioscorea alata, both of which have a biomass exceeding 6 tonnes per hectare.

Broader buffer - 20 km radius**FIGURE 9 BROADER BUFFER - 20 KM RADIUS****TABLE 11: QUADRAT DETAILS BROADER BUFFER - 20 KM RADIUS**

Sr.No.	Location	Latitude	Longitude	Habitat
1	Dakshin champamura	23.719968	91.290515	Degraded habitat dominated by Rubber plantation
2	Paschim takarjala	23.727079	91.42424	Mixed forest near rubber plantation, major plants are Parkia biglandulosa, Albizia procera , Trema orientalis etc.
3	Jirania	23.804144	91.485237	Riverine ecosystem dominated by bamboo forest, other plants are white teak, teak, Palmyra palm, Alocasia, banana also present near settlement
4	tuichamankuri	23.928808	91.502029	Subtropical woodland dominated by teak forest along with some forest species like Macaranga & Mallotus
5	IC nagar	23.774065	91.247757	Dominated by Bamboo forest & agricultural landscape, major plants are Microcos paniculata , Wild turmeric, Carallia brachiata etc.

Expanding the radius to 20km, Hevea brasiliensis still dominates, but its biomass nearly doubles to almost 59 tonnes per hectare. Tectona grandis and Microcos paniculata follow,

with the former showing a significant increase from the 15km range. Among the shrubs, *Chromolaena odorata* remains consistent, but its biomass marginally decreases. *Paspalum botterii*, an herb, significantly increases in biomass to over 14 tonnes per hectare. Trees like *Ziziphus oenoplia*, *Mangifera indica*, and *Streblus asper* show a biomass of less than 3 tonnes per hectare, indicating their lesser dominance in this region. It's also worth noting that in this expanded range, *Bambusa balcooa*, an herb, has a biomass of over 6 tonnes per hectare, and *Spermaceoce latifolia* and *Alocasia indica* both register biomasses close to 4 tonnes per hectare.

The 15-20km buffer zone, encompassing regions such as Dakshin Champamura, Paschim Takarjala, Jirania, Tuichamankuri, and IC Nagar, offers a rich tapestry of terrestrial and moist deciduous habitats. Dakshin Champamura, with its dominance of rubber plantations, has sadly witnessed a considerable decline in vegetation diversity. Contrarily, Paschim Takarjala boasts mixed forests enriched with plants like *Parkia biglandulosa*, *Albizia procera*, and *Trema orientalis*. Jirania is an interesting blend with plants like Palmyra palm, *Alocasia*, and bamboo, although these areas are seeing diminishing green cover due to nearby human settlements. Tuichamankuri is blessed with subtropical woodlands, particularly teak forests, giving it a hilly terrain. IC Nagar, on the other hand, is characterised by a moist deciduous habitat primarily dominated by dense bamboo forests. Nevertheless, the shared concern for all these regions is the palpable strain on their flora due to the expanding rubber and bamboo plantations, increasing human settlements, and encroachments in the reserve forest areas.

4.2 Vegetation diversity comparison between core and buffer areas

The Core area and surroundings represent moist deciduous to subtropical habitats. It has been primarily dominated by rubber plantations, which have impacted the ecological health of the region. This is confirmed by the loss of over 35% forest cover in the past 20 years. The core area is marked by prominent plant species including teak, *Cassia tora*, and bamboo. The predominant tree species in the core area include "Titi", "Rubber Tree", "Teak", and *Trema orientalis*, with notable shrub and herb species like "Siam weed", "Hill Glory Bower", and "Golden Beard Grass".

0-500m: The immediate vicinity has terrestrial moist deciduous surroundings with tree species like *Microcos paniculata* and *Hevea brasiliensis* being dominant.

5km radius: Within this zone, trees like *Shorea robusta* make an appearance, and human-favoured rubber trees continue their dominance. *Mikania micrantha*, a traditional wound healer, is a prominent climber.

5-10km radius: The broader buffer showcases *Microcos paniculata*'s dominance in forest canopy, with locations like Ranjit Nagar featuring bamboo and *Parthenium hysterophorus*. In Jogendranagar, species include Teak, *Schima wallichii*, and bamboo.

15km-20km radius: This outer buffer has moist deciduous terrains and subtropical landscapes with significant rubber plantation dominance. Areas with teak and mango trees support diverse plant life. Places like Prabhapur and Kathiram bari have rubber plantations impacting plant diversity. In contrast, teak-rich zones offer better habitats for varied plant

species. Mohanpur leans towards moist deciduous types with notable plants like *Microcos paniculata* and *Melastoma affine*. Dominant trees in this buffer include *Hevea brasiliensis* and *Microcos paniculata*.

TABLE 12: MOST DOMINANT VEGETATION SPECIES IN DIFFERENT CORE AND BUFFER ZONES

Radius	Group	Abundance	Species richness	Dominant Species - Scientific name	Biomass tonnes hectare
0km	Tree	11	11	<i>Aquilaria Malaccensis</i>	14.91
0km	Shrub	104	12	<i>Chromolaena Odorata</i>	53.098
0km	Herb	95	17	<i>Chrysopogon Aciculatus</i>	21.526
0km	Climber	46	02	<i>Pueraria Phaseoloides</i>	11.481
0km	Climber	41	4	<i>Mikania micrantha</i>	7.89
10km	Tree	179	25	<i>Microcos paniculata</i>	210.28
10km	Shrub	421	19	<i>Clerodendrum infortunatum</i>	61.84
10km	Herb	957	36	<i>Paspalum botterii</i>	104.57
10km	Fern	21	2	<i>Dryopteris spp.</i>	3.95
10km	Climber	77	6	<i>Mikania micrantha</i>	21.05
15km	Tree	188	15	<i>Microcos paniculata</i>	115.12
15km	Shrub	319	12	<i>Chromolaena odorata</i>	46.05
15km	Herb	412	12	<i>Paspalum botterii</i>	42.10
15km	Climber	74	4	<i>Dioscorea alata</i>	18.42
20km	Tree	338	26	<i>Hevea brasiliensis</i>	208.87
20km	Shrub	227	10	<i>Chromolaena odorata</i>	42.10
20km	Herb	659	24	<i>Paspalum botterii</i>	69.73
20km	Fern	20	2	<i>Dryopteris spp.</i>	2.63
20km	Climber	80	6	<i>Pueraria phaseoloides</i>	17.10
500m	Tree	160	12	<i>Gmelina arborea</i>	155.38
500m	Shrub	248	11	<i>Chromolaena odorata</i>	38.16
500m	Herb	240	13	<i>Chrysopogon aciculatus</i>	30.26
500m	Fern	11	2	<i>Dryopteris spp.</i>	2.63

500m	Climber	26	3	Pueraria phaseoloides	5.26
5km	Tree	371	39	Microcos paniculata	456.05
5km	Shrub	613	16	Clerodendrum infortunatum	81.58
5km	Herb	889	25	Paspalum botterii	89.47
5km	Fern	37	3	Dryopteris spp.	6.58
5km	Climber	92	6	Dioscorea bulbifera	22.37

5. ANIMAL DIVERSITY

5.0 Fauna in the Core area – the project site

The core area of Bodhjung Nagar showcases a rich tapestry of faunal diversity, comprising various species across different taxa such as Arthropoda, Amphibia, Aves, Insects, and Reptiles. This diversity is evident in species like the Lynx Spider (*Oxyopes Sp*), Common Asian Toad (*Duttaphrynus Melanostictus*), and the Cricket Frog (*Minervarya Teraiensis*), each reflecting the unique ecological niches within this region. Notably, the Rusty Millipede (*Trigoniulus Corallinus*) and a variety of bird species such as the Common Myna (*Acridotheres Tristic*), Blyth's Reed Warbler (*Acrocephalus Dumetorum*), and the Intermediate Egret (*Ardea Intermedia*) contribute to the ecological complexity of the area.

Insects, including various species of butterflies like the Common Pierrot (*Castalius Rosimon*) and the Common Sailer (*Eptis Hylas*), along with Odonata species such as the Green Marsh Hawk (*Orthetrum Sabina*), add to the biodiversity. The presence of mammals like Pallas's Squirrel (*Callosciurus Erythraeus*) and reptiles including various gecko species (*Hemidactylus spp.*) and the Garden Lizard (*Calotes Irawadi*), enriches the faunal spectrum.

The habitats in Bodhjung Nagar vary from terrestrial moist deciduous environments, dominated by invasive shrubs and herbs, to areas near settlements and wetlands. These diverse habitats support different species, indicating a well-balanced ecosystem. For instance, areas with a low amount of shrubs due to tree covering, where important plants like Arjun, Sisham, Neem, Champa, and Amla are present, provide ideal conditions for certain species. Similarly, the wetland bounded areas with wetland grasses and regions near water bodies covered with duckweed and bamboo patches cater to specific faunal needs.

The implications of faunal biodiversity loss in such a diverse ecosystem are profound. Loss of species can lead to imbalances in the food web, affecting both predator and prey species. It can also impact pollination, seed dispersal, and other ecological processes that are vital for the sustenance of the ecosystem. Furthermore, the loss of biodiversity can reduce the resilience of the ecosystem to environmental changes and challenges, making it more susceptible to invasive species and diseases.

Preserving this faunal diversity is crucial for maintaining the ecological balance and health of Bodhjung Nagar's core area. It is essential to monitor and manage these species and their

habitats, ensuring that the intricate web of life in this region remains intact for future generations.

5.1 Fauna in the Buffer areas

Immediate vicinity - 0-500m

Within the 500m radius, the area has similar biodiversity as the core area. There are some vegetation patches with a large presence of avian species. Among amphibians, species such as the cricket frog (*Minevaria teraiensis*) and the tree frog (*Polypedates* sp) are present. Birds such as the Ashy Woodswallow (*Artamus fuscus*), Blue-tailed Bee-eater (*Merops philippinus*), and Spotted Dove (*Spilopelia chinensis*) are abundant. Insects like the Striped Tiger butterfly (*Danaus genutia*) and Glassy Tiger butterfly add to the invertebrate diversity. The presence of mammals is signified by the Rodent (*Bandicota* sp) and reptilian species include garden lizard (*Calotes irawadi*) and flat-tailed gecko (*Hemidactylus* sp).

Inner buffer - 5km radius

Within a 5km expanse, the area boasts a diverse range of fauna. The amphibian community features the Common Indian Toad (*Duttaphrynus melanostictus*). Bird enthusiasts would be captivated by the rich avian population, with notable species such as the Chestnut-tailed Starling (*Sturnia malabarica*), Yellow-footed Green Pigeon (*Treron phoenicopterus*), Spotted Dove (*Spilopelia chinensis*), White-rumped Munia (*Lonchura striata*), Ashy Woodswallow (*Artamus fuscus*), Red-whiskered Bulbul (*Pycnonotus jocosus*), and Lineated Barbet (*Psilopogon lineatus*).

Furthermore, the region is home to birds like the Turtle Dove, Red-breasted Parakeet, Brown-backed Needle-tail, Grey-breasted Prinia, Oriental Magpie-robin, Bamboo Tree Brown, Plain Prinia, Siberian Stonechat, Asian Paradise Flycatcher, Pin-striped Tit Babbler, European Honey Buzzard, Red-rump Swallow, Black Kite, Hooded Pitta, and Common Myna. Complementing this avian diversity are invertebrates such as the Huntsman Spider, Dung Beetle, and Wolf Spider. Additionally, the Pallas's Squirrel and the Bamboo Tree Brown Butterfly can also be spotted in this biodiverse region.

Central buffer - 10km radius

Within a 10km buffer zone, the amphibian population is represented by the Common Indian Toad, Narrow-mouthed frog, cricket frog, and Tree frog, each observed once in different quadrates.

The avian population demonstrates significant diversity: the Common Myna was recorded with an abundance of 30 individuals across 4 quadrates, the Barn Swallow and Chestnut-tailed Starling each had numbers of 29 individuals across 4 quadrates, and the Red-rumped Swallow with 28 individuals in similar quadrates.

House Sparrows were counted 25 times in 2 quadrates, the Red-vented Bulbul 24 times across 7 quadrates, and both the Asian Palm Swift and Spotted Dove 20 times in 4 quadrates. Birds like the Black Drongo, Indian Pond Heron, Jungle Crow, House Crow, Striated Babbler, and Red-whiskered Bulbul were observed with numbers ranging from 10 to 16 individuals in various quadrates. Others, ranging from the White-rumped Munia to the Common

Woodshrike, showed an abundance of 6 to 9 individuals in different quadrants. Birds such as the Puff-throated Babbler to the Eurasian Tree Sparrow were recorded with 3 individuals each in separate quadrates.

The observed diversity and abundance of these species have significant ecological implications, suggesting a balanced and healthy ecosystem. This biodiversity can serve as a bioindicator, reflecting the overall health, stability, and resilience of the area, potentially signalling any environmental disturbances or changes.

Outer buffer - 15km radius

Within the 15km radius, the area is remarkably rich in avian diversity, primarily dominated by the class Aves, which showcases a wide array of bird species. The most abundant species in this region is the House Sparrow (*Passer domesticus*), with a count of 47, followed closely by the Ashy Woodswallow (*Artamus fuscus*) and Blue-tailed Bee-eater (*Merops philippinus*), both contributing to the ecosystem by controlling insect populations. The Common Myna (*Acridotheres tristis*) and Bank Myna (*Acridotheres ginginianus*) are also present in appreciable numbers, playing vital roles in seed dispersal and helping in the natural process of germination.

In the amphibian category, two species were observed: *Minevarya teraiensis*, a type of cricket frog, and *Polypedates* sp, commonly known as the tree frog. Both of these species, though present in lesser numbers, are essential indicators of environmental health, with their presence typically suggesting a balanced aquatic system and cleaner water sources.

Bird species like the Black Drongo (*Dicrurus macrocercus*), Asian green bee-eater (*Merops orientalis*), and the Indian White-eye (*Zosterops palpebrosus*) enhance the beauty of the region and contribute to its ecological balance by preying on pests. The White-Throated Kingfisher (*Halcyon smyrnensis*) and Red Junglefowl (*Gallus gallus*) further diversify the fauna of this radius. Their ecological significance lies in their roles as predators and seed dispersers, maintaining a balanced food chain and aiding in forest regeneration. Collectively, the species within this radius reflect a vibrant and functional ecosystem, crucial for maintaining local biodiversity and ecological processes.

The animal life in this buffer is impacted by rubber plantations, which do not support a diverse range of species. Areas with teak and other woodlands, on the other hand, are homes to birds like the White-breasted kingfisher and the Chestnut-tailed starling. However, bamboo plantations and flat lands near settlements have been identified as potential threats to migratory birds and regional animals. In Prabhapuram, the prevalence of rubber plantations has restricted animal diversity, with only a few species like the Blue-tailed bee-eater and Common myna managing to thrive. Kathiram bari presents a similar scenario; its rubber plantations don't offer a hospitable environment for diverse fauna.

However, areas rich in teak and other woodlands are buzzing with life, housing species such as the White-breasted kingfisher, Chestnut-tailed starling, and Chestnut-headed bee-eater. It's worth noting that bamboo plantations closer to settlements fall short in supporting a varied range of birds and animals. On the other hand, Mohanpur, with its moist terrains enriched by diverse flora, serves as a sanctuary for birds like the Black hooded oriole, Black kite, and Red-

whiskered Bulbul. Yet, echoing the challenges in Kathiram bari, its bamboo expanses and proximity to settlements hinder the flourishing of local fauna.

Broader buffer - 20 km radius

Within a 20km radius, there's a splendid array of fauna, particularly evident among birds and amphibians. Common amphibians like the *Duttaphrynus melanostictus* (Common Indian Toad) and *Microhyla* sp. (Narrow-mouthed frogs) thrive in this area. Their presence, alongside the *Minevarya teraiensis* (cricket frog) and *Polypedates* sp. (Tree frog), reflects a robust aquatic and semi-aquatic ecosystem. These amphibians are not only integral to food chains but also act as bioindicators, signifying environmental well-being.

The bird community is richly diverse, featuring species like the Brahminy Starling, Common Myna, and Common Emerald Dove in substantial numbers. Birds such as the Asian Glossy Starling, Ashy Woodswallow, and Grey-breasted Prinia play significant roles in insect control and seed dispersal. The presence of various pigeon species like the Green Imperial Pigeon and Yellow-footed Green Pigeon, indicates an abundance of fruit-bearing trees, providing sustenance and shelter. The Indian Paradise Flycatcher and Black Drongo enrich this avian diversity, controlling insect populations and ensuring ecological stability.

Species like the Little Egret and Indian Pond Heron point towards the presence of wetlands or water sources, since these birds predominantly reside in such environments, preying on aquatic inhabitants. The Chestnut-tailed Starling and Indian Jungle Crow hint at diverse habitats ranging from dense woodlands to open meadows, each adding uniquely to the local ecosystem. Overall, the varied and ample species within this radius highlight a harmonious and flourishing ecosystem, with each species playing an indispensable part in preserving ecological balance.

Amid the challenges of human interference, the buffer zone's varied habitats continue to shelter a diverse range of fauna. In Dakshin Champamura, even as biodiversity faces threats, birds like the Black Drongo and Rufous Treepie find sanctuary. Paschim Takarjala boasts of the Alpine Swift and Indian Pond Heron. Jirania, despite diminishing green zones, is home to species like the Tokay Gecko, Stork-billed Kingfisher, Greater Racket-tailed Drongo, Black Hooded Oriole, and Stink bugs, particularly along its bamboo-rich riverbanks. Tuichamankuri's undulating terrains provide refuge for birds like the Long-tailed Shrike and Blue-bearded Bee-eater. In contrast, IC Nagar, with its dense bamboo cover, attracts the Tree Frog, Black Hooded Oriole, and Pallas's Squirrel. Nonetheless, the intrusion of plantations and rice fields in some regions casts a shadow over the potential biodiversity, transforming habitats from primary to secondary.

5.2 Faunal diversity comparison between core and buffer areas

Similarities between Core and Buffer areas:

- Both the core and buffer areas display a rich avian diversity, with species like the Spotted Dove and Common Myna being commonly found in both regions.
- Insects, especially butterflies, are evident in both the core and buffer regions, adding to the overall biodiversity.

- Mammalian presence in both areas tends to be limited, with some specific species like the Pallas's squirrel being observed.
- Amphibians, though not frequently mentioned for the core, have a presence in both core and buffer areas, reflecting a healthy aquatic ecosystem.
- Both regions face challenges from certain human activities such as rubber plantations, which restrict biodiversity.

Key Differences between Core and Buffer areas:

- **Species Composition:** While both areas are rich in bird species, the specific types of birds and their frequencies vary. For instance, the Asian Palm Swift is more frequent in the core, while the House Sparrow dominates in the 15km buffer.
- **Buffer Zoning:** The biodiversity within the buffer areas varies depending on the distance from the core. For instance, the immediate vicinity (0-500m) has similarities with the core, while the broader buffer (20km radius) sees a splendid array of fauna, especially among amphibians.
- **Environmental Impact:** Rubber plantations in certain buffer zones, such as in Prabhapur and Kathiram bari, restrict animal diversity, a challenge not prominently mentioned for the core area.
- **Diversity Depth:** The core region appears to be more bird-dominant, while buffer zones, especially as they expand, see a more varied mix of amphibians, birds, and other fauna.
- **Ecological Indicators:** While both regions have bioindicators suggesting environmental well-being, the buffer areas, particularly the 10km radius, have a more detailed observation of avian population counts across various quadrates, serving as robust indicators of ecosystem health.

TABLE13: DOMINANT FAUNAL SPECIES IN CORE AND BUFFER AREAS

Radius	Group	Dominant Species - Common name	Abundance	Species richness
0km	Aves	Black Drongo	205	39
0km	Insect-butterfly	Indian Cabbage White	34	12
0km	Mammal	Pallas's squirrel	3	1
0km	Other insects	Blister beetle	58	14
0km	Reptile	common house gecko	5	4
0km	Spider	Two Tailed Spider	1	1
10km	Amphibian	Common Indian Toad	4	4
10km	Aves	Black Drongo	612	80
10km	Insect-butterfly	Common crow	115	37

10km	Insect-odonata	Fulvous forest Skimmer	5	5
10km	Mammal	Pallas's squirrel	3	2
10km	Other insects	Blister beetle	105	17
10km	Reptile	Calotes irawadi	11	5
15km	Amphibian	cricket frog	2	2
15km	Aves	Black Drongo	452	79
15km	Insect-butterfly	Common crow	68	32
15km	Insect-odonata	Fulvous forest Skimmer	5	5
15km	Other insects	Blister beetle	30	16
15km	Reptile	Tokay gecko	2	2
20km	Amphibian	Common Indian Toad	6	4
20km	Aves	Black Drongo	741	100
20km	Insect-butterfly	Common crow	101	33
20km	Insect-odonata	Wandering glider	257	7
20km	Mammal	Pallas's squirrel	11	2
20km	Other insects	lynx spider	138	17
20km	Reptile	Calotes irawadi	10	4
500m	Amphibian	cricket frog	2	2
500m	Aves	Common Myna	97	38
500m	Insect-butterfly	Glassy Tiger	5	3
500m	Mammal	Rodent	1	1
500m	Other insects	Carpenter bee	2	2
500m	Reptile	Calotes irawadi	2	2
5km	Amphibian	Common Indian Toad	6	2
5km	Aves	Black Drongo	416	96
5km	Insect-butterfly	Bamboo Tree Brown	45	31

5km	Insect-odonata	Green Marsh hawk	262	12
5km	Mammal	Pallas's squirrel	3	1
5km	Other insects	Ant mimic jumper	24	8
5km	Reptile	Calotes irawadi	2	2

6. BIODIVERSITY INDICATORS

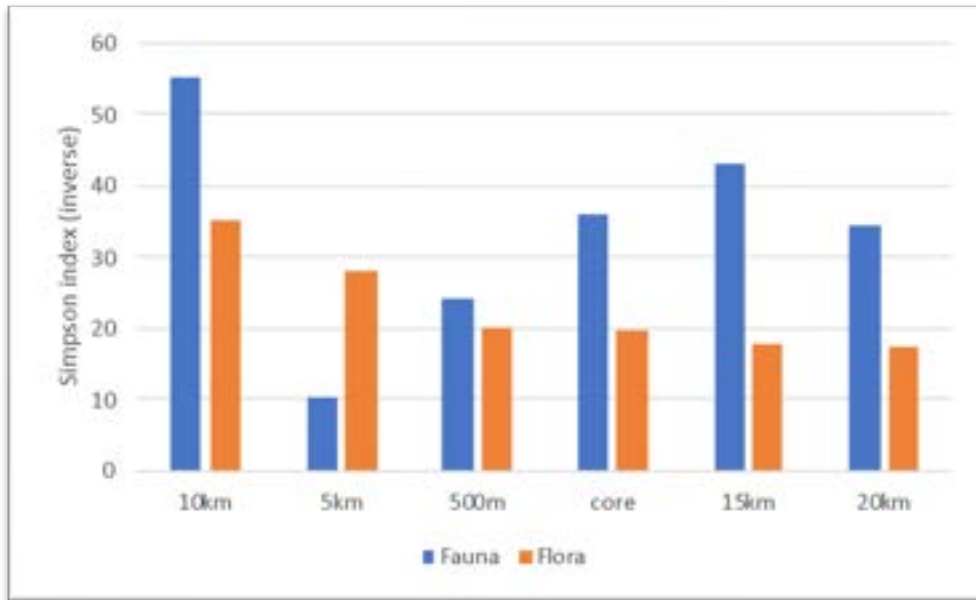


FIGURE 10: RADIUS

In the core radius, fauna exhibits a higher Shannon index of 3.89 compared to flora at 3.23, while also boasting a greater species richness, 71 versus 46 species. The Simpson Index, however, is closer between the two, with fauna at 0.97 and flora at 0.95. At 500m radius, fauna again surpasses flora in Shannon diversity with values of 3.55 and 3.25, respectively, and maintains a greater species richness at 48, contrasted with flora's 41 species. Their Simpson indices remain similar, both around the 0.95 mark.

For the 5km radius zone, fauna presents a Shannon index of 3.80 and species richness of 152, while flora demonstrates a slightly lower Shannon value of 3.68 but a lesser species richness of 89. The Simpson index for fauna drops to 0.90, with flora showing a higher value of 0.96. In the 10km radius, fauna has a higher Shannon index at 4.46, compared to flora's 3.91. The species richness is closely matched between fauna and flora, with 150 and 88 species, respectively. Both have a high Simpson index, with fauna at 0.98 and flora closely following at 0.97.

Within the 15km radius, fauna showcases a Shannon index of 4.34 and a species richness of 136, whereas flora has a slightly lower Shannon value of 3.20 and a species richness of 43. Their Simpson indices hover around the mid-0.90s. For the 20km radius, fauna's Shannon

diversity stands at 4.31 with a species richness of 167, outpacing flora's Shannon index of 3.40 and 68 species. Both types have Simpson indices in the mid-0.90s.

Across all radius zones, fauna consistently displays higher Shannon diversity and species richness than flora. The Simpson indices for both types are generally high and closely matched, signifying great diversity.

The Shannon Index measures the diversity and evenness within an ecological community. Higher values suggest greater diversity and evenness. The Simpson Index indicates the probability that two individuals randomly selected from a sample will belong to the same species. A higher value denotes greater diversity. The Inverse of the Simpson provides a clearer representation of diversity; a higher value signifies a more diverse community. Species richness represents the count of species present in a given sample, providing a straightforward measure of diversity.

6.0 management implications of biodiversity indicators

In the core area:

The data suggests that the core site of the industrial estate harbours significant biodiversity, especially in the fauna category. For the management of the industrial estate, this signifies a responsibility to ensure that ongoing or future developments minimally impact this rich ecological diversity. The presence of such a diverse ecosystem could also be an opportunity for the owner to champion sustainable and eco-friendly practices, potentially positioning the estate as a green industry leader. Additionally, understanding the rich biodiversity can aid in stakeholder communications and offer potential for eco-tourism or educational initiatives. However, it's equally crucial for management to conduct regular biodiversity assessments to monitor the health and diversity of the ecosystem, ensuring conservation measures are effective.

In the buffer area:

The data from the buffer zones, especially at distances like 500m and 5km, indicates a notable presence of biodiversity in both flora and fauna categories. For the management of the industrial estate, this highlights the importance of extending conservation efforts beyond the core site, ensuring that the surrounding areas, which serve as a buffer, maintain their ecological health and diversity. The buffer zones can act as a safety net, mitigating potential negative impacts on the core site's biodiversity. To promote sustainable development, the management can consider implementing green corridors or wildlife passages in these buffer zones. This would ensure safe movement for fauna and facilitate gene flow among plant populations. Regular environmental impact assessments, community engagement, and habitat restoration initiatives in these buffer areas can help balance industrial activities with ecological preservation.

7. HABITAT AND LANDCOVER ASSESSMENTS

7.0 Observation in the core area

The core area of Bodjung Nagar, as depicted in the land cover map, displays a diverse landscape characterized by a mix of natural and human-modified environments. The dominant

green patches signify a substantial presence of trees, indicating forested or woodland areas that are crucial for maintaining the local biodiversity and ecological balance. These areas provide habitats for various species and play a vital role in carbon sequestration and soil conservation.

Interspersed with the greenery are areas of shrubland, which, though not as rich in biodiversity as forests, still offer important ecosystems that can support a variety of fauna and flora. These shrublands may also act as buffer zones or transitional habitats between human-dominated landscapes and forested regions. Grasslands are also present, though less prominently, serving as habitats for different species of insects, birds, and small mammals. These ecosystems are important for their role in maintaining soil health and supporting pollinators.

The red areas indicate built-up land, reflecting the human footprint in the form of residential, industrial, or commercial use. The presence of industrial sites such as steel rolling mills and beverage production facilities highlights the economic activities in the region. However, the encroachment of built-up areas into natural habitats can lead to habitat fragmentation, which is detrimental to wildlife.

Croplands are visible as well, indicating agricultural use of the land. Agriculture can provide food resources but can also lead to habitat loss if not managed sustainably.

The map also shows barren or sparsely vegetated lands, which could be areas of degraded land, possibly due to overuse or past industrial activities. These areas often require restoration efforts to improve biodiversity and prevent soil erosion.

Interestingly, the presence of herbaceous wetlands can be seen, which are crucial for water filtration, flood protection, and providing breeding grounds for many aquatic species. The proximity of open water bodies and wetlands to industrial areas raises concerns about potential pollution and the need for stringent environmental safeguards.

The land cover and land use patterns in Bodhjung Nagar's core area are indicative of a region undergoing transition, balancing economic development with ecological conservation. Sustainable land management practices are essential to ensure that the natural habitats are preserved and that the land-use changes do not adversely affect the local biodiversity and ecosystem services.

Satellite Resolution mentioned in the **table no 15**.

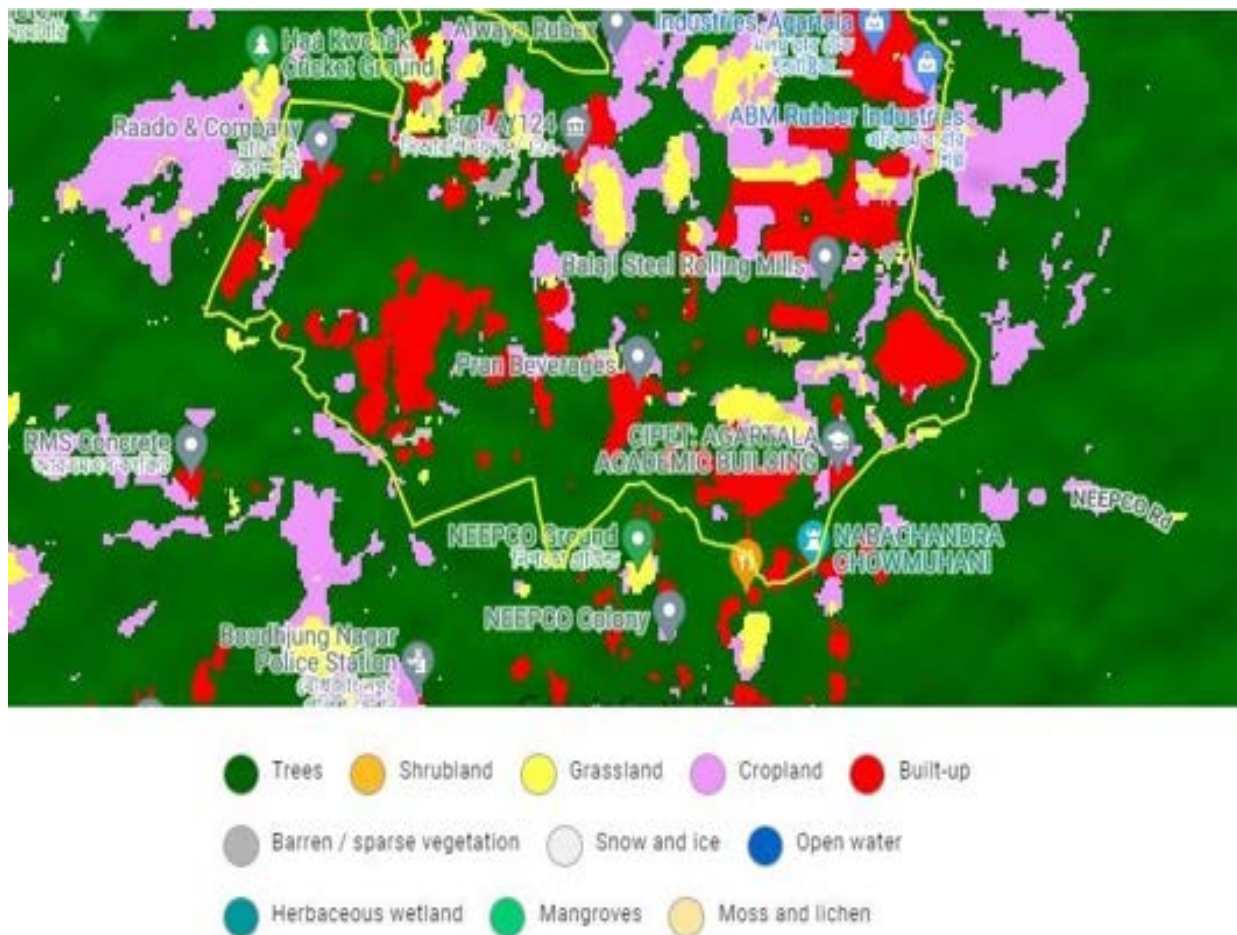


FIGURE 11: LAND USE AND LANDCOVER MAP OF THE CORE AREA

Class name	Area(ha)	Area(%)
Low (s6.0)	221.92	99.62
Total	221.92	

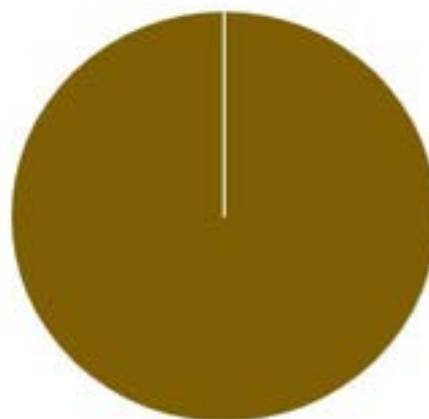


FIGURE 12: THE CORE AREA IS CLASSIFIED AS LOW ECOLOGICAL INTEGRITY DUE TO SIGNIFICANT FOREST AND BIODIVERSITY LOSS.

The integrity of the core area of Bodhjung Nagar is depicted in the pie chart, which classifies the land by vegetation density. The data suggests that the ecological integrity of the area is currently at a low threshold, with 221.92 hectares, or 99.62% of the area, characterized by low vegetation density (≤ 6.0). Such a homogenous distribution indicates that the region lacks significant areas of dense vegetation, which are essential for a robust and resilient ecosystem.

Ecological integrity refers to the ability of an ecosystem to support and maintain a community of organisms with a species composition, diversity, and functional organization comparable to those of natural habitats within a region. The current state of low vegetation density across nearly the entire area raises concerns about the health of the local ecosystems. Dense vegetation is critical for providing habitat for various species, maintaining soil and water quality, and offering services such as carbon sequestration and climate regulation.

The overwhelming dominance of low-density vegetation could be the result of several factors, including but not limited to, anthropogenic activities like deforestation, unsustainable agricultural practices, and urban expansion, which often lead to habitat fragmentation and degradation. Such conditions could significantly impact the local fauna and flora, leading to a decrease in biodiversity and disruption of ecosystem services.

To enhance the ecological integrity of Bodhjung Nagar, efforts could be directed towards increasing vegetation density through reforestation and afforestation initiatives. Protecting existing natural habitats, restoring degraded lands, and implementing sustainable land use practices are essential to improve the structural and functional aspects of the ecosystem. These steps would not only help in enhancing the biodiversity and ecological services but also contribute to the overall health and sustainability of the environment in Bodhjung Nagar's core area.

The forest cover change dynamics in the core area of Bodhjung Nagar reveal a significant transformation over the past two decades. From the total land area of 222.77 hectares, the forest cover has drastically decreased from 60.1 hectares in the year 2000 to just 15.69 hectares in 2022. This represents a forest loss of 44.41 hectares, which is a stark indicator of the environmental changes that have occurred.

The forest cover in 2000 constituted approximately 27% of the total land area, but by 2022, it had plummeted to just over 7%. This reduction of nearly 20% in forest cover over 22 years is substantial and points to a loss of nearly three-quarters of the forested area, with the percentage of forest loss being approximately 73.89%.

This change in forest cover could be attributed to a number of factors, including but not limited to, deforestation for agricultural expansion, urban development, and possibly natural causes such as disease or fire. The consequences of such a loss are profound, impacting not only the biodiversity and ecosystem services provided by these forests but also the climate and local communities that depend on them.

The table below summarizes the forest cover change:

Description	Total land area	Forest Cover in 2000	Forest Cover in 2022	Forest Cover Loss (compared to 2000)
Area in Hectares	222.8	60.1	15.7	44.41
Area in %	100%	73.35%	63.03%	74 %

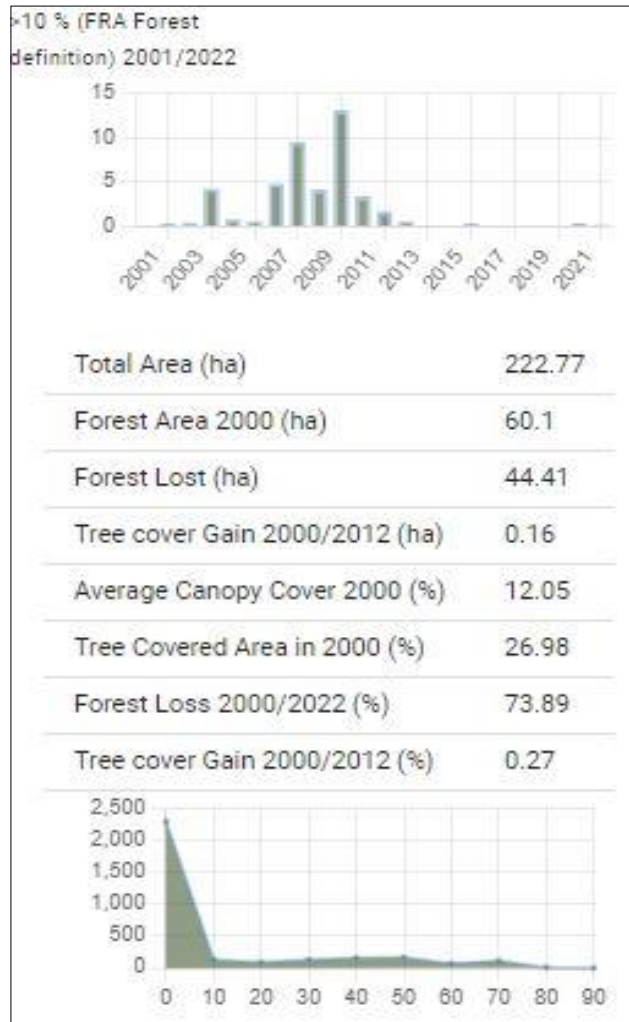


FIGURE 13: TREE COVER LOSS PATTERNS IN AND AROUND THE BODJUNG NAGAR SITE

7.1 Observations in the buffer areas

The land use and land cover (LULC) image of the area surrounding Agartala illustrates a diverse mix of natural and anthropogenic landscapes. The predominant green areas signify substantial forest cover, indicating regions that are likely to be rich in biodiversity and essential for maintaining ecological balance. These forests are crucial for supporting a variety of species, sequestering carbon, and protecting watersheds.

Encroaching on these green areas are patches of red, denoting built-up areas that represent the urban sprawl of Agartala. The urban landscape is characterized by residential, commercial,

and industrial land use, reflecting human development and economic activity. This growth often comes at the expense of natural areas and can lead to challenges such as habitat fragmentation, loss of biodiversity, and urban heat island effects.

Shrublands, shown in lighter green, are interspersed among the forests and urban areas. These lands are typically transitional zones and can support a variety of wildlife while also serving agricultural or grazing purposes. However, they may also be indicative of secondary succession where forests have been cleared and are in the process of regrowing.

Grasslands and croplands, depicted in yellow and purple respectively, are indicative of agricultural use. These areas are essential for local food production but can be vulnerable to unsustainable practices that may lead to soil degradation and loss of land fertility.

Barren or sparsely vegetated areas, represented in white, could be either naturally low in vegetation or areas impacted by deforestation, overgrazing, or other forms of land degradation. The presence of these areas within the context of a largely green region highlights the importance of land management practices that prevent land degradation and promote restoration.

The image also shows open water bodies, which are vital for the region's hydrology, supporting both wildlife and human needs. The herbaceous wetlands, possibly indicated by the light blue areas, are critical ecosystems that provide services like water filtration, flood mitigation, and habitat for aquatic and semi-aquatic species.

This LULC snapshot underscores the dynamic interplay between natural ecosystems and human activities. It highlights the importance of integrated land use planning to ensure sustainable development that conserves natural habitats, supports biodiversity, and meets human needs without compromising the ecological integrity of the region.

The forest cover change dynamics in the region from the year 2000 to 2022 reveal a nuanced picture of environmental transformation. Over this 22-year period, the total area of 70,328.49 hectares experienced a forest loss of 1,473.33 hectares, reducing the forest cover from 26,283.76 hectares in 2000 to 24,810.43 hectares in 2022.

In percentage terms, the forest cover constituted approximately 37.40% of the total land area in 2000, which decreased to about 35.30% by 2022. This reduction of forest cover by 2.10% over the two decades indicates a gradual but notable loss of forested areas. This change, while relatively small in percentage terms, can have significant ecological impacts, including reduced biodiversity, altered local climate conditions, and compromised ecosystem services such as carbon storage and water regulation.

The table below summarizes the forest cover change:

Description	Total land area	Forest Cover in 2000	Forest Cover in 2022	Forest Cover Loss (compared to 2000)
Area in Hectares	70329	26 283	24810	1473
Area in %	100%	37.4%	35.3%	5.6 %



FIGURE14: PATTERNS OF CHANGE IN THE BUFFER AREA

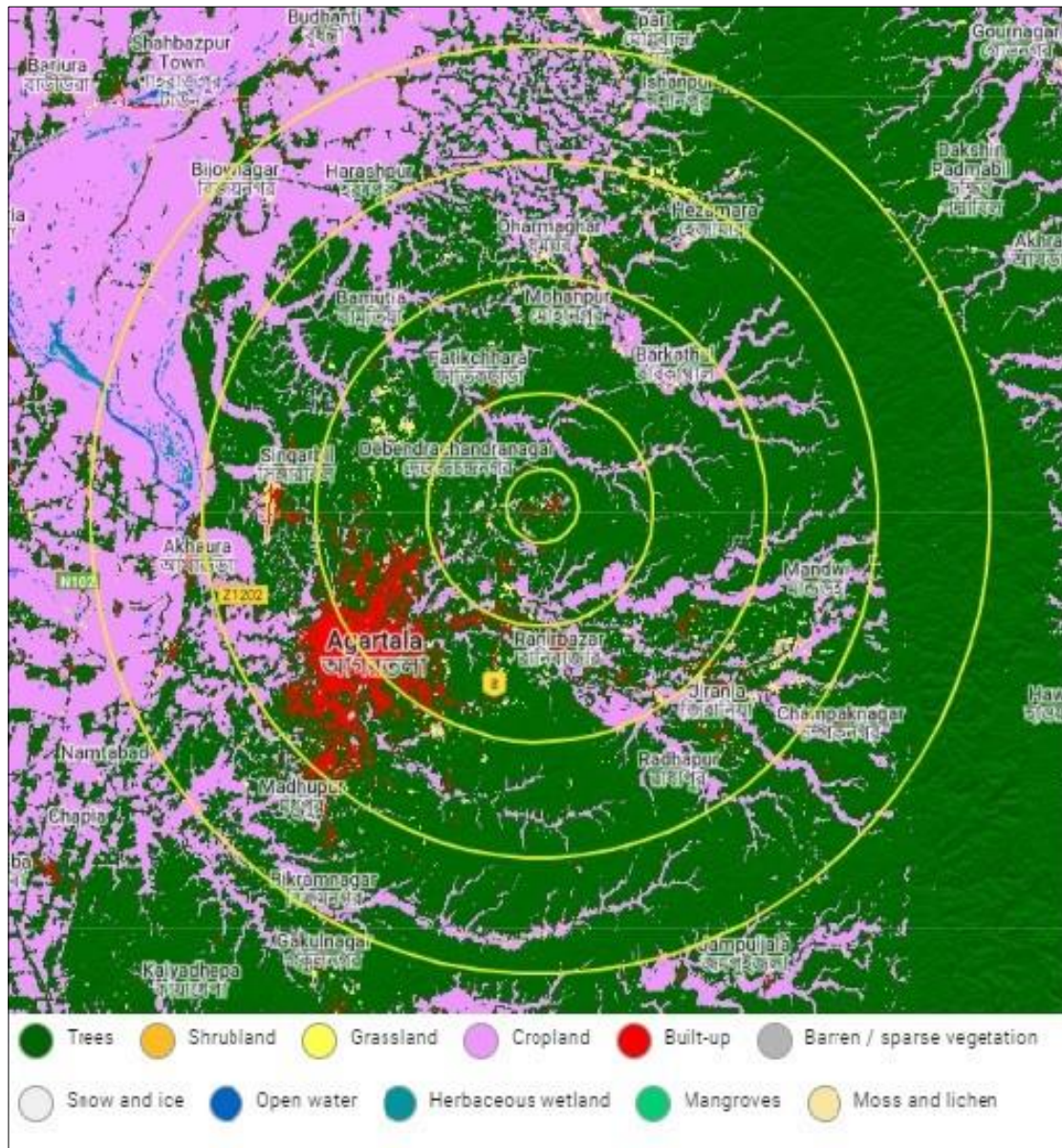


FIGURE 15: LANDCOVER AND LAND USE IN THE BUFFER AREA

Satellite Resolution mentioned in the **table no 15**

8. ECOLOGICAL AND CONSERVATION SIGNIFICANCE

8.0 Key ecologically essential species in the core and buffer

In our detailed study, we've identified a select group of species that hold immense practical value for both ecological balance and human welfare. From our findings, it's evident that these species aren't just theoretical markers of biodiversity; they're tangible contributors to our everyday lives. They are the potential powerhouses for large-scale plantation projects, capable of reviving degraded landscapes and enhancing soil quality.

A significant portion of our identified species are arboreal, many of which are indigenous, such as *Microcos paniculata* (Pichandi) and *Trema orientalis* (Indian charcoal tree). These species

predominantly flourish on hilltops, slopes, and in the vicinity of water bodies. Native shrubberies like *Ardisia neriifolia* (Coralberry) and *Clerodendrum infortunatum* (Bhat) are mainly observed on the plains and slopes. The region's herbaceous layer is enriched with various bamboo species, notably *Bambusa cacharensis* (Bom bamboo), which is unique to north-east India. Other significant herbaceous species include wild banana variants like *Musa flaviflora*. Fern diversity is also pronounced, with species such as *Dryopteris* spp. (male fern) and *Pteris vittata* (Chinese brake) are frequently seen adjacent to water sources and on slopes.

Flora and fauna details with the boundary of Bodhojung Nagar industrial estate as **annexure -2**

Key Species Identification:

- *Gmelina arborea* (Gamai): An indigenous tree of the Verbenaceae family, predominantly seen on hilltops and plains.
- *Toona ciliata* (Rongil): A member of the Meliaceae family, this indigenous tree is frequently located on hilltops, slopes, and plains.
- *Lagerstroemia speciosa* (Pride of India): A regional representative of the Lythraceae family, commonly located adjacent to aquatic habit

The list is predominantly composed of species native to the region, underscoring the area's rich endogenous biodiversity. Trees such as *Aquilaria Malaccensis* (Agar) warrant special attention due to their critically endangered status, while the *Oroxylum indicum* (Indian trumpet tree) is also noteworthy given its vulnerable classification. A few introduced species, including *Parkia javanica* (tree bean) and *Lantana camara* (Yellow Sage), have been identified. While they might present certain ecological advantages, unchecked proliferation could disrupt the balance of indigenous ecosystems.

For successful ecological restoration, species placement recommendations are grounded in their natural habitats. For instance, trees like *Gmelina arborea* (Gamai) and *Ficus benghalensis* (Bat) are ideal for hilltops and plains, whereas *Lagerstroemia speciosa* (Pride of India) thrives near aquatic zones.

A comprehensive sheet detailing ecologically important species is attached in the supporting document database.

8.1 Protected species in the region

In the study area, both the core and buffer regions harbour species of significant conservation importance. The buffer region is home to the native and endemic herbaceous species *Bambusa cacharensis*, commonly known as Bom. Another noteworthy tree in the buffer zone is the *Oroxylum indicum*, or the Indian Trumpet Tree, which is native and currently classified as endangered. The same herbaceous species, *Bambusa cacharensis*, is also found in the core region. The fauna in the core region includes resident species like the garden lizard (*Calotes irawadi*) and Pallas's squirrel (*Callosciurus erythraeus*), with the latter being under Schedule 1 protection. The buffer zone, on the other hand, teems with diverse fauna including Baillon's Crake (*Zapornia pusilla*), the Ashy-headed Green Pigeon (*Treron phayrei*), and the

Blossom-headed Parakeet (*Psittacula roseata*) to name a few. Additionally, the buffer region houses the carnivorous Shikra (*Accipiter badius*) which is a Schedule 1 protected bird, and the intriguing Wandering spider (*Ctenus* sp).

Schedule 1 Protected Species:

- Pallas's squirrel (*Callosciurus erythraeus*)
- Shikra (*Accipiter badius*)

Schedule 2 Protected Species:

- Baillon's Crake (*Zapornia pusilla*)
- Ashy-headed Green Pigeon (*Treron phayrei*)
- Blossom-headed Parakeet (*Psittacula roseata*)
- Red-breasted Parakeet (*Psittacula alexandri*)
- Wandering spider (*Ctenus* sp)

Endangered Species:

- Indian Trumpet Tree (*Oroxylum indicum*)
- Agar (*Aquilaria Malaccensis*)

Endemic Species:

- Bom (*Bambusa cacharensis*)

Near Threatened Species:

- Ashy-headed Green Pigeon (*Treron phayrei*)
- Blossom-headed Parakeet (*Psittacula roseata*)
- Red-breasted Parakeet (*Psittacula alexandri*)

These species, distributed across the core and buffer regions, require varying protection and conservation attention, as indicated by their classification.

9. BIODIVERSITY ASSESSMENT BASED ON SECONDARY

9.0 Literature Review

The project area's biodiversity, as gleaned from secondary literature, showcases an array of species from varied taxonomic classes, highlighting the ecological richness and complexity of the habitat. Based on the literature review we found a total of 68 species across six main classes, including Aves (birds), Magnoliopsida (flowering plants), Insecta (insects), Arachnida (spiders), Basidiomycota (fungi), Chilopoda (centipedes), and Diplopoda (millipedes). Among these, a majority are birds and plants, indicating a habitat that is conducive to avian and plant biodiversity.

Birds: The avian fauna is notably diverse, with 24 bird species such as the Common Myna (*Acridotheres tristis*), Ashy Woodswallow (*Artamus fuscus*), and the Lesser Coucal (*Centropus bengalensis*), typically inhabiting open woodlands, grasslands, and urban areas. Most of these species are of Least Concern according to the IUCN, except for the Phayre's Leaf Monkey (*Trachypithecus phayrei*), which is marked as Endangered, signifying the need for conservation focus on this species.

Plants: The flora includes 23 species of flowering plants like Devil's Horsewhip (*Achyranthes aspera*) and Peacock Flower (*Caesalpinia pulcherrima*), which are adapted to a range of tropical habitats, from forests to disturbed areas. These species have not been evaluated by IUCN, indicating a potential lack of specific conservation data.

Insects: The insect population in the area is represented by 15 species such as the Amerila astreus (*Amerila astreus*), a moth species, and the Ditch Jewel (*Brachythemis contaminata*), an insect that frequents freshwater habitats. The insects here show adaptability to varied environmental conditions, from aquatic to forest ecosystems.[1,2](#)

Spiders (Arachnida), Fungi (Basidiomycota), Centipedes (Chilopoda), and Millipedes (Diplopoda):

Lesser-represented classes include spiders, fungi, centipedes, and millipedes, with each class having one to two species recorded such as the Ant-mimic Spiders (Genus *Myrmarachne*) and the *Panaeolus antillarum*, a type of fungus. These species are typically found in moist environments and are not evaluated by IUCN.

The key habitats identified from the data include tropical and subtropical forests, urban areas, grasslands, freshwater habitats, and varied, often disturbed areas. These habitats are essential for providing the ecological niches required by the diverse species present.

Conservation Status: A total of 17 species are listed under IUCN's Least Concern category, reflecting a stable presence in their natural habitats. However, a significant number of species, specifically 50, have not been evaluated by the IUCN, underscoring a gap in conservation assessment and potential unrecognised threats to these species.

The data underscores the richness of the project area's biodiversity and the importance of its varied habitats, which range from urban areas to natural woodlands and forests. Urban areas, while often considered less ideal for wildlife, are shown here to support a variety of bird life, demonstrating their adaptability and the importance of urban biodiversity. Conversely, the presence of species such as the Endangered Phayre's Leaf Monkey (*Trachypithecus phayrei*) in tropical forests highlights the critical need for habitat conservation and the potential impact of habitat loss due to development or other anthropogenic pressures.[3,4](#)

9.1 Integrated Biodiversity Assessment Tool (IBAT)

The Integrated Biodiversity Assessment Tool (IBAT)[7](#) is a software tool that provides access to a wide range of global biodiversity and conservation information. It is designed to support

decision-making processes and help assess potential impacts on biodiversity during project planning and development.

IBAT integrates various datasets from reputable sources, including the International Union for Conservation of Nature (IUCN), BirdLife International, and other data providers, into a single platform. These datasets include information on species distributions, protected areas, Key Biodiversity Areas (KBAs), and other relevant biodiversity indicators.



FIGURE 16 : GEOGRAPHICAL LOCATION

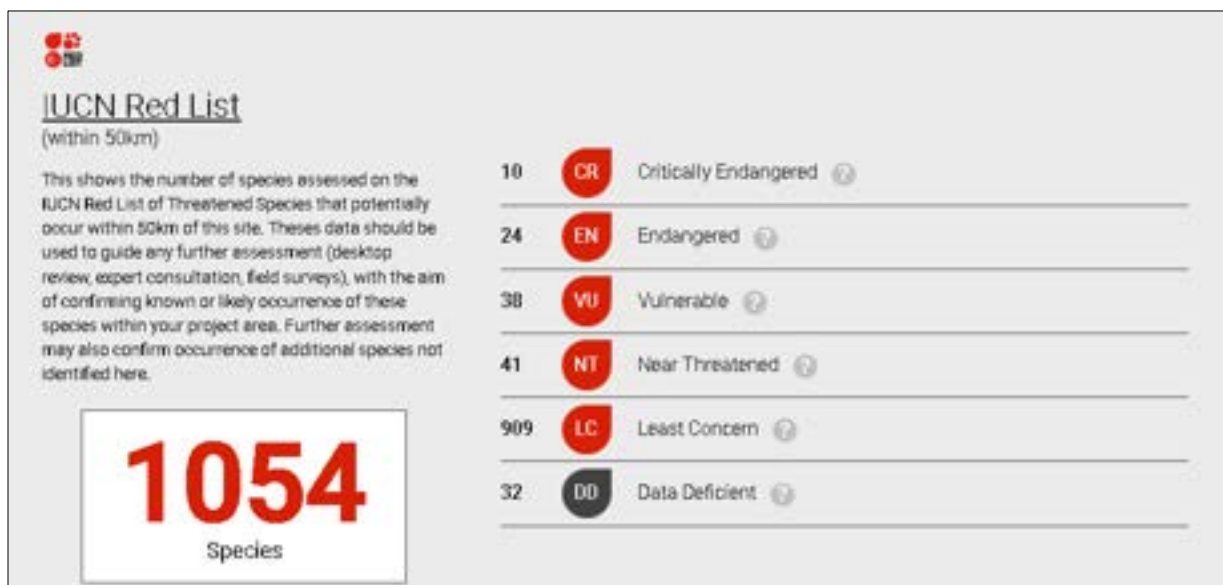


FIGURE 17 : IBAT ASSESSMENT WITHIN 50 KMS

According to the IUCN⁶ (International Union for Conservation of Nature), we have categorised species into different conservation statuses. The following are the species falling under the categories of Critically Endangered, Endangered, Vulnerable, Near Threatened & Data Deficient within 50 km radius of the project site. However, we have not included species classified as Least Concerned as they are considered less significant in terms of conservation status.

TABLE14: SPECIES AND RED LIST CRITERIA

S.No	Scientific Name	Class Name	Red list Category	Red list Criteria
1	Schizothorax plagiostomus	Actinopterygii	Vulnerable	A2b
2	Wallago attu	Actinopterygii	Vulnerable	A2d
3	Bagarius bagarius	Actinopterygii	Vulnerable	A2d
4	Ortygornis gularis	Aves	Vulnerable	A2cd+3cd+4cd
5	Clanga hastata	Aves	Vulnerable	C2a(ii)
6	Leptoptilos javanicus	Aves	Vulnerable	A2cd+3cd+4cd
7	Gallinago nemoricola	Aves	Vulnerable	C2a(ii)
8	Aquila heliaca	Aves	Vulnerable	C2a(ii)
9	Sterna aurantia	Aves	Vulnerable	A2bcd+3bcd+4bcd
10	Buceros bicornis	Aves	Vulnerable	A3cd+4cd
11	Clanga clanga	Aves	Vulnerable	A2cde
12	Aythya ferina	Aves	Vulnerable	A2abcd+3bcd+4abcd
13	Oryza malampuzhaensis	Liliopsida	Vulnerable	B1ab(iii,v)
14	Dipterocarpus costatus	Magnoliopsida	Vulnerable	A2cd
15	Dipterocarpus turbinatus	Magnoliopsida	Vulnerable	A2cd
16	Beilschmiedia assamica	Magnoliopsida	Vulnerable	B2ab(iii)
17	Dalbergia thomsonii	Magnoliopsida	Vulnerable	B2ab(iii)
18	Arctonyx collaris	Mammalia	Vulnerable	A2cd+3cd+4cd
19	Arctictis binturong	Mammalia	Vulnerable	A2cd+3cd+4cd
20	Rusa unicolor	Mammalia	Vulnerable	A2cd+3cd+4cd
21	Helarctos malayanus	Mammalia	Vulnerable	A2cd+3cd+4cd
22	Capricornis sumatraensis	Mammalia	Vulnerable	A2cd
23	Panthera pardus	Mammalia	Vulnerable	A2cd
24	Lutrogale perspicillata	Mammalia	Vulnerable	A2cde+3cde
25	Aonyx cinereus	Mammalia	Vulnerable	A2cde+3cde
26	Ursus thibetanus	Mammalia	Vulnerable	A2cd
27	Macaca arctoides	Mammalia	Vulnerable	A2cd+3cd
28	Trachypithecus pileatus	Mammalia	Vulnerable	A2ac+3c
29	Neofelis nebulosa	Mammalia	Vulnerable	A2cd+4cd
30	Macaca leonina	Mammalia	Vulnerable	A2acd+3cd
31	Prionailurus viverrinus	Mammalia	Vulnerable	A2cd+3cd+4cd
32	Ophiophagus hannah	Reptilia	Vulnerable	A2acd
33	Elaphe taeniura	Reptilia	Vulnerable	A2d
34	Pangshura tecta	Reptilia	Vulnerable	A4d
35	Lissemys punctata	Reptilia	Vulnerable	A2cd+4cd
36	Crocodylus palustris	Reptilia	Vulnerable	A2cd

37	Python bivittatus	Reptilia	Vulnerable	A2acd
38	Xenochrophis cerasogaster	Reptilia	Vulnerable	A2c
39	Parambassis lala	Actinopterygii	Near Threatened	
40	Balitora Brucei	Actinopterygii	Near Threatened	
41	Ompok bimaculatus	Actinopterygii	Near Threatened	
42	Microphis deocata	Actinopterygii	Near Threatened	
43	Anguilla bicolor	Actinopterygii	Near Threatened	A2bcde
44	Anguilla bengalensis	Actinopterygii	Near Threatened	A2cd
45	Arborophila atrogularis	Aves	Near Threatened	C1+2a(i)
46	Mareca falcata	Aves	Near Threatened	A2bd+3bd+4bd
47	Calidris ruficollis	Aves	Near Threatened	A2bc+3bc+4bc
48	Vanellus duvaucelii	Aves	Near Threatened	A3cde
49	Anhinga melanogaster	Aves	Near Threatened	A2bcd+3bcd+4bcd
50	Threskiornis melanocephalus	Aves	Near Threatened	A2bcd+3bcd+4bcd
51	Ephippiorhynchus asiaticus	Aves	Near Threatened	A2bc+3bc+4bc;C1
52	Palaeornis eupatria	Aves	Near Threatened	A2cd+3cd+4cd
53	Limosa lapponica	Aves	Near Threatened	A2abc+3bc+4abc
54	Himalayapsitta roseata	Aves	Near Threatened	A2cd+3cd+4cd
55	Psittacula alexandri	Aves	Near Threatened	A2cd+3cd+4cd
56	Limosa limosa	Aves	Near Threatened	A2bcde+3bcde+4bcde
57	Ichthyophaga ichthyaetus	Aves	Near Threatened	A2cd+3cd+4cd; C1+2a(i)
58	Numenius arquata	Aves	Near Threatened	A2bcd+3bcd+4bcd
59	Pelecanus philippensis	Aves	Near Threatened	A2cd; C1
60	Graminicola bengalensis	Aves	Near Threatened	C2a(i)
61	Calidris canutus	Aves	Near Threatened	A2abc+3bc+4abc
62	Aythya nyroca	Aves	Near Threatened	A2cd+3cd+4cd
63	Haematopus ostralegus	Aves	Near Threatened	A2bc+3b+4bc
64	Calliope pectardens	Aves	Near Threatened	C2a(ii)
65	Treron phayrei	Aves	Near Threatened	A2cd+3cd+4cd
66	Falco jugger	Aves	Near Threatened	A2cd+3cd+4cd; C1
67	Ducula aenea	Aves	Near Threatened	A3cd+4cd
68	Circus macrourus	Aves	Near Threatened	A2cde+3cde+4cde
69	Asiagomphus personatus	Insecta	Near Threatened	
70	Aegle marmelos	Magnoliopsida	Near Threatened	A2acd
71	Maydelliathelphusa edentula	Malacostraca	Near Threatened	
72	Rousettus leschenaultii	Mammalia	Near Threatened	A2cd
73	Coelops frithii	Mammalia	Near Threatened	A4c
74	Pardofelis marmorata	Mammalia	Near Threatened	
75	Catopuma temminckii	Mammalia	Near Threatened	
76	Varanus bengalensis	Reptilia	Near Threatened	A2d
77	Eryx conicus	Reptilia	Near Threatened	A2d
78	Herpetoreas xenura	Reptilia	Near Threatened	B1b(iii)
79	Ptyas korros	Reptilia	Near Threatened	A2d
80	Tor putitora	Actinopterygii	Endangered	A2abcd

81	Leptoptilos dubius	Aves	Endangered	A2bcd+3bcd+4bcd;C2a(ii)
82	Asarcornis scutulata	Aves	Endangered	A2cd+3cd+4cd;C2a(i)
83	Laticilla cinerascens	Aves	Endangered	A2c+3c+4c; C2a(i)
84	Perdicula manipurensis	Aves	Endangered	C2a(i)
85	Haliaeetus leucoryphus	Aves	Endangered	C2a(ii)
86	Aquila nipalensis	Aves	Endangered	A2abcd+3bcd+4abcd
87	Sterna acuticauda	Aves	Endangered	C2a(ii)
88	Urogymnus polylepis	Chondrichthyes	Endangered	A2bcd
89	Hoolock hoolock	Mammalia	Endangered	A4acd
90	Elephas maximus	Mammalia	Endangered	A2c
91	Platanista gangetica	Mammalia	Endangered	A2abcde+3bcde+4abcde
92	Cuon alpinus	Mammalia	Endangered	C2a(i)
93	Trachypithecus phayrei	Mammalia	Endangered	A2cd
94	Nycticebus bengalensis	Mammalia	Endangered	A2acd+3cd+4acd
95	Panthera tigris	Mammalia	Endangered	A2abcd
96	Morenia petersi	Reptilia	Endangered	A2cd+4cd
97	Nilssonia gangetica	Reptilia	Endangered	A2d+4d
98	Nilssonia hurum	Reptilia	Endangered	A2d+4d
99	Hardella thurjii	Reptilia	Endangered	A2bcd+4bcd
100	Varanus flavescens	Reptilia	Endangered	A2cd
101	Geoclemys hamiltonii	Reptilia	Endangered	A2cd+4cd
102	Johnius gangeticus	Actinopterygii	Data Deficient	
103	Taenioides cirratus	Actinopterygii	Data Deficient	
104	Platycephalus indicus	Actinopterygii	Data Deficient	
105	Gobiopterus chuno	Actinopterygii	Data Deficient	
106	Gogangra laevis	Actinopterygii	Data Deficient	
107	Pseudolaguvia muricata	Actinopterygii	Data Deficient	
108	Pseudolaguvia virgulata	Actinopterygii	Data Deficient	
109	Megalops cyprinoides	Actinopterygii	Data Deficient	
110	Planiliza tade	Actinopterygii	Data Deficient	
111	Doryichthys martensii	Actinopterygii	Data Deficient	
112	Micryletta aishani	Amphibia	Data Deficient	
113	Corbicula sylhetica	Bivalvia	Data Deficient	
114	Physunio micropteroides	Bivalvia	Data Deficient	
115	Stenothyra echinata	Gastropoda	Data Deficient	
116	Assiminea hungerfordiana	Gastropoda	Data Deficient	
117	Camptoceras austeni	Gastropoda	Data Deficient	
118	Neritina platyconcha	Gastropoda	Data Deficient	
119	Auriculodes gangetica	Gastropoda	Data Deficient	
120	Anisogomphus caudalis	Insecta	Data Deficient	
121	Ranalisma rostrata	Liliopsida	Data Deficient	
122	Oryza coarctata	Liliopsida	Data Deficient	
123	Limnophila diffusa	Magnoliopsida	Data Deficient	
124	Limnophila pulcherrima	Magnoliopsida	Data Deficient	

125	Prunus bifrons	Magnoliopsida	Data Deficient	
126	Quercus gomeziana	Magnoliopsida	Data Deficient	
127	Macrobrachium kempfi	Malacostraca	Data Deficient	
128	Maydelliathelphusa falcidigitis	Malacostraca	Data Deficient	
129	Globitelphusa pistorica	Malacostraca	Data Deficient	
130	Globitelphusa cylindra	Malacostraca	Data Deficient	
131	Travancoriana napaea	Malacostraca	Data Deficient	
132	Acanthopotamon fungosum	Malacostraca	Data Deficient	
133	Blythia reticulata	Reptilia	Data Deficient	
134	Emberiza aureola	Aves	Critically Endangered	A2acd+3cd+4acd
135	Houbaropsis bengalensis	Aves	Critically Endangered	A3bcd+4abcd
136	Ardea insignis	Aves	Critically Endangered	C2a(i)
137	Aythya baeri	Aves	Critically Endangered	A2cd+3cd+4cd; C2a(ii)
138	Gyps bengalensis	Aves	Critically Endangered	A2abce+4abce
139	Aquilaria malaccensis	Magnoliopsida	Critically Endangered	A2cd
140	Manis pentadactyla	Mammalia	Critically Endangered	A3d+4d
141	Pelochelys cantorii	Reptilia	Critically Endangered	A2cd+4cd
142	Nilssononia nigricans	Reptilia	Critically Endangered	A4cd
143	Indotestudo elongata	Reptilia	Critically Endangered	A2cd

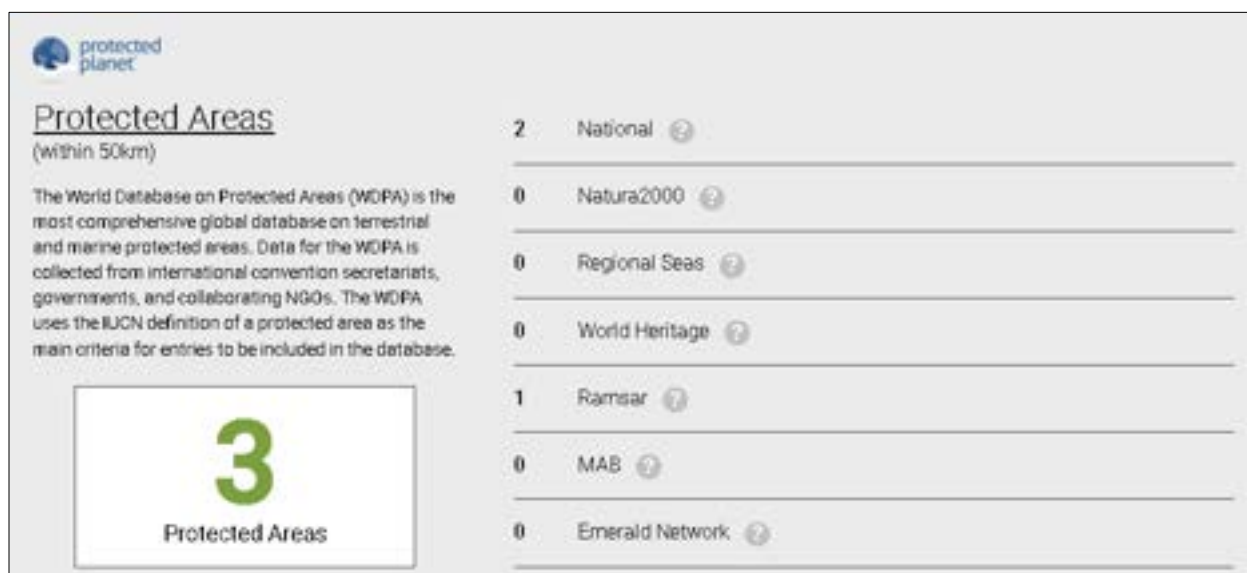


FIGURE 18 : PROTECTED AREAS

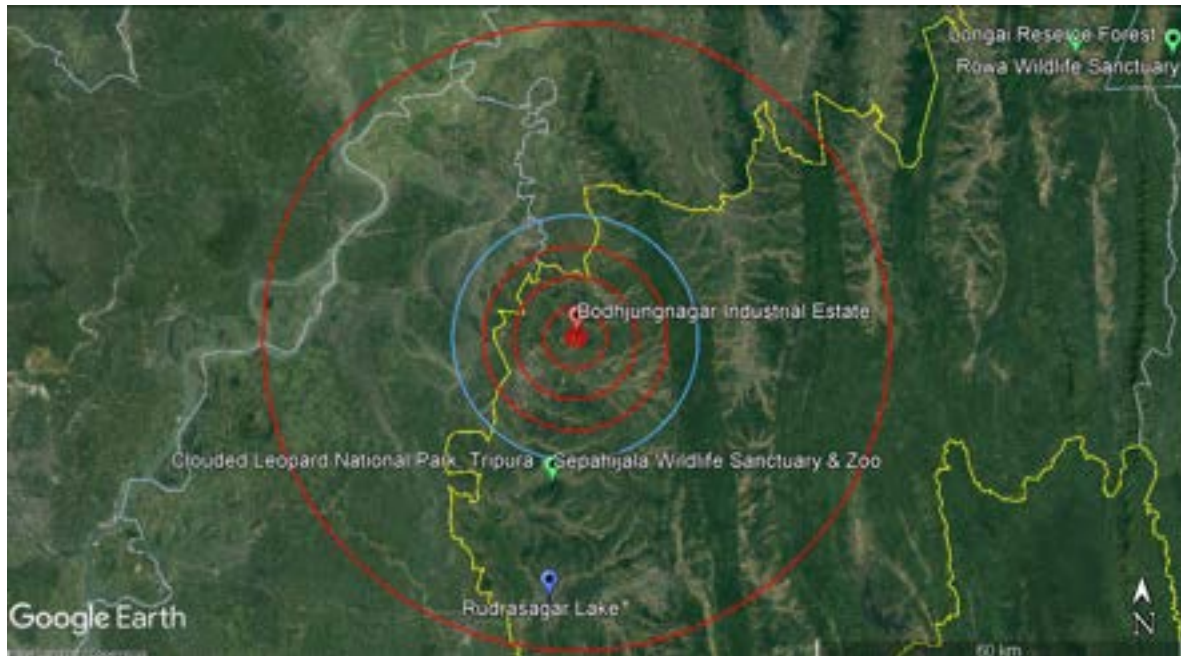


FIGURE 19: PROTECTED AREAS WITHIN 50 KM RADIUS (ALL THE PROTECTED AREAS ARE WITHIN 20-50 KM RANGE)

According to IBAT (Integrated Biodiversity Assessment Tool), protected areas refer to specific geographic areas that are legally designated and managed to conserve biodiversity and natural resources. These areas are established with the objective of safeguarding ecosystems, habitats, species, and ecological processes from potential threats and human activities that could harm their integrity.

Protected areas can vary in size, ranging from small reserves to large national parks or even transboundary conservation areas. They can include a wide range of habitats such as forests, wetlands, grasslands, marine areas, and more.

The designation and management of protected areas are typically governed by national or regional legislation, policies, and regulations. These areas may have different levels of protection and management categories, such as strict nature reserves, national parks, wildlife sanctuaries, or community conserved areas, depending on their conservation objectives and the level of human use permitted within them.

Below are the list of Key Protected Areas within 20 km to 50 km radius within India

- Clouded leopard National Park
- Sepahijala Wildlife Sanctuary
- Rudrasagar Lake (Ramsar Site)

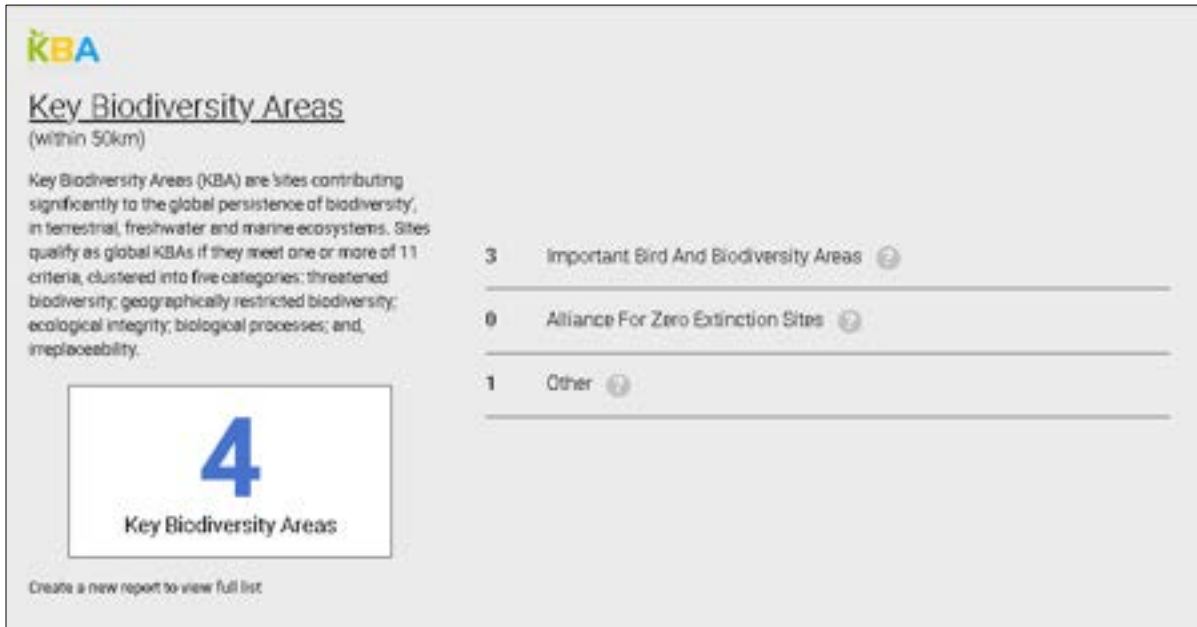


FIGURE 20: KEY BIODIVERSITY AREAS

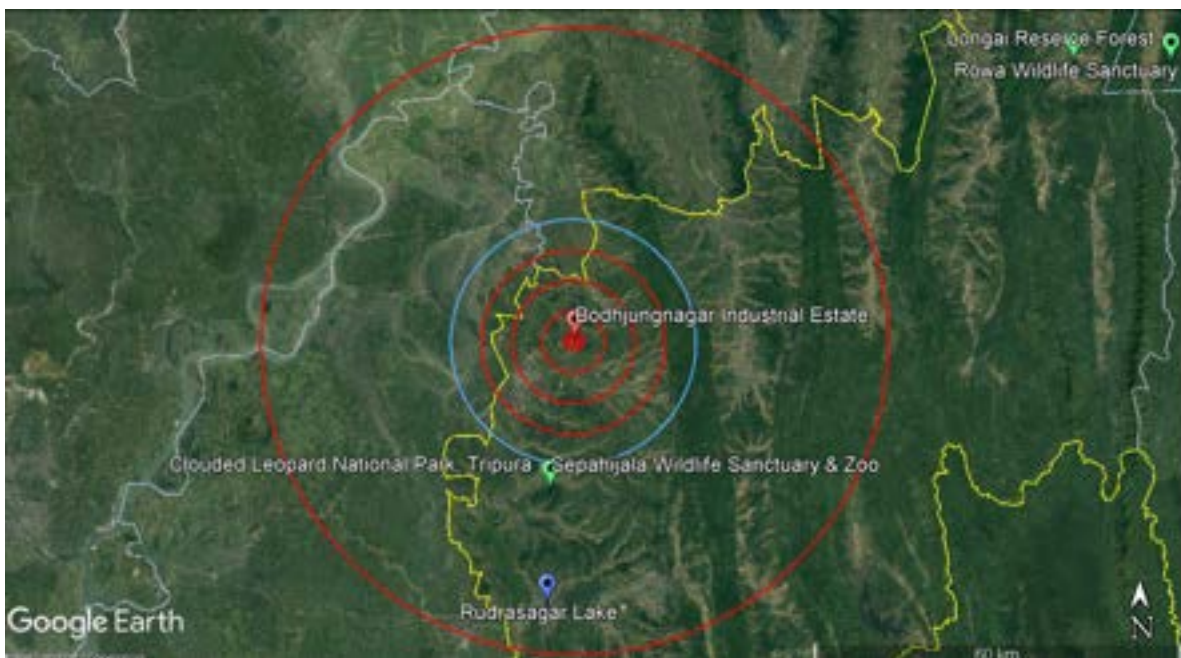


FIGURE 21: KBAs WITHIN 50 KM RADIUS (ALL THE KBAs ARE WITHIN 20-50 KM RANGE)

Key Biodiversity Areas (KBAs) in Tripura are specific sites that have been identified as having exceptional biodiversity significance. These areas are crucial for the conservation of species, habitats, and ecological processes. While I don't have access to the specific list of KBAs in Tripura, I can provide you with a general understanding of what KBAs represent and how they are identified.

KBAs are typically identified through a systematic and scientific approach that takes into account various factors such as species richness, endemism, threat status of species, and

ecological uniqueness. The identification process involves the assessment of available data, including species distribution records, ecological studies, and expert consultations.

These areas can encompass a range of ecosystems, including forests, wetlands, grasslands, and other habitats. KBAs play a vital role in maintaining biodiversity and often serve as important refuges for endangered or vulnerable species.[8](#)

Below are the list of Key Biodiversity Areas from 20 km to 50 km radius within India

- Clouded leopard National Park
- Sepahijala Wildlife Sanctuary
- Rudrasagar Lake (Ramsar Site)

9.2 IUCN Status

Population trends of species

Our survey provides critical insights into the population trends of the local species, categorised into four distinct segments based on the data observed. The findings are graphically represented in the pie chart (figure 12) in this report section, which outlines the percentage of species within each population trend category.

- **Unknown Trends:** Alarmingly, the largest segment of the chart, accounting for 39%, represents species with 'Unknown' population trends. This significant figure indicates a substantial gap in our monitoring and data collection efforts, emphasising the need for enhanced research to understand the ecological dynamics in the Bodhjung Nagar area better.
- **Stable Populations:** A positive note is that 32% of the species observed have 'Stable' populations. This stability suggests that, for now, these species are maintaining their numbers, which could be indicative of suitable habitat conditions and the effectiveness of current conservation measures within this locale.
- **Decreasing Populations:** A cause for concern is the 24% of species that are experiencing a 'Decreasing' trend in their populations. This decline points to possible challenges in the ecosystem, such as habitat loss, pollution, or overexploitation, which need to be addressed promptly to prevent further losses.
- **Increasing Populations:** A mere 5% of the species are on an 'Increasing' trend. While this is a hopeful sign for these particular species, it is a small number compared to those with declining populations, underscoring the necessity for continued conservation efforts to foster such positive trends across a broader array of species in the Bodhjung Nagar area.

In conclusion, the population trend data from the Bodhjung Nagar area presents a mixed but concerning picture, with a notable number of species either in decline or with insufficient data to assess their status. Moving forward, it is imperative that we fill knowledge gaps and mitigate

the factors leading to population declines, thereby ensuring the protection and resilience of biodiversity in Bodhjung Nagar buffer areas.[6](#)

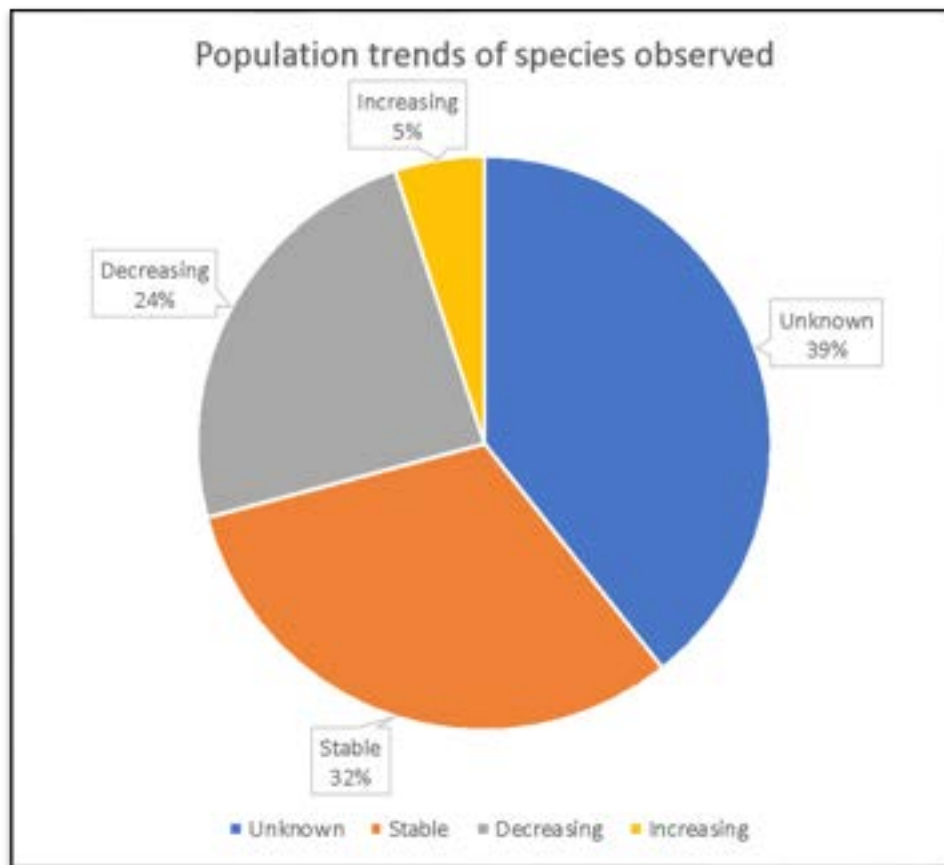


FIGURE 22: POPULATION TRENDS OF SPECIES OBSERVED

Status of species:

This assessment of the Bodhjung Nagar areas provides an overview of the species' risk categories as defined by the International Union for Conservation of Nature (IUCN):

- **Critically Endangered:** Representing 7% of the species assessed, the Critically Endangered category includes those species that are facing an extremely high risk of extinction in the wild. This small but significant portion highlights the urgent need for targeted conservation efforts to avert the loss of these species.
- **Endangered:** Making up 15% of the observations, the Endangered species are at a very high risk of extinction. The status of these species is particularly concerning and calls for immediate action to identify and mitigate the primary threats to their survival.
- **Vulnerable:** Constituting 26% of the species assessed, those classified as Vulnerable are at a high risk of extinction. While not as immediately at risk as the Endangered or Critically Endangered categories, the need for protective measures is pressing to ensure their populations do not decline further.

- **Near Threatened:** The Near Threatened species, accounting for 29% of the observations, are close to qualifying for or are likely to qualify for a threatened category in the near future. This substantial proportion reflects species that could face more serious risks if current trends continue or if no conservation actions are implemented.
- **Data Deficient:** Alarming, 23% of the species fall under the Data Deficient category. This significant percentage indicates a lack of sufficient information to make a direct, or indirect, assessment of their risk of extinction. It underscores the critical need for more comprehensive biological and ecological research in the Bodhjung Nagar area to inform conservation strategies.

In summary, the Bodhjung Nagar area harbours a range of species with varying levels of conservation concern. A considerable number of these species are threatened or near threatened, emphasising the necessity for conservation initiatives. Moreover, the large proportion of Data Deficient species highlights an urgent need for further research to properly assess their status and to formulate effective conservation plans.

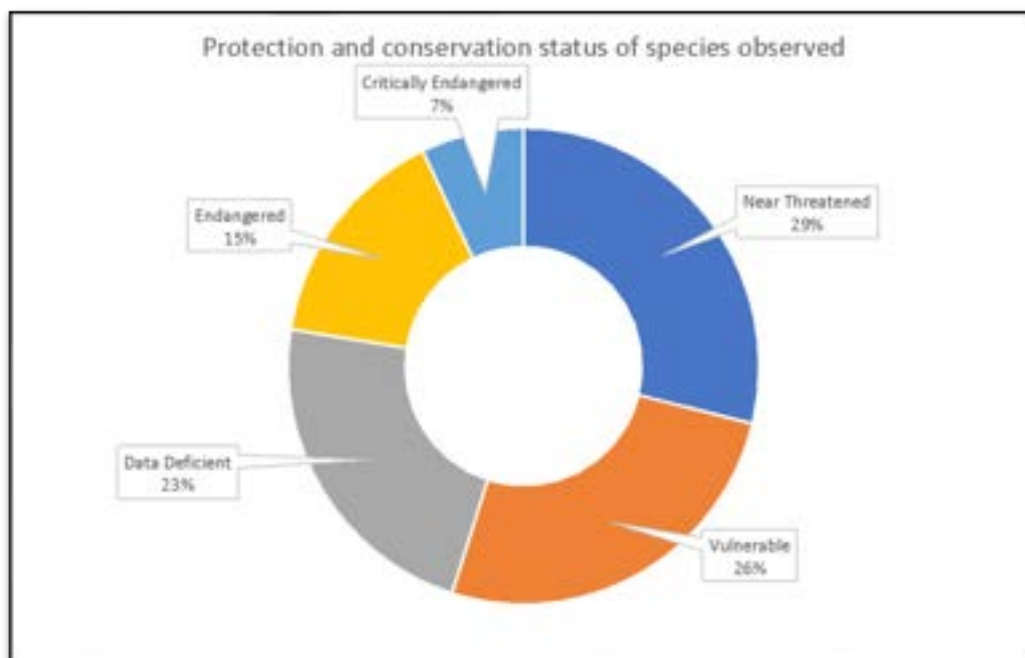


FIGURE 23: CONSERVATION STATUS OF SPECIES

10. BIODIVERSITY CONSERVATION POLICIES BY THE STATE

The Tripura state strategies and action plan on biodiversity conservation encompass various initiatives and efforts aimed at preserving the rich biological diversity of the region. The Tripura Biodiversity Board (TBB) plays a pivotal role in raising awareness about the conservation of biological diversity and the sustainable use of its components through mass media. Tripura's biodiversity is characterised by a significant range of floral diversity, with approximately 8.6% of angiosperms known from India recorded in Tripura. The state's floral diversity, comprising 1546 species belonging to 862 genera and 192 families, reflects the region's ecological significance. In terms of legal frameworks, the Tripura Biological Diversity Rules, 2006,

establish the composition, duties, and responsibilities of the Biodiversity Management Committees and Bodies, emphasising the state's commitment to biodiversity management and conservation. Tripura's strategies and action plan on biodiversity conservation encompass a multi-faceted approach, including awareness creation, conservation breeding, and legal frameworks, reflecting the state's dedication to preserving its rich biological diversity for the well-being of present and future generations.

The key components of Tripura's biodiversity conservation action plan include the following:

- **Development of Picnic Spots:** The plan includes the development of picnic spots to promote eco-tourism and raise awareness about the region's biodiversity
- **Habitat Improvement and Management:** Efforts are directed towards the improvement and management of habitats, including the enrichment of vegetation and maintenance of older grasslands
- **Inventorization of Bio-Diversity Resources:** The action plan involves the incentivization of biodiversity resources to assess and document the region's biological diversity
- **Conservation Breeding:** The state has focused on conservation breeding to protect key species, emphasising the importance of preserving genetic diversity and preventing the extinction of valuable species
- **State Biodiversity Strategy and Action Plan (SBSAP):** The Tripura Biodiversity Board has invited proposals for the development of the State Biodiversity Strategy and Action Plan (SBSAP) up to 2030, indicating a forward-looking approach to biodiversity conservation
- **Ecosystem Diversity:** The plan recognizes the significance of ecosystem diversity, species diversity, and genetic diversity in Tripura, emphasising the need to conserve and sustainably manage these components of biodiversity
- **Legal Frameworks:** The Tripura Biological Diversity Rules, 2006, establish the composition, duties, and responsibilities of the Biodiversity Management Committees and
- **Involvement of Village Communities and Panchayats:** The involvement of village communities and panchayats in biodiversity conservation activities is considered essential for the successful implementation of conservation efforts. This approach likely includes engaging local communities in habitat protection and restoration initiatives, thereby contributing to the conservation of endangered species.
- **Shifting Cultivation and Habitat Conservation:** Addressing the impact of shifting cultivation on habitat loss is crucial for biodiversity conservation in Tripura. Efforts to

manage shifting cultivation practices and their impact on habitats can contribute to the protection of endangered species and their habitats

11. HIGH-RESOLUTION SATELLITE IMAGERY

In the endeavour to map land cover and analyse forest cover change over the past decade, Sentinel-2 imagery has been an indispensable asset. The Sentinel-2 mission, part of the European Union's Copernicus Programme, provides high-resolution multispectral data crucial for environmental monitoring and land management applications. With its twin satellites, Sentinel-2A and Sentinel-2B, the mission captures the Earth's surface in 13 spectral bands, ranging from visible, near-infrared to shortwave infrared at spatial resolutions of 10, 20, and 60 metres. The 10-metre resolution bands, in particular, have been pivotal in the classification process, enabling the discrimination of fine-scale land cover features which is essential for creating detailed and accurate land cover maps.

Utilising Sentinel-2's frequent revisit time of 5 days, we were able to compile a time-series dataset that facilitated the detection of temporal changes and trends in land use, especially within forested regions. By applying advanced remote sensing techniques and classification algorithms to this multispectral dataset, we generated precise land cover maps that not only provided a snapshot of the current land use but also traced the transformation of the landscape over time. Through change detection analysis, quantifiable evidence of deforestation, forest degradation, and regrowth was identified, offering critical insights into the health and dynamics of forest ecosystems.

This analytical process was enhanced by the rich spectral information provided by Sentinel-2's red edge and shortwave infrared bands, which are particularly sensitive to vegetation health and biomass. These bands were instrumental in assessing the vigour of the vegetation and allowed for a more nuanced evaluation of forest cover changes. By leveraging the temporal resolution and spectral depth of Sentinel-2 imagery, we gained a comprehensive understanding of the land cover dynamics and were able to document the rate and patterns of forest change, providing valuable information for conservation initiatives, sustainable management, and policy formulation.

Key points:

- Leveraged high-resolution Sentinel-2 multispectral imagery, with 13 spectral bands at 10, 20, and 60 metres, to conduct detailed land cover mapping and monitor forest cover dynamics over a decade.
- Applied advanced classification algorithms to Sentinel-2's temporal datasets, allowing for accurate discrimination of land use changes, including deforestation, forest degradation, and regrowth.
- Exploited the 10-metre resolution bands for fine-scale feature recognition, enhancing the precision of land cover classifications and enabling the assessment of subtle environmental changes.
- Utilised the red edge and shortwave infrared bands of Sentinel-2 to assess vegetation health and biomass, providing critical insights for sustainable land management and conservation policies.



FIGURE 24: SATELLITE IMAGERY OF CORE AREA BASED ON 2022-2024 COMPOSITE OF SENTINEL 2 B4, B3, B2 BANDS



FIGURE 25: SATELLITE IMAGERY OF ZOOMED OUT AREA AROUND THE CORE BASED ON 2022-2024 COMPOSITE OF SENTINEL 2 B4, B3, B2 BANDS

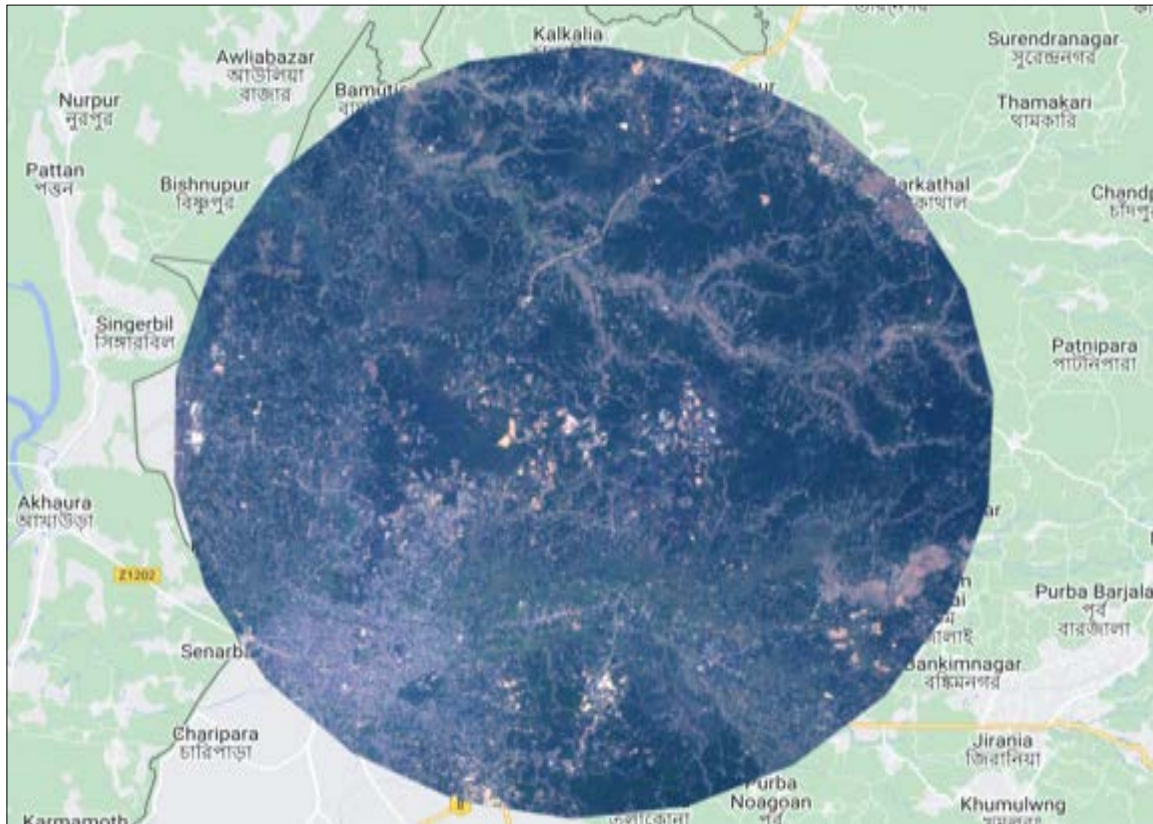


FIGURE 26: SATELLITE IMAGERY OF 15 KM AREA BASED ON 2022-2024 COMPOSITE OF SENTINEL 2 B4, B3, B2 BANDS

Access To Satellite Imagery Is Provided Blow :

https://drive.google.com/drive/folders/1hJ_UOKC2dFzt-WOZJcGnuENRPkqCGmP9?usp=sharing

TABLE15: SATELLITE RESOLUTION

Band	Central Wavelength (µm)	Resolution (m)	Description	Land Cover Parameter	Use Cases
B1	0.443	60	Coastal aerosol band, used for atmospheric corrections.	Coastal and aerosol studies	Coastal monitoring, atmospheric corrections
B2	0.49	10	Blue band, very sensitive to vegetation and chlorophyll content.	Chlorophyll content, vegetation health	Crop monitoring, forest management
B3	0.56	10	Green band, penetrates water well and reflects off of plant chlorophyll.	Chlorophyll absorption, plant vigour	Vegetation tracking, inland water bodies
B4	0.665	10	Red band, sensitive to chlorophyll and can indicate vegetation stress.	Plant health, species differentiation	Agricultural health assessment, forest surveys

B5	0.705	20	Red-edge band, indicative of the chlorophyll content of vegetation.	Chlorophyll gradient, biomass	Precision agriculture, forest parameter monitoring
B6	0.74	20	Red-edge band, helps in assessing plant health and stress.	Vegetation stress, leaf area index	Health status of crops, vegetation classification
B7	0.783	20	Red-edge band, used for chlorophyll content, plant species identification.	Crop type discrimination, moisture content	Agricultural surveys, forest species mapping
B8	0.842	10	Near-infrared, strong reflectance from healthy vegetation.	Biomass growth, vegetation cover	Crop yield prediction, forest monitoring
B8A	0.865	20	Narrow near-infrared, for detailed vegetation studies.	Leaf water content, plant stress	Drought assessment, detailed vegetation studies
B9	0.945	60	Water vapour band, used for atmospheric correction.	Atmospheric water vapour	Climate studies, correcting imagery for water vapour
B10	1.375	60	SWIR for atmospheric corrections especially for cirrus clouds.	Cirrus cloud detection	Cloud mapping, improved surface studies

12. BIODIVERSITY MANAGEMENT PLAN

The Bodhjung Nagar Industrial Estate, encompassed by its surrounding buffer zones, is a landscape rich with varied ecosystems. These regions, from the immediate vicinity of the industrial core to the extended buffer zones reaching up to 20 kilometres, are home to a mosaic of biodiversity. The habitats transition from moist deciduous forests in closer proximity to subtropical environments as one moves outward. Recognizing the intrinsic ecological value and the escalating threats posed by industrial and human activities, this management plan is dedicated to preserving the unique biological tapestry of the area. It is a blueprint for action, aiming to counteract the impacts of industrial expansion and anthropogenic pressures while fostering sustainable practices that align with the ecological needs of the region.

12.0 Objectives of the Plan:

The objectives of this plan are ambitious and holistic in nature. Primarily, it seeks to safeguard the biodiversity encapsulated within the Bodhjung Nagar Industrial Estate and its surrounding buffers. This entails a concerted effort to negate the adverse effects stemming from the industrial complex and the encroachment of human development. The strategy is to embed sustainable practices deeply within the fabric of the local communities and industries, thereby ensuring the ecological integrity of the area while not undermining its economic potential.

Integral to this plan is the formation of a robust monitoring and evaluation system. This system will serve as the ecological barometer for the region, consistently providing insights into the health of the ecosystems and facilitating informed decision-making to achieve both immediate and extended conservation targets.

Legal and Policy Framework: Our approach is grounded in strict adherence to the Indian Wildlife (Protection) Act of 1972 and the Forest Conservation Act of 1980. Collaborative efforts with the Botanical Survey of India and the Zoological Survey of India will be essential for the targeted conservation of species. This plan also aligns with the guidelines provided by the National Biodiversity Authority, ensuring that all actions are legally compliant and geared toward effective biodiversity stewardship.

Habitat and Species Conservation Strategies: An immediate mitigation for deforestation and land conversion for rubber plantations or industrial use is the cornerstone of this plan. We aim to restore the lost forest cover, with a targeted increase in average canopy cover. Native species will be prioritised for plantation, which will support local fauna and reduce the effects of monoculture of rubber plantations. Special attention will be given to species listed in the Red Data Book, and protection measures for endangered species like Phayre's Leaf Monkey will be implemented. These strategies are designed not only to restore habitats but also to rebuild the ecological framework that supports biodiversity.

Pollution Control Measures: To address pollution, we will establish effluent treatment plants for the industrial estate, ensuring that neither water bodies nor the soil is contaminated by industrial processes. Air quality will be rigorously monitored, and emissions from industries will be regulated to meet stringent standards. Furthermore, a zero-waste policy will be pursued, with industrial recycling and waste reduction measures in place to minimise the ecological footprint of the estate.

Sustainable Land Use and Agricultural Practices: Sustainable agricultural practices will be promoted vigorously. Organic farming and agroforestry will replace harmful agrochemicals, bolstering ecological resilience. Support for natural pest management will be offered, reducing reliance on chemical pesticides. Additionally, the development of community-based industries, such as bamboo and cane crafts, will provide alternative livelihoods that are in harmony with the conservation goals.

Community Engagement and Education: The plan includes comprehensive environmental education programs for local communities to foster an understanding of biodiversity and its importance. Community participation in forest management will be encouraged, providing a sense of ownership and responsibility for local conservation efforts. Training programs will be initiated, focusing on sustainable livelihoods that support the ecological objectives of the region.

Research and Monitoring: Continued biodiversity research and monitoring are essential to this plan. A biodiversity information system will be established to document species populations and habitat health. This system will serve as a reference point for management decisions and will be developed in collaboration with academic institutions that bring expertise in local ecosystems.

12.1 Implementation plan

The implementation of this plan will be structured into immediate, short-term, medium-term, and long-term goals. Actions to prevent further habitat degradation will be taken immediately. Short-term goals will focus on establishing pollution control measures and engaging the community in conservation efforts. Medium-term goals will see improvements in habitat quality and the development of sustainable practices. Long-term goals aim to establish a stable increase in the populations of key species and the successful operation of the biodiversity information system.

Immediate Actions:

Upon ratification of the plan, immediate actions will be undertaken to halt habitat degradation. These will include:

- Enforcing a moratorium on the clearance of any additional forested or natural areas within the estate and its buffer zones.
- Implementing emergency measures to protect critical habitats, particularly those that house endangered species or are of high ecological value.
- Establishing a rapid response team to address any urgent biodiversity threats, such as illegal poaching or sudden pollution incidents.⁵

Short-Term Goals (1-3 Years):

The short-term phase is crucial for laying the groundwork for longer-term conservation success and will focus on the following:

- **Pollution Control:** Installation of effluent treatment plants and air quality monitoring stations. Development of waste management strategies to reduce the industrial footprint.⁵
- **Community Engagement:** Launching educational campaigns, setting up participatory conservation programs, and incentivizing sustainable agricultural practices among local communities.
- **Biodiversity Baselines:** Conducting comprehensive biodiversity surveys to establish baselines for flora and fauna populations.

Medium-Term Goals (4-7 Years):

As the plan progresses, medium-term goals will aim to consolidate gains from initial efforts and expand the scope of conservation activities:

- **Habitat Restoration:** Intensifying efforts to reforest and rehabilitate degraded lands, with particular attention to creating wildlife corridors and restoring native plant species.
- **Sustainable Practices:** Promoting eco-friendly industrial processes, expanding sustainable land-use practices, and integrating biodiversity conservation into corporate operations.
- **Community Development:** Deepening community involvement through sustainable livelihood initiatives and expanding the reach of educational programs.

Long-Term Goals (8-10 Years and Beyond):

The long-term goals of the plan envision a self-sustaining ecosystem that thrives alongside human activity:

- **Species Population Stability:** Aiming for a stable or increasing trend in the populations of key species through ongoing conservation efforts and habitat management.
- **Biodiversity Information System:** Fully implementing a biodiversity information system that tracks, analyzes, and reports on ecological data, informing adaptive management and policy decisions.
- **Legacy Projects:** Establishing flagship conservation projects, such as large-scale rewilding or the creation of extensive protected areas, to leave a lasting conservation legacy.

12.2 Monitoring and evaluation

Monitoring and Evaluation (M&E) are pivotal components of the Biodiversity Management Plan for Bodhjung Nagar Industrial Estate and its surrounding buffer areas, designed to ensure that the plan's execution remains on track and is effective in meeting its conservation goals. This M&E framework is established to continuously assess the ecological health of the region, gauge the success of implemented strategies, and adapt to emergent challenges or new ecological insights.

Bi-Annual Monitoring Reports:

The M&E strategy entails the development of detailed bi-annual reports. These reports are intended to provide a comprehensive overview of the current state of biodiversity within the Bodhjung Nagar region. They will detail the abundance and health of species populations, the integrity of various habitats, and the quality of water and air. Special attention will be paid to species of conservation concern, changes in land use patterns, and the presence of invasive species. The reporting will also assess the effectiveness of pollution control measures, the degree to which industries comply with environmental standards, and the success of community engagement in conservation efforts.

Data Collection and Analysis:

Data for these reports will be collected through a variety of methods, including remote sensing for land cover changes, field surveys for species inventory, water and soil testing for pollution levels, and social surveys to understand community engagement. Advanced statistical and spatial analysis tools will be utilized to interpret this data, enabling the identification of trends and the pinpointing of areas requiring additional focus.

Performance Indicators:

Specific performance indicators will be established to quantify the success of various initiatives. These indicators will include measures such as the number of species benefited from habitat restoration, percentage reduction in pollution levels, and the extent of community participation in sustainable practices. The indicators will provide clear metrics for success and facilitate the transparent reporting of progress to stakeholders.

Feedback Loops and Adaptation:

The M&E framework will incorporate feedback loops, ensuring that report findings can inform and adjust the management plan. If certain strategies are found to be ineffective or if new threats to biodiversity arise, the plan will be revised accordingly. These feedback loops will also facilitate the integration of new scientific findings, ensuring that the management plan remains aligned with the best available science and practices in conservation.

Stakeholder Involvement:

Stakeholders, including local communities, conservationists, and industrial representatives, will be involved in the M&E process. Their insights and on-the-ground experiences will be invaluable in interpreting data and refining the management strategies. This inclusive approach will not only improve the effectiveness of the plan but also ensure stakeholder buy-in and support for conservation actions.

Long-Term Sustainability:

Ultimately, the goal of the M&E framework is to ensure the long-term sustainability of the region's biodiversity. By methodically assessing the health of the ecosystem and the impact of the management plan, the framework serves as an early-warning system for potential ecological decline and a guidepost for conservation successes. It will be instrumental in shaping a sustainable future for Bodhjung Nagar Industrial Estate that harmonizes industrial activity with the preservation of its rich ecological heritage.

Ecotourism Development

Ecotourism initiatives will be carefully developed to provide economic benefits while promoting conservation. These activities will be regulated to prevent habitat disturbance and ensure that the exploitation of wildlife is not a byproduct of tourism.

Institutional Arrangements

A Biodiversity Management Committee will be formed, comprising environmental groups, government agencies, local communities, and industry representatives. This committee will meet regularly to review progress, troubleshoot challenges, and adapt management strategies as necessary.

Funding and Resource Allocation

Financial resources for conservation activities will be allocated from state government funds and contributions from industries within the Bodhjung Nagar Industrial Estate. Additional funding will be sought through conservation grants and corporate social responsibility initiatives.

Implementation Schedule

The implementation of this plan will be structured into immediate, short-term, medium-term, and long-term goals. Actions to prevent further habitat degradation will be taken immediately. Short-term goals will focus on establishing pollution control measures and engaging the community in conservation efforts. Medium-term goals will see improvements in habitat quality and the development of sustainable practices. Long-term goals aim to establish a stable increase in the populations of key species and the successful operation of the biodiversity information system.

13. CONCLUSION

The extensive study of the core and buffer areas underscores the profound ecological significance of these regions, teeming with a diverse array of species and habitats. Yet, the encroaching threats, predominantly from human activities, cast a looming shadow over this biodiversity. As we move forward, it becomes paramount that conservation measures are not just deliberated upon but actively implemented, ensuring that the harmony of this ecological treasure is preserved for future generations.

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Bodhjung Nagar Industrial estate Ecologically important species for conservation & restoration

S. No	Scientific name	Common name	Family	Habit	Origin	Where to plant
1	<i>Gmelina arborea</i>	Gamai	Verbenaceae	Tree	Native	Hilltop/plains
2	<i>Microcos paniculata</i>	Pichandi	Malvaceae	Tree	Native	Hilltop/plains
3	<i>Toona ciliata</i>	rongil	Meliaceae	Tree	Native	Hilltop/slope/plains
4	<i>Tectona grandis</i>	segun	Lamiaceae	Tree	Native	Hilltop/plains
5	<i>Trema orientalis</i>	Indian charcoal tree	Cannabaceae	Tree	Native	Hilltop/slope/near water body
6	<i>Lannea coromandelica</i>	Indian ash tree	Anacardiaceae	Tree	Native	Hilltop/slope
7	<i>Peltophorum pterocarpum</i>	Copper pod tree	Fabaceae	Tree	Native	Hilltop/plains
8	<i>Neolamarckia cadamba</i>	kadam	Rubiaceae	Tree	Native	Hilltop/plains
9	<i>Lagerstroemia speciosa</i>	Pride of india	Lythraceae	Tree	Native	Near water body
10	<i>Albizia procera</i>	Koroi	Fabaceae	Tree	Native	Hilltop/plains
11	<i>Ficus benghalensis</i>	Bat	Moraceae	Tree	Native	Hilltop/slope/plains
12	<i>Artocarpus lacucha</i>	monkey fruit	Moraceae	Tree	Native	Hilltop/plains
13	<i>Stereospermum tetragonum</i>	yellow snake tree	Bignoniaceae	Tree	Native	Hilltop/slope
14	<i>Antidesma montanum</i>	mountain currant tree	Phyllanthaceae	Tree	Native	Hilltop/slope
15	<i>Chaetocarpus castanocarpus</i>		Peraceae	Tree	Native	Hilltop/near water body
16	<i>Sterculia villosa</i>	elephant rope tree	Sterculiaceae	Tree	Native	Slope/near water body
17	<i>Aphanomixis polystachya</i>	pithraj tree	Meliaceae	Tree	Native	Hilltop/slope
18	<i>Dillenia pentagyna</i>	Nepali elephant apple	Dilleniaceae	Tree	Native	Hilltop/slope
19	<i>Holigarna arnottiana</i>	Black Varnish Tree	Anacardiaceae	Tree	Native	Hilltop/plains
20	<i>Schima wallichii</i>	needlewood tree	Theaceae	Tree	Native	Hilltop/plains

21	<i>Melia azedarach</i>	jangli neem	Meliaceae	Tree	Native	Hilltop/slope/plains
22	<i>Cassia fistula</i>	golden shower tree	Fabaceae	Tree	Native	Hilltop/slope/plains
23	<i>Careya arborea</i>	Patana oak	Lecythidaceae	Tree	Native	Hilltop/plains/plains
24	<i>Ficus religiosa</i>	Asathwa	Moraceae	Tree	Native	Slope/plains
25	<i>Ziziphus oenoplia</i>	jackal jujube	Rhamnaceae	Tree	Native	Slope/plains
26	<i>Parkia javanica</i>	tree bean	Mimosaceae	Tree	Exotic	plains/hilltop
27	<i>Dipterocarpus turbinatus</i>	Garjan	Dipterocarpaceae	Tree	Native	Hilltop/plains
28	<i>Mallotus philippensis</i>	Kamala tree	Euphorbiaceae	Tree	Native	Hilltop/plains
29	<i>Aquilaria Malaccensis</i>	Agar	Thymelaeaceae	Tree	Native	plains/slopes (critically endangered)
30	<i>Carallia brachiata</i>	Corkwood	Rhizophoraceae	Tree	Native	plains/lowlands/near water body
31	<i>Oroxylum indicum</i>	Indian trumpet tree	Bignoniaceae	Tree	Native	Hilltop/plains (Threatened)
32	<i>Bridelia tomentosa</i>	Khy	Phyllanthaceae	Tree	Native	plains/slopes
33	<i>Ardisia neriifolia</i>	Coralberry	Primulaceae	Shrub	Native	plains/slopes
34	<i>Clerodendrum infortunatum</i>	Bhat	Lamiaceae	Shrub	Native	plains
35	clerodendrum paniculatum	Pagoda Flower	Lamiaceae	Shrub	Native	plains
36	<i>Urena lobata</i>	Caesarweed	Malvaceae	Shrub	Native	plains
37	<i>Lantana camera</i>	Yellow Sage	Verbenaceae	Shrub	Exotic	Slope/plains
38	<i>Thyrsostachys oliveri</i>	Kanakaich bamboo	Poaceae	Herb	Native	Slope/plains
39	<i>Bambusa balcoa</i>	barak bamboo	Poaceae	Herb	Native	plains

40	<i>Bambusa cucharensis</i>	Bom bamboo	Poaceae	Herb	Native	plains (endemic to north east India)
41	<i>bambusa pallida</i>	makhla bamboo	Poaceae	Herb	Native	Slope/plains
42	<i>Bambusa polymorpha</i>	Paura bamboo	Poaceae	Herb	Native	Slope/plains
43	<i>Bambusa Tulda</i>	Mirtinga bamboo	Poaceae	Herb	Native	Slope/plains
44	<i>Bambusa vulgaris</i>	Bari bamboo	Poaceae	Herb	Native	plains
45	<i>Dendrocalamus longispathus</i>	Rupai bamboo	Poaceae	Herb	Native	plains
46	<i>Melocana baccifera</i>	Muli bamboo	Poaceae	Herb	Native	Slope/plains
47	<i>Schizostachyum dullooa</i>	Dolu bamboo	Poaceae	Herb	Native	Plains
48	<i>Dendrocalamus hamitonii</i>	Pencha bamboo	Poaceae	Herb	Native	Plains
49	<i>Artocarpus chaplasha</i>	chaplaiash	Moraceae	Tree	Native	Hilltop/plains
50	<i>Baccaurea ramiflora</i>	latkan	Phyllanthaceae	Tree	Native	Hilltop/plains
51	<i>Bischofia javanica</i>	bishop wood	Phyllanthaceae	Tree	Native	Hilltop/plains
52	<i>Butea monosperma</i>	palash	Fabaceae	Tree	Native	Hilltop/plains
53	<i>Nymphaea pubescens</i>	Pink water lily	Nymphaeaceae	Herb	Native	Water body
54	<i>Pontederia crassipes</i>	kochuripana	Pontederiaceae	Herb	Native	Water body
55	<i>Musa flaviflora</i>	wild banana	Musacea	Herb	Native	Slope/plains
56	<i>Musa balbisiana</i>	aitta kola	Musacea	Herb	Native	Slope/plains
57	<i>Curcuma aromatica</i>	wild turmeric	Zingiberaceae	Herb	Native	plains/near water body
58	<i>Ficus hispida</i>	Dumur	Moraceae	Tree	Native	Slope/plains
59	<i>Canna indica</i>	Kolaboti	Cannaceae	Herb	Exotic	Slope/plains
60	<i>Polygonum hydropiper</i>	Water pepper	Polygonaceae	Herb	Native	Near water body

61	<i>Saccharum spontaneum</i>	wild sugarcane	Poaceae	Herb	Native	Slope/plains
62	<i>Thysanolaena latifolia</i>	tiger grass	Poaceae	Herb	Native	Slope/plains
63	<i>Ruellia tuberosa</i>	Snapdragon root	Acanthaceae	Herb	Exotic	plains
64	<i>Tectaria spp.</i>	Least Halberd	Tectariaceae	Fern	Native	Near water body/slopes
65	<i>Dryopteris spp.</i>	male fern	Dryopteridaceae	Fern	Native	Near water body/slopes
66	<i>Aglaomorpha quercifolia</i>	Oak leaf fern	Polypodiaceae	Fern	Native	Near water body/slopes
67	<i>Pteris vittata</i>	Chinese brake	Pteridaceae	Fern	Native	Near water body/slopes
68	<i>Lygodium spp</i>	vine-like fern	Lygodiaceae	Fern	Native	Near water body/slopes
69	<i>Adiantum capillus-veneris</i>	venus hair fern	Pteridaceae	Fern	Native	Near water body/slopes
70	<i>Cystopteris fragilis</i>	common fragile fern	Dryopteridaceae	Fern	Native	Near water body/slopes
71	<i>Cymbidium spp.</i>	boat orchids	Orchidaceae	Herb	Native	Tree trunk
72	<i>Wedelia chinensis</i>	Bhringraj	Asteraceae	Herb	Native	Near water body/slopes/plains

Flora and fauna details with the boundary of Bodhojung Nagar industrial estate

Protected species in the Bodhojung Nagar industrial estate (core) & mitigation measures during construction phase:

Protected species:

Schedule 1 Protected Species:

- Shikra (*Accipiter badius*)
- Red-breasted Parakeet (*Psittacula alexandri*)

Schedule 2 Protected Species:

- Ashy-headed Green Pigeon (*Treron phayrei*)
- Blossom-headed Parakeet (*Psittacula roseata*)

Endemic Species:

- Bom (*Bambusa cacharensis*)

Endangered Species:

- Indian Trumpet Tree (*Oroxylum indicum*)
- Agar (*Aquilaria Malaccensis*)

Near Threatened Species:

- Ashy-headed Green Pigeon (*Treron phayrei*)
- Blossom-headed Parakeet (*Psittacula roseata*)
- Red-breasted Parakeet (*Psittacula alexandri*)

In the core site, the presence of Schedule 1 and Schedule 2 Protected Species, including the Shikra (*Accipiter badius*), Red-breasted Parakeet (*Psittacula alexandri*), Ashy-headed Green Pigeon (*Treron phayrei*), and Blossom-headed Parakeet (*Psittacula roseata*), highlights the ecological sensitivity of the area. Additionally, the site is home to the Endangered Indian Trumpet Tree (*Oroxylum indicum*), the Agar tree (*Aquilaria Malaccensis*), and the endemic Bom (*Bambusa cacharensis*), further emphasizing the need for careful consideration during the construction phase of the industrial area.

Mitigation measures during construction phase:

During the construction phase of an industrial area within this region, stringent mitigation measures are imperative to minimize the impact on these protected species. Specific steps should include conducting thorough surveys to identify the presence and distribution of these species in areas earmarked for development.

Establishing barricades around critical habitats is crucial to minimize direct disturbances. These protective barriers shields sensitive ecosystems from potential harm caused by human activities. In the context of construction, it is imperative to implement practices that go beyond the mere establishment of barricades. Construction processes should actively minimize noise levels, vibrations, and any form of habitat destruction. This comprehensive approach significantly contributes to reducing the overall impact on species residing in these critical habitats. By carefully planning and executing construction practices with environmental sensitivity, we can ensure the preservation of biodiversity and the ecological balance within these essential ecosystems.

Regular monitoring during and after the construction phase is essential to assess the effectiveness of mitigation measures and make any necessary adjustments. Collaborative efforts between environmental experts, construction teams, and local authorities are crucial to ensuring that industrial development occurs in harmony with the conservation goals for the protected species in the core site.

Mitigation approaches that best ensure the protection of vulnerable species of plants and animals and their specialized habitats likely to be impacted by the project require the implementation of following choices exclusively or in combination.

- Restriction of construction activities to defined areas which are ecologically less sensitive.
- Scheduling of operations to take account of animal breeding seasons.
- Removal of rare/endangered plants from the site and transplant them temporarily or permanently.
- Removal of rare/endangered animals from site or promote the use of suitable alternate locations.
- Management of site activities (e.g., use of machinery, transport, waste/overburden removal) to maintain acceptable soil, water and vegetation quality.
- Restoration/duplication of vegetation and other habitat features.
- Maintenance of viable population of animal species.
- Creation/restoration of habitats to compensate for damage caused.

The following recommendations have taken due care to ensure mitigation of most project impacts on ecological/biological values by adopting a combination of choices discussed above. Sources Wild life institute of India https://wii.gov.in/eia/casestudies/river_valley_projects5_mitigation_planning



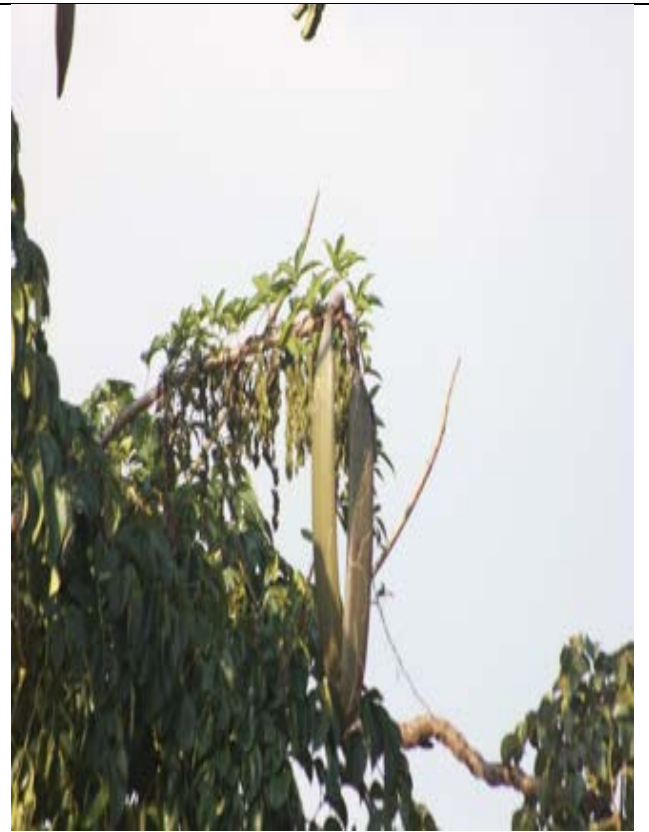
Bamboo, Oroxyllum indicum & Agar tree Location in industrial area



Bambusa cacharensis in core site



Agar tree - Aquilaria Malaccensis



Oroxylum indicum

Biodiversity within core site

Sr. No.	Scientific Name	Common Name	Habit	Family	Trait	Distribution	Group
1	Zapornia pusilla	Baillon's Crake	Birds	Rallidae	Ominvores	Resident	fauna
2	Gallus gallus	Red Junglefowl	Birds	Phasianidae	Ominvores	Resident	fauna
3	Caprimulgus macrurus	Large-tailed Nightjar	Birds	Caprimulgidae (Nightjars)	Insectivores	Resident	fauna
4	Hirundapus gigaeus	Brown-backed Needletail	Birds	Hemiprocnidae (Treeswifts)	Insectivores	Resident	fauna
5	Tachymarptis melba	Alpine Swift	Birds	Hemiprocnidae (Treeswifts)	Insectivores	Resident	fauna
6	Apus nipalensis	House Swift	Birds	Hemiprocnidae (Treeswifts)	Insectivores	Resident	fauna
7	Ceropus sinensis	Greater Coucal	Birds	Cuculidae (Cuckoos)	Ominvores	Resident	fauna
8	Phaenicophaeus tristis	Green-billed Malkoha	Birds	Cuculidae (Cuckoos)	Ominvores	Resident	fauna
9	Eudynamys scolopaceus	Asian Koel	Birds	Cuculidae (Cuckoos)	Ominvores	Resident	fauna
10	Chrysococcyx maculatus	Asian Emerald Cuckoo	Birds	Cuculidae (Cuckoos)	Ominvores	Resident	fauna
11	Streptopelia oriealis	Oriental Turtle Dove	Birds	Columbidae (Pigeons, Doves)	Frugivoures	Resident	fauna
12	Columba livia	Rock Dove	Birds	Columbidae (Pigeons, Doves)	Frugivoures	Resident	fauna
13	Streptopelia decaocto	Eurasian Collared Dove	Birds	Columbidae (Pigeons, Doves)	Frugivoures	Resident	fauna
14	Streptopelia tranquebarica	Red Collared Dove	Birds	Columbidae (Pigeons, Doves)	Frugivoures	Resident	fauna
15	Spilopelia chinensis	Spotted Dove	Birds	Columbidae (Pigeons, Doves)	Frugivoures	Resident	fauna
16	Chalcophaps indica	Common Emerald Dove	Birds	Columbidae (Pigeons, Doves)	Frugivoures	Resident	fauna
17	Treron phayrei	Ashy-headed Green Pigeon	Birds	Columbidae (Pigeons, Doves)	Frugivoures	Resident	fauna
18	Treron phoenicopterus	Yellow-footed Green Pigeon	Birds	Columbidae (Pigeons, Doves)	Frugivoures	Resident	fauna
19	Ducula aenea	Green Imperial Pigeon	Birds	Columbidae (Pigeons, Doves)	Frugivoures	Resident	fauna
20	Amaurornis phoenicurus	White-breasted Waterhen	Birds	Rallidae (Rails, Crakes and Coots)	Ominvores	Resident	fauna
21	Gallinula chloropus	Common Moorhen	Birds	Rallidae (Rails, Crakes and Coots)	Ominvores	Resident	fauna
22	Vanellus indicus	Red-wattled Lapwing	Birds	Charadriidae (Plovers)	Carnivores	Resident	fauna
23	Gallinago stenura	Pin-tailed Snipe	Birds	Scolopacidae (Sandpipers, Snipes)	Carnivores	Resident	fauna
24	Gallinago gallinago	Common Snipe	Birds	Scolopacidae (Sandpipers, Snipes)	Carnivores	Resident	fauna
25	Actitis hypoleucos	Common Sandpiper	Birds	Scolopacidae (Sandpipers, Snipes)	Carnivores	Resident	fauna
26	Artamus fuscus	Ashy Woodswallow	Birds	Artamidae	Insectivores	Resident	fauna
27	Ardeola grayii	Indian Pond Heron	Birds	Ardeidae (Herons, Bitterns)	Ominvores	Resident	fauna
28	Bubus coromandus	Eastern Cattle Egret	Birds	Ardeidae (Herons, Bitterns)	Ominvores	Resident	fauna
29	Egretta garzetta	Little Egret	Birds	Ardeidae (Herons, Bitterns)	Ominvores	Resident	fauna
30	Accipiter badius	Shikra	Birds	Accipitridae (Kites, Hawks, Eagles)	Carnivores	Resident	fauna
31	Milvus migrans	Black Kite	Birds	Accipitridae (Kites, Hawks, Eagles)	Carnivores	Resident	fauna
32	Glauclidium cuculoides	Asian Barred Owlet	Birds	Strigidae (Owls)	Carnivores	Resident	fauna
33	Athene brama	Spotted Owlet	Birds	Strigidae (Owls)	Carnivores	Resident	fauna
34	Coracias affinis	Indochinese Roller	Birds	Coraciidae (Rollers)	Ominvores	Resident	fauna

35	Halcyon smyrnensis)	white-throated kingfisher	Birds	ALeast Concernedinidae (Kingfishers)	Carnivores	Resident	fauna
36	Merops philippinus	Blue-tailed Bee-eater	Birds	Meropidae (Bee-eaters)	Insectivores	Resident	fauna
37	Merops orientalis	Asiangreen bee-eater	Birds	Meropidae (Bee-eaters)	Insectivores	Resident	fauna
38	Psilopogon lineatus	Lineated Barbet	Birds	Megalaimidae (Asian Barbets)	Ominvores	Resident	fauna
39	Psilopogon haemacephalus	Coppersmith Barbet	Birds	Megalaimidae (Asian Barbets)	Ominvores	Resident	fauna
40	Dinopium benghalense	Black-rumped Flameback	Birds	Picidae (Woodpeckers)	Insectivores	NE	fauna
41	Psittacula krameri	Rose-ringed Parakeet	Birds	Psittaculidae (Old World Parrots)	Ominvores	Resident	fauna
42	Tephrodornis pondicerianus	Common Woodshrike	Birds	Vangidae (Vangas and Allies)	Insectivores	Resident	fauna
43	Aegithina tiphia	Common Iora	Birds	Aegithinidae (Ioras)	Insectivores	Resident	fauna
44	Lanius schach	Long-tailed Shrike	Birds	Laniidae (Shrikes)	Insectivores	Resident	fauna
45	Oriolus xahornus	Black-hooded Oriole	Birds	Oriolidae	Ominvores	Resident	fauna
46	Dicrurus macrocercus	Black Drongo	Birds	Dicruridae (Drongos)	Ominvores	Resident	fauna
47	Dicrurus leucophaeus	Ashy Drongo	Birds	Dicruridae (Drongos)	Ominvores	Resident	fauna
48	Dicrurus annectens	Crow-billed Drongo	Birds	Dicruridae (Drongos)	Ominvores	Resident	fauna
49	Dicrurus hottenottus	Hair-crested Drongo	Birds	Dicruridae (Drongos)	Ominvores	Resident	fauna
50	Dicrurus paradiseus	Greater Racket-tailed Drongo	Birds	Dicruridae (Drongos)	Ominvores	Resident	fauna
51	Rhipidura albicollis	White-throated Fantail	Birds	Rhipiduridae	Insectivores	Resident	fauna
52	Dendrocitta vagabunda	Rufous Treepie	Birds	Corvidae (Crows, Jays)	Ominvores	Resident	fauna
53	Corvus splendens	House Crow	Birds	Corvidae (Crows, Jays)	Ominvores	Resident	fauna
54	Corvus culminatus	Indian Jungle Crow	Birds	Corvidae (Crows, Jays)	Ominvores	Resident	fauna
55	Pycnonotus cafer	Red-vented Bulbul	Birds	Pycnonotidae (Bulbuls)	Ominvores	Resident	fauna
56	Hirundo rustica	Barn Swallow	Birds	Hirundinidae (Swallows, Martins)	Ominvores	Resident	fauna
57	Cecropis daurica	Red-rumped Swallow	Birds	Hirundinidae (Swallows, Martins)	Ominvores	Resident	fauna
58	Prinia hodgsonii	Grey-breasted Prinia	Birds	Cisticolidae (Cisticolas and Allies)	Insectivores	Resident	fauna
59	Prinia inornata	Plain Prinia	Birds	Cisticolidae (Cisticolas and Allies)	Insectivores	Resident	fauna
60	Orthotomus sutorius	Common Tailorbird	Birds	Cisticolidae (Cisticolas and Allies)	Insectivores	Resident	fauna
61	Pomatorhinus schisticeps	White-browed Scimitar Babbler	Birds	Timaliidae (Babblers, Scimitar Babblers)	Insectivores	Resident	fauna
62	Argya earlei	Striated Babbler	Birds	Leiothrichidae (Laughingthrushes and Allies)	Ominvores	NE	fauna
63	Zosterops palpebrosus	Indian White-eye	Birds	Zosteropidae (White-eyes)	Ominvores	NE	fauna
64	Aplonis panayensis	Asian Glossy Starling	Birds	Sturnidae (Starlings, Rhabdornises)	Ominvores	Resident	fauna
65	Gracula religiosa	Common Hill Myna	Birds	Sturnidae (Starlings, Rhabdornises)	Ominvores	Resident	fauna
66	Gracupica contra	Indian pied myna	Birds	Sturnidae (Starlings, Rhabdornises)	Ominvores	Resident	fauna
67	Acridotheres fuscus	Jungle Myna	Birds	Sturnidae (Starlings, Rhabdornises)	Ominvores	Resident	fauna

68	<i>Acridotheres ginginianus</i>	Bank Myna	Birds	Sturnidae (Starlings, Rhabdornises)	Ominvores	NE	fauna
69	<i>Acridotheres tristis</i>	Common Myna	Birds	Sturnidae (Starlings, Rhabdornises)	Ominvores	Resident	fauna
70	<i>Sturnia malabarica</i>	Chestnut-tailed Starling	Birds	Sturnidae (Starlings, Rhabdornises)	Ominvores	Resident	fauna
71	<i>Sturnia pagodarum</i>	Brahminy Starling	Birds	Sturnidae (Starlings, Rhabdornises)	Ominvores	NE	fauna
72	<i>Leptocoma zeylonica</i>	Purple-rumped Sunbird	Birds	Nectariniidae (Sunbirds)	Ominvores	Resident	fauna
73	<i>Passer domesticus</i>	House Sparrow	Birds	Passeridae (Old World Sparrows, Snowfinches)	Ominvores	Resident	fauna
74	<i>Passer moanus</i>	Eurasian Tree Sparrow	Birds	Passeridae (Old World Sparrows, Snowfinches)	Ominvores	Resident	fauna
75	<i>Euodice malabarica</i>	Indian Silverbill	Birds	Estrildidae (Waxbills, Munias and Allies)	Ominvores	Resident	fauna
76	<i>Lonchura striata</i>	White-rumped Munia	Birds	Estrildidae (Waxbills, Munias and Allies)	Ominvores	Resident	fauna
77	<i>Graphium sarpedon</i>	Common Bluebottle	Butterflies	Papilionidae	Herbivores	Resident	fauna
78	<i>Graphium doson</i>	Common Jay	Butterflies	Papilionidae	Herbivores	Resident	fauna
79	<i>Chilasa clytia</i>	Common Mime	Butterflies	Papilionidae	Herbivores	Resident	fauna
80	<i>Papilio polytes</i>	Common Mormon	Butterflies	Papilionidae	Herbivores	Resident	fauna
81	<i>Papilio helenus</i>	Red Helen	Butterflies	Papilionidae	Herbivores	Resident	fauna
82	<i>Papilio memnon</i>	Great Mormon	Butterflies	Papilionidae	Herbivores	Resident	fauna
83	<i>Papilio demoleus</i>	Lime Butterfly	Butterflies	Papilionidae	Herbivores	Resident	fauna
84	<i>trophaneura aristolochiae</i>	Common Rose	Butterflies	Papilionidae	Herbivores	Resident	fauna
85	<i>Eurema hecabe</i>	Common grass yellow	Butterflies	Pieridae	Herbivores	Resident	fauna
86	<i>Catopsilia pomona</i>	Common Emigrant	Butterflies	Pieridae	Herbivores	Resident	fauna
87	<i>Catopsilia pyranthe</i>	Mottled Emigrant	Butterflies	Pieridae	Herbivores	Resident	fauna
88	<i>Pareronia valeria</i>	Common Wanderer	Butterflies	Pieridae	Herbivores	Resident	fauna
89	<i>Pieris canidia</i>	Indian Cabbage White	Butterflies	Pieridae	Herbivores	Resident	fauna
90	<i>Leptosia nina</i>	Psyche	Butterflies	Pieridae	Herbivores	Resident	fauna
91	<i>Hypolycaena erylus</i>	Common Tit	Butterflies	Family: Lycaenidae	Herbivores	Resident	fauna
92	<i>Acytolepis puspa</i>	Common Hedge blue	Butterflies	Family: Lycaenidae	Herbivores	Resident	fauna
93	<i>Danaus genutia</i>	Striped Tiger	Butterflies	Nymphalidae	Herbivores	Resident	fauna
94	<i>Danaus chrysippus</i>	Plain Tiger	Butterflies	Nymphalidae	Herbivores	Resident	fauna
95	<i>Paraica aglea</i>	Glassy Tiger	Butterflies	Nymphalidae	Herbivores	Resident	fauna
96	<i>Euploea core</i>	Common crow	Butterflies	Nymphalidae	Herbivores	Resident	fauna
97	<i>Melanitis leda</i>	Common Evening Brown	Butterflies	Nymphalidae	Herbivores	Resident	fauna
98	<i>Ypthima baldus</i>	Common Five-ring	Butterflies	Nymphalidae	Herbivores	Resident	fauna
99	<i>Ypthima huebneri</i>	Common four-ring	Butterflies	Nymphalidae	Herbivores	Resident	fauna
100	<i>Eptis hylas</i>	Common Sailer	Butterflies	Nymphalidae	Herbivores	Resident	fauna
101	<i>Cyrestis thyodamas</i>	Common Map	Butterflies	Nymphalidae	Herbivores	Resident	fauna

102	<i>Junonia iphita</i>	Chocolate Pansy	Butterflies	Nymphalidae	Herbivores	Resident	fauna
103	<i>Junonia atlites</i>	Grey Pansy	Butterflies	Nymphalidae	Herbivores	Resident	fauna
104	<i>Junonia almana</i>	Peacock Pansy	Butterflies	Nymphalidae	Herbivores	Resident	fauna
105	<i>Junonia lemonias</i>	Lemon Pansy	Butterflies	Nymphalidae	Herbivores	Resident	fauna
106	<i>Hypolimnas bolina</i>	Great eggfly	Butterflies	Nymphalidae	Herbivores	Resident	fauna
107	<i>Tagiades japetus</i>	Common Snow flat	Butterflies	Hesperiidae	Herbivores	Resident	fauna
108	<i>Borbo cinnara</i>	Rice Swift	Butterflies	Hesperiidae	Herbivores	Resident	fauna
109	<i>Brachydiplax sobrina</i>	Little blue Marsh hawk	Dragonflies	Libellulidae†	Carnivores	Resident	fauna
110	<i>Diplacodes trivialis</i>	Ground Skimmer	Dragonflies	Libellulidae†	Carnivores	Resident	fauna
111	<i>Neurothemis fulvia</i>	Fulvous forest Skimmer	Dragonflies	Libellulidae†	Carnivores	Resident	fauna
112	<i>Orthetrum sabina</i>	Green Marsh hawk	Dragonflies	Libellulidae†	Carnivores	Resident	fauna
113	<i>Ischnura aurora</i>	Golden dartlet	Dragonflies	Libellulidae†	Carnivores	Resident	fauna
114	<i>Epacromia</i> sps	Banded Grasshopper	Insects	Orthoptera	Herbivores	Native	fauna
115	<i>Erthesina fullo</i>	Stink Bug	Insects	Pentatomidae	Herbivores	Native	fauna
116	<i>Eumemes</i> sps	Potter wasp	Insects	Eumenidae	Insectivores	Native	fauna
117	<i>Humbertiella ceylonica</i>	Indian Bark Mantis	Insects	Hymenoptera	Insectivores	Native	fauna
118	<i>Ictinogomphus rapax</i>	Common Club Tail	Insects	Gomphidae	Insectivores	Native	fauna
119	<i>Ischnura senegalensis</i>	Senegal Golden Darlet	Insects	Coenagrionidae	Insectivores	Native	fauna
120	<i>Mylabris pustulata</i>	Blister beetle	Insects	Meloidae	Nectarivores	Native	fauna
121	<i>Oecophylla smaragdina</i>	WeAvesr Ant	Insects	Formicidae	Insectivores	Native	fauna
122	<i>Papilio demoleus</i>	Common lime butterfly	Insects	Papilionoidea	Nectarivores	Native	fauna
123	<i>Polistella</i> sps	Red Paper Wasp	Insects	Vespidae	Nectarivores	Native	fauna
124	<i>Telostylinus</i> sps	True Fly	Insects	Neriidae	Nectarivores	Native	fauna
125	<i>Trithemus festiva</i>	Black Stream Glider	Insects	Libellulidae	Insectivores	Native	fauna
126	<i>Xylocopa auripennis</i>	Carpenter bee	Insects	Apidae	Nectarivores	Native	fauna
127	<i>Hemidactylus frenatus</i>	common house gecko	Reptiles	Geckoidae	Insectivores	Native	fauna
128	<i>Hemidactylus platyurus</i>	flat tailed gecko	Reptiles	Geckoidae	Insectivores	Native	fauna
129	<i>Hemidactylus aquilonius</i>	smooth scaled house gecko	Reptiles	Geckoidae	Insectivores	Native	fauna
130	<i>Hemidactylus garnotii</i>	garnot's house gecko	Reptiles	Geckoidae	Insectivores	Native	fauna
131	<i>Plexippus paykulli</i>	pantropical jumper	Insects	Salticidae	Insectivores	Native	fauna
132	<i>Nephila pilipes</i>	golden wood spider	Insects	Salticidae	Insectivores	Native	fauna
133	<i>Copsychus saularis</i>	Oriental magpie robin	Birds	Muscicapidae (Chats, Old World Flycatchers)	Insectivores	Resident	fauna
134	<i>Oxyopes</i> sp	lynx spider	Insects	Salticidae	Insectivores	Resident	fauna
135	<i>Calotes irawadi</i>	lizard	Reptiles	Agamidae	Carnivores	Resident	fauna

136	<i>Callosciurus erythraeus</i>	Pallas's squirrel	Mammals	Sciuridae	Carnivores	Resident	fauna
137	<i>Minevarya teraiensis</i>	cricket frog	Amphibians	Dicroglossidae	Insectivores	Native	fauna
138	<i>Duttaphrynus melanostictus</i>	Common Indian Toad	Amphibians	Bufo	Insectivores	Native	fauna
139	<i>Microhyla</i> sp.	Narrow-mouthed frog	Amphibians	Microhylidae	Insectivores	Native	fauna
140	<i>Polypedates</i> sp	Tree frog	Amphibians	Rhacophoridae	Insectivores	Native	fauna
141	<i>Bandicota</i> sp	Rodent	Mammals	Rodentia	Omnivores	Resident	fauna
142	<i>Motacilla cinerea</i>	Grey Wagtail	Birds	Motacillidae (Wagtails, Pipits)	Omnivores	Resident	fauna
143	<i>Polyura athamas</i>	Common Nawab	Butterflies	Family: Nymphalidae	Herbivores	Resident	fauna
144	<i>Lethe europa</i>	Bamboo Treebrown	Butterflies	Family: Nymphalidae	Herbivores	Resident	fauna
145	<i>Elymnias hypermnestra</i>	Common Palmfly	Butterflies	Family: Nymphalidae	Herbivores	Resident	fauna
146	<i>Mycalesis anaxias</i>	White-bar bushbrown	Butterflies	Family: Nymphalidae	Herbivores	Resident	fauna
147	<i>Pellorneum ruficeps</i>	Puff-throated Babbler	Birds	Pellorneidae (Ground Babblers)	Insectivores	Resident	fauna
148	<i>Cisticola juncidis</i>	Zitting Cisticola	Birds	Cisticolidae (Cisticolas and Allies)	Insectivores	Resident	fauna
149	<i>Pycnonotus jocosus</i>	Red-whiskered Bulbul	Birds	Pycnonotidae (Bulbuls)	Omnivores	Resident	fauna
150	<i>Mirafra assamica</i>	Bengal Bush Lark	Birds	Alaudidae (Larks)	Insectivores	Resident	fauna
151	<i>Alauda gulgula</i>	Oriental Threatened Skylark	Birds	Alaudidae (Larks)	Insectivores	Resident	fauna
152	<i>Psittacula roseata</i>	Blossom-headed Parakeet	Birds	Psittaculidae (Old World Parrots)	Omnivores	Resident	fauna
153	<i>Psittacula alexandri</i>	Red-breasted Parakeet	Birds	Psittaculidae (Old World Parrots)	Omnivores	Resident	fauna
154	<i>Pelargopsis capensis</i>	Stork-billed Kingfisher	Birds	Alcedinidae (Kingfishers)	Carnivores	Resident	fauna
155	<i>Alcedo atthis</i>	Common Kingfisher	Birds	Alcedinidae (Kingfishers)	Carnivores	Resident	fauna
156	<i>Ctenus</i> sp	Wandering spider	Insects	Ctenidae	Carnivores	Resident	fauna
157	<i>Myrmarachne</i> sp	Ant mimic jumper	Insects	Salticidae	Insectivores	Native	fauna
158	<i>Heteropoda</i> sp	Huntsman spider	Insects	Salticidae	Insectivores	Native	fauna
159	<i>Copsychus malabaricus</i>	White-rumped Shama	Birds	Muscicapidae (Chats, Old World Flycatchers)	Insectivores	Resident	fauna
160	<i>Terpsiphone paradisi</i>	Indian Paradise Flycatcher	Birds	Monarchidae (Monarchs)	Insectivores	Resident	fauna
161	<i>Mixornis gularis</i>	Pin-striped Tit-Babbler	Birds	Timaliidae (Babblers, Scimitar Babblers)	Insectivores	Resident	fauna
162	<i>Timalia pileata</i>	Chestnut-capped Babbler	Birds	Timaliidae (Babblers, Scimitar Babblers)	Insectivores	Resident	fauna
163	<i>Muscicapa muttui</i>	Brown-breasted Flycatcher	Birds	Muscicapidae (Chats, Old World Flycatchers)	Insectivores	Resident	fauna
164	<i>Alcippe poiocephala</i>	Brown-cheeked Fulvetta	Birds	Coronopidae	Insectivores	Resident	fauna
165	<i>Dicrurus aeneus</i>	Bronzed Drongo	Birds	Dicruridae (Drongos)	Omnivores	Resident	fauna
166	<i>Dendrocopos macei</i>	Fulvous-breasted Woodpecker	Birds	Picidae (Woodpeckers)	Insectivores	NE	fauna

167	<i>Aviceda leuphotes</i>	Black Baza	Birds	Accipitridae (Kites, Hawks, Eagles)	Carnivores	Resident	fauna
168	<i>Spilornis cheela</i>	Crested Serpent Eagle	Birds	Accipitridae (Kites, Hawks, Eagles)	Carnivores	Resident	fauna
169	<i>Nisaetus nipalensis</i>	Mountain Hawk-Eagle	Birds	Accipitridae (Kites, Hawks, Eagles)	Carnivores	Resident	fauna
170	<i>Accipiter trivirgatus</i>	Crested Goshawk	Birds	Accipitridae (Kites, Hawks, Eagles)	Carnivores	Resident	fauna
171	<i>Accipiter virgatus</i>	Besra	Birds	Accipitridae (Kites, Hawks, Eagles)	Carnivores	Resident	fauna
172	<i>Accipiter nisus</i>	Eurasian Sparrowhawk	Birds	Accipitridae (Kites, Hawks, Eagles)	Carnivores	Resident	fauna
173	<i>Circus aeruginosus</i>	Western Marsh Harrier	Birds	Accipitridae (Kites, Hawks, Eagles)	Carnivores	Resident	fauna
174	<i>Micropternus brachyurus</i>	Rufous Woodpecker <i>Micropternus brachyurus</i>	Birds	Picidae (Woodpeckers)	Insectivores	Resident	fauna
175	<i>Eutropis</i> sp	Striped skink	Insects	Salticidae	Insectivores	Resident	fauna
176	<i>Lygosoma</i> sp	Supple skink	Insects	Salticidae	Insectivores	Resident	fauna
177	<i>Oxyopes</i> sp	lynx spider	Insects	Salticidae	Insectivores	Resident	fauna
178	<i>Chloropsis aurifrons</i>	Golden-fronted Leafbird	Birds	Chloropseidae (Leafbirds)	Insectivores	Resident	fauna
179	<i>Pitta sordida</i>	Hooded Pitta	Birds	Pittidae (Pittas)	Ominvores	Resident	fauna
180	<i>Pernis ptilorhynchus</i>	Oriental Honey-buzzard	Birds	Accipitridae (Kites, Hawks, Eagles)	Carnivores	Resident	fauna
181	<i>Ixobrychus sinensis</i>	Yellow Bittern	Birds	Ardeidae (Herons, Bitterns)	Ominvores	Resident	fauna
182	<i>Ixobrychus cinnamomeus</i>	Cinnamon Bittern	Birds	Ardeidae (Herons, Bitterns)	Ominvores	Resident	fauna
183	<i>Phylloscopus humei</i>	Hume's Leaf Warbler	Birds	Phylloscopidae (Leaf Warblers)	Insectivores	Resident	fauna
184	<i>Phylloscopus fuscatus</i>	Dusky Warbler	Birds	Phylloscopidae (Leaf Warblers)	Insectivores	Resident	fauna
185	<i>Phylloscopus trochiloides</i>	Greenish Warbler	Birds	Phylloscopidae (Leaf Warblers)	Insectivores	Resident	fauna
186	<i>Merops leschenaulti</i>	chestnut-headed bee-eater	Birds	Meropidae (Bee-eaters)	Insectivores	Resident	fauna
187	<i>Gekko gekko</i>	Tokay gecko	Reptiles	Geckoidae	Insectivores	Resident	fauna
188	<i>Asilidae</i> sp	Robberfly	Insects	<i>Asilidae</i> †	Insectivores	Resident	fauna
189	<i>Thomisus</i> sp	Crab spider	Insects	Salticidae	Insectivores	Resident	fauna
190	<i>Dicaeum agile</i>	Thick-billed Flowerpecker	Birds	Dicaeidae (Flowerpeckers)	Ominvores	Resident	fauna
191	<i>Dicaeum erythrorhynchus</i>	Pale-billed Flowerpecker	Birds	Dicaeidae (Flowerpeckers)	Ominvores	NE	fauna
192	<i>Dicaeum minullum</i>	Plain Flowerpecker	Birds	Dicaeidae (Flowerpeckers)	Ominvores	Resident	fauna
193	<i>Lonchura punctulata</i>	Scaly-breasted Munia	Birds	Estrildidae (Waxbills, Munias and Allies)	Ominvores	Resident	fauna
194	<i>Lonchura atricapilla</i>	Chestnut Munia	Birds	Estrildidae (Waxbills, Munias and Allies)	Ominvores	Resident	fauna
195	<i>Bambusa cacharensis</i>	Bom	Herbs	Poaceae	Autotrophs	Native	flora
196	<i>Hevea brasiliensis</i>	Rubber	Trees	Euphorbiaceae	Autotrophs	Exotic	flora
197	<i>Gmelina arborea</i>	Gamai	Trees	Verbenaceae	Autotrophs	Native	flora
198	<i>Toona ciliata</i>	Rongil	Trees	Meliaceae	Autotrophs	Native	flora
199	<i>Microcos paniculata</i>	Pichandi	Trees	Malvaceae	Autotrophs	Native	flora
200	<i>Ficus hispida</i>	Dumur	Trees	Moraceae	Autotrophs	Native	flora
201	<i>Trema orientalis</i>	Indian charcoal Tree	Trees	Cannabaceae	Autotrophs	Native	flora
202	<i>Tectona grandis</i>	Segun	Trees	Lamiaceae	Autotrophs	Native	flora

203	<i>Ficus religiosa</i>	Ashwatha	Trees	Moraceae	Autotrophs	Native	flora
204	<i>Cassia alata</i>	Ringworm bush	Shrub s	Fabaceae	Autotrophs	Exotic	flora
205	<i>Streblus asper</i>	Ruposhi Gach	Trees	Moraceae	Autotrophs	Native	flora
206	<i>Ziziphus mauritiana</i>	Boroi	Trees	Rhamnaceae	Autotrophs	Native	flora
207	<i>Alstonia scholaris</i>	Chatim	Trees	Apocynaceae	Autotrophs	Native	flora
208	<i>Neolamarckia cadamba</i>	Kadam	Trees	Rubiaceae	Autotrophs	Native	flora
209	<i>Aphanomixis polystachya</i>	Pithraj Tree	Trees	Meliaceae	Autotrophs	Native	flora
210	<i>Urena lobata</i>	Caesarweed	Shrub s	Malvaceae	Autotrophs	Native	flora
211	<i>Chrysopogon aciculatus</i>	False beardgrass	Herbs	Poaceae	Autotrophs	Native	flora
212	<i>Cassia obtusifolia</i>	Sicklepod	Shrub s	Fabaceae	Autotrophs	Native	flora
213	<i>Sida acuta</i>	Wireweed	Shrub s	Malvaceae	Autotrophs	Exotic	flora
214	<i>Ageratum conyzoides</i>	Goat Weed	Herbs	Asteraceae	Autotrophs	Exotic	flora
215	<i>Mimosa pudica</i>	Lojjabati	Herbs	Fabaceae	Autotrophs	Exotic	flora
216	<i>Solanum sisymbriifolium</i>	Sticky nightshade	Shrub s	Solanaceae	Autotrophs	Exotic	flora
217	<i>Torenia crustacea</i>	Hard slitwort	Herbs	Linderniaceae	Autotrophs	Native	flora
218	<i>Mitracarpus hirtus</i>	Girdlepod	Herbs	Rubiaceae	Autotrophs	Exotic	flora
219	<i>Spermacoce latifolia</i>	False button weed	Herbs	Rubiaceae	Autotrophs	Exotic	flora
220	<i>Melastoma affine</i>	blue tongue	Shrub s	Melastomatacea	Autotrophs	Exotic	flora
221	<i>Paspalum botterii</i>	Crown grass	Herbs	Poaceae	Autotrophs	Exotic	flora
222	<i>Scoparia dulcis</i>	Scoparia weed	Herbs	Plantaginaceae	Autotrophs	Native	flora
223	<i>Leucas aspera</i>	Ghal Ghase	Herbs	Lamiaceae	Autotrophs	Native	flora
224	<i>Alternanthera sessilis</i>	Brazilian spinach	Herbs	Amaranthaceae	Autotrophs	Exotic	flora
225	<i>Cassia occidentalis</i>	Coffee senna	Shrub s	Fabaceae	Autotrophs	Exotic	flora
226	<i>Digitaria sanguinalis</i>	hairy crabgrass	Herbs	Poaceae	Autotrophs	Native	flora
227	<i>Pueraria phaseoloides</i>	tropical kudzu	Climb ers	Fabaceae	Autotrophs	Native	flora
228	<i>Cyperus rotundus</i>	Nut grass	Herbs	Cyperaceae	Autotrophs	Native	flora
229	<i>Mikania micrantha</i>	Bitter vine	Climb ers	Asteraceae	Autotrophs	Exotic	flora
230	<i>Coccinia grandis</i>	ivy gourd	Climb ers	Cucurbitaceae	Autotrophs	Native	flora
231	<i>Crotalaria pallida</i>	Smooth Rattlepod	Shrub s	Fabaceae	Autotrophs	Native	flora
232	<i>Oplismenus hirtellus</i>	Basket grass	Herbs	poaceae	Autotrophs	Native	flora
233	<i>Dioscorea alata</i>	true yam	Climb ers	Dioscoreaceae	Autotrophs	Exotic	flora
234	<i>Lantana camera</i>	Yellow Sage	Shrub s	Verbenaceae	Autotrophs	Exotic	flora
235	<i>Tridax procumbens</i>	coatbuttons	Herbs	Asteraceae	Autotrophs	Exotic	flora
236	<i>Bambusa tulda</i>	mritinga	Herbs	Poaceae	Autotrophs	Native	flora
237	<i>Bambusa balcooa</i>	Barak	Herbs	Poaceae	Autotrophs	Native	flora
238	<i>Schizostachyum dullooa</i>	makhla	Herbs	Poaceae	Autotrophs	Native	flora
239	<i>Clerodendrum infortunatum</i>	Bhat	Shrub s	Lamiaceae	Autotrophs	Native	flora
240	<i>Chromolaena odorata</i>	Jack in the bush	Shrub s	Asteraceae	Autotrophs	Exotic	flora
241	<i>Mesosphaerum suaveolens</i>	Mint weed	Shrub s	Lamiaceae	Autotrophs	Exotic	flora
242	<i>Dryopteris spp.</i>	male Fern	Ferns	Dryopteridaceae	Autotrophs	Native	flora
243	<i>Tectaria spp.</i>	LEAST HALBERD	Ferns	Tectariaceae	Autotrophs	Native	flora

244	Holarrhena antidysenterica	Kurchi	Shrubs	Apocynaceae	Autotrophs	Native	flora
245	Ludwigia octovalvis	Mexican primrose-willow	Herbs	Onagraceae	Autotrophs	Exotic	flora
246	Ricinus communis	castor bean	Shrubs	Euphorbiaceae	Autotrophs	Exotic	flora
247	Alocasia macrorrhizos	Bishkochu	Herbs	Araceae	Autotrophs	Native	flora
248	Cassia sophera	kasunda	Trees	Fabaceae	Autotrophs	Exotic	flora
249	Jatropha gossypifolia	Bellyache bush	Shrubs	Euphorbiaceae	Autotrophs	Exotic	flora
250	Jatropha curcas	physic nut	Shrubs	Euphorbiaceae	Autotrophs	Exotic	flora
251	Grona triflora	beggarweed	Herbs	Fabaceae	Autotrophs	Native	flora
252	Solanum torvum	Nightshade	Shrubs	Solanaceae	Autotrophs	Exotic	flora
253	Terminalia arjuna	Arjun	Trees	Combretaceae	Autotrophs	Native	flora
254	Cassia siamea	kassod Tree	Trees	Fabaceae	Autotrophs	Native	flora
255	Azadirachta indica	Neem	Trees	Meliaceae	Autotrophs	Native	flora
256	Monoon longifolium	Debdaru	Trees	Annonaceae	Autotrophs	Native	flora
257	Plumeria alba	Champa	Trees	Magnoliaceae	Autotrophs	Native	flora
258	Aquilaria malaccensis Lamk.	Agar	Trees	Thymelaeaceae	Autotrophs	Native	flora
259	Swietenia mahagoni	Mehagani	Trees	Meliaceae	Autotrophs	Exotic	flora
260	Syzygium cumini	Jaam	Trees	Myrtaceae	Autotrophs	Native	flora
261	Mimusops elengi	bullet wood	Trees	Sapotaceae	Autotrophs	Native	flora
262	Cleome ruidosperma	fringed spider flower	Herbs	Cleomaceae	Autotrophs	Exotic	flora
263	cardiospermum halicacabum	ballon plant	Climbers	sapindaceae	Autotrophs	Native	flora
264	Artocarpus heterophyllus	Kathal	Trees	Moraceae	Autotrophs	Native	flora
265	Areca catechu	Supari	Trees	Arecaceae	Autotrophs	Exotic	flora
266	Dichanthelium clandestinum	deertongue	Herbs	Poaceae	Autotrophs	Exotic	flora
267	Spondias mombin	Amra	Trees	Anacardiaceae	Autotrophs	Exotic	flora
268	Acacia auriculiformis	Akashmoni	Trees	Fabaceae	Autotrophs	Exotic	flora
269	Delonix regia	Krishnachura	Trees	Fabaceae	Autotrophs	Native	flora
270	Phyllanthus emblica	amla	Trees	Phyllanthaceae	Autotrophs	Native	flora
271	Dalbergia sissoo	shisham	Trees	Fabaceae	Autotrophs	Native	flora
272	Euphorbia hirta	Asthma-plant	Herbs	Euphorbiaceae	Autotrophs	Exotic	flora
273	Leersia japonica	Japanese cutgrass	Herbs	Poaceae	Autotrophs	Native	flora
274	Ficus benghalensis	Bat	Trees	Moraceae	Autotrophs	Native	flora
275	Alocasia indica	Kochu	Herbs	Araceae	Autotrophs	Native	flora
276	Pontederia crassipes	kochuripana	Herbs	Pontederiaceae	Autotrophs	Native	flora
277	Terminalia bellirica	bahera	Trees	Combretaceae	Autotrophs	Native	flora
278	Parthenium hysterophorus	famine weed	Herbs	Asteraceae	Autotrophs	Exotic	flora

SITE PHOTOGRAPHS

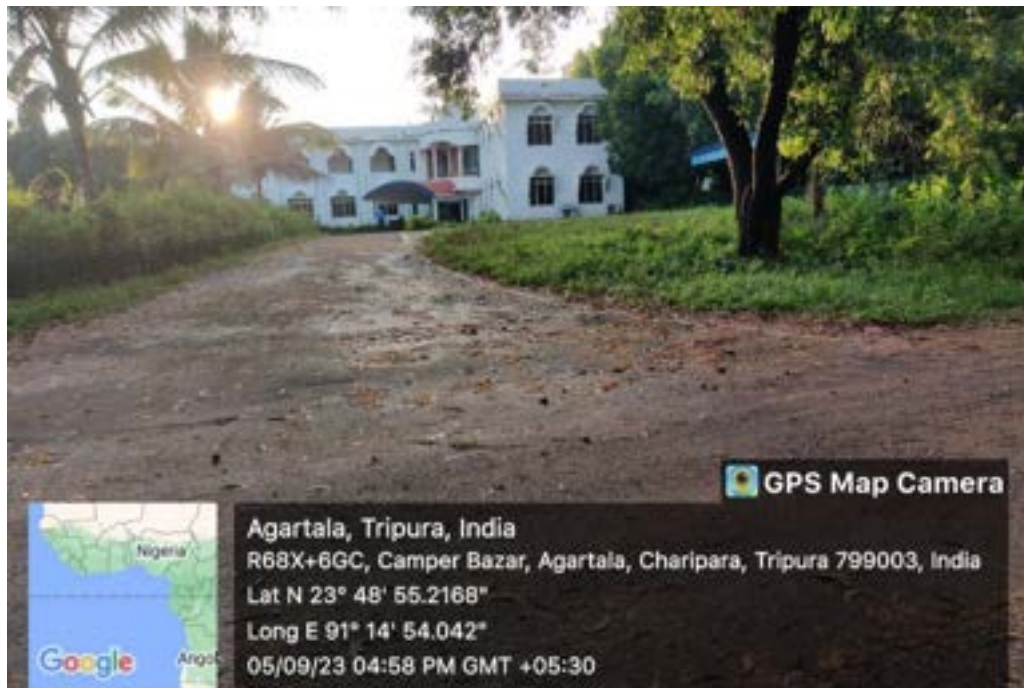


FIGURE 27 : CORE SITE



FIGURE 28 : TEAM WORKING IN THE CORE SIT



FIGURE 29: CORE SITE

BUFFER ZONE

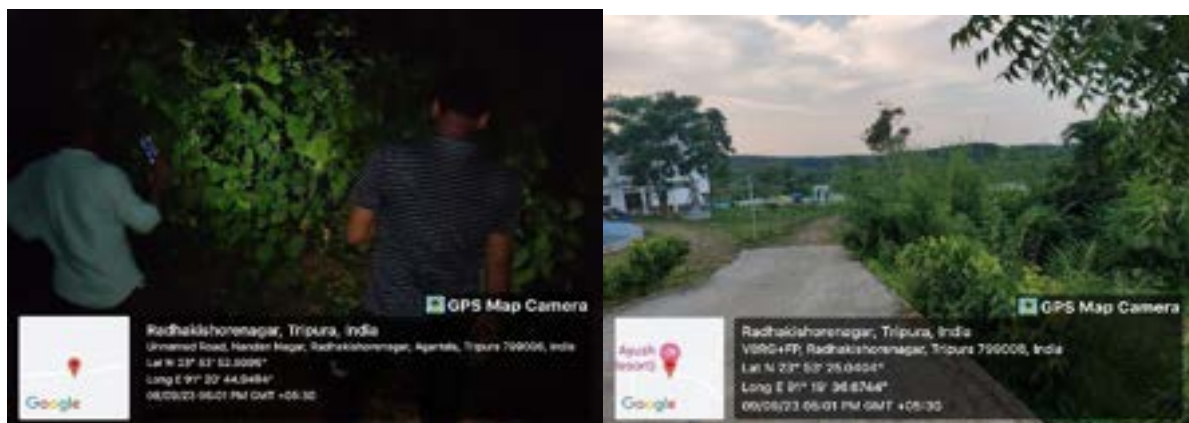


FIGURE 30 TEAM WORKING IN THE BUFFER ZONE





FIGURE 32 : OXYGEN PARK



FIGURE 33 : FATIKCHARRA



FIGURE 34: TARANAGAR (MOHANPUR)



FIGURE35: TUICHHAMANKURI



FIGURE35: BAMUTIA



FIGURE37 : COMMUNICATING WITH THE LOCALS

FAUNA



FIGURE38: ASIAN KOEL



FIGURE39: BAMBOO-TAIL DAMSELFL



FIGURE40: BANDED HORNET

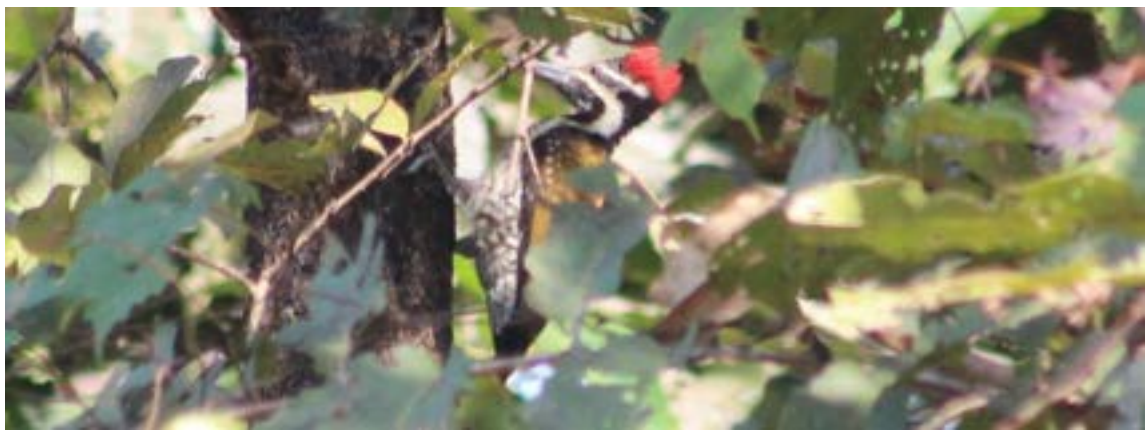


FIGURE41: BLACK-RUMP FLAMEBACK



FIGURE 42: ORIENTAL HONEY BUZZARD



FIGURE43: PADDYFIELD DRAGONFLY



FIGURE44: PLAIN TIGER BUTTERFLY



FIGURE 45 : PRAYING MANTIS



FIGURE46 : RUFIOUS TREEPIE



FIGURE 47: SCALY-BREASTED MUNIA



FIGURE 49: PALLAS'S SQUIRREL



FIGURE 48 : WHITE THROATED KINGFISHER



FIGURE 50:ARGIOPE SP (SIGNATURE SPIDER)



FIGURE 51: ASEMONIA TENUIPES (TAILED JUMPER)



FIGURE52: BUNGARUS FASCIATUS (BANDED KRAIT)



FIGURE53: HUNTSMAN SPIDER (HETEROPODA VENATORIA)



FIGURE54: IDIOPS SP (TRAPDOOR SPIDER)



FIGURE 55: NEPHILA PILIPES (GOLDEN ORB WEAVER)



FIGURE56: POLYPEDATES TERAIENSIS (TREE FROG)



FIGURE57: SCOLOPENDRA DEHAANI (CHERRY RED CENTIPEDE)



FIGURE 58: TELAMONIA DIMIDIATA (TWO STRIPPED JUMPER)



FIGURE59: THOMISUS SP (CRAB SPIDER)



FIGURE60: TOCKAY GECKO (GEKKO GECKO)

FLORA



FIGURE 61 : MELASTOMA AFFINE



FIGURE 62 : MIMOSA PUDICA



FIGURE 63 : BAMBOO STAND



FIGURE 64 : FICUS HISPIDA



FIGURE 65: FICUS RELIGIOSA



FIGURE 66: TRIDAX PROCUMBENS



FIGURE 67 : COSTUS SPP



FIGURE 68: CROTALARIA PELLIDA

APPENDIX-6

**Joint Verification and Communication from
Tripura Forest Department regarding and
Tree felling (extraction)**

No.F.6-5/Deptt. Oprnt./Timber/SSD/Vol-IV/FOR/2023-24/507-09

GOVERNMENT OF TRIPURA
OFFICE OF THE SUB DIVISIONAL FOREST OFFICER
SADAR FOREST SUB DIVISION
AGARTALA, TRIPURA WEST

Dated: 14/05/2024

To
The Managing Director TIDC Ltd.
Khejurbagan, Agartala, Tripura West.

Sub: Request for placement of fund amounting to Rs.2,68,870/- (Rupees: Two lakhs sixty eight thousand eight hundred seventy) only in connection with extraction of 286 (two hundred eighty six) nos. trees from Bodhjunnagar Industrial Area under Mohanpur Range jurisdiction - regarding.

Ref: No.F.5/MNPR/Deptt. Oprtn./2021-22/115, dt. 10/05/2024 of the Range Officer, Mohanpur Range.

Sir,

With reference to the subject as cited above, I would like to furnish here in below the Bank Account details of the undersigned with a request to placement of fund amounting to Rs.2,68,870/- (Rupees: Two lakhs sixty eight thousand eight hundred seventy) only in connection with extraction of 286 (two hundred eighty six) nos. trees from Bodhjunnagar Industrial Area for up gradation of Bodhjunnagar Industrial Area (construction of CRCSRE, 0.99 land area of Tripura) under Mohanpur Range jurisdiction. The joint field visit report along with tree enumeration list and estimate has also been prepared and submitted by the Range Officer, Mohanpur Range for placement of the aforesaid amount. After placement of fund please send fund allotment copy through SDFO's Mail Address (sdfosadar@gmail.com).


Account Details:

Name of Account Holder	Account Number	Bank	Branch	IFSC Code
Sub Divisional Forest Officer, Sadar, Deptt. Oprnt	130022010000947	Union Bank of India	Akhaura	UBIN0913006

This is for favour of your kind information and doing the needful please.

Encl: As stated.

Yours faithfully


(T.K. Debbarma, TFS)
Sub-Divisional Forest Officer
Sadar Forest Sub Division

Copy to:

1. The District Forest Officer, West Forest District for favour of kind information.
2. The Range Officer, Mohanpur Range for information.


Sub-Divisional Forest Officer
Sadar Forest Sub Division

No.F.5/MNPR /Deptt. Oprtn./2021-22/ 115
Government of Tripura
Office of the Range Officer, Mohanpur Forest Range
Sadar Forest Sub-Division

Dated, 10/05/2024.

To
The Sub-Divisional Forest Officer
Sadar Forest Sub-Division
West Tripura

Subject: Submission of joint field visit report including tree enumeration list & preliminary estimate for extraction of trees from Bodhjungle industrial Area in connection with up gradation of Bodhjungle industrial Area (construction of CRCSRE, 0.99 land area of Tripura) -regarding.

Sir,

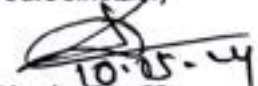
With reference to the subject cited above, I would like to inform you that extraction of trees through departmental operation from Bodhjungle industrial Area in connection with the up gradation of Bodhjungle industrial Area (construction of CRCSRE, 0.99 land area of Tripura). On 4th May, 2024 a joint field visit was conducted along with the RA Mohanpur & officials from TIDC. During the field visit 286 (two hundred eighty- six) nos. trees were found and enumeration list containing 286 (two hundred eighty- six) nos. trees enclosed preliminary estimate for extraction of said trees.

This is for favour of your kind information & doing the needful please.

Enclosed:

1. Tree enumeration list.
2. Preliminary Estimate for extraction.

Yours sincerely


10.05.24
Dhruba Das, FR

Range Officer, Mohanpur Range
Sadar Forest Sub-Division

Copy to:

1. The Beat Officer, Kamalghat Beat for information.
2. Office file.

*Dept of (upgrad)
to be sent to Director, TIDC
Copy to O/S*


10.05.24
Range Officer, Mohanpur Range
Sadar Forest Sub-Division

*211
14/5/24*

Preliminary Estimate for the extraction of per cum of round timber/firewood:

No.	Particulars	Item of work	Variables/Type of site/Location	Rate (Rs/cum)
1.	Surveying & marking of trees	Surveying and marking of trees along Transmission line/Mining area/Roadside and other Forest areas	Along the road	15
2.	Branch cutting	Branch removal of tree to facilitate felling prior to felling of tree	Along the road	400
3.	Felling	Felling of standing trees at suitable direction	Along the road	207
4.	Logging	Logging of felled trees	Along the road	196
5.	Dragging by Elephant or Mechanical means	Dragging of logs to stacking site by mechanical means for loading in vehicle for transportation	Along the road	780
6.	Transportation including loading & unloading	Transportation of logs from stacking site to Depot	Distance of transportation is up to 21 KM	1350
7.	Stacking at Depot site	Stacking, lot making etc. in depot	LS	175
Total=				3123.00
Monitoring & evaluation (Fuel for vehicles, other expenses) 3 %=				93.69
Maintenance & cleaning of depot 20 %=				624.60
Grand total =				3841.29

Say, Rs.3841.00

Approx. Volume of round timber/firewood = 70 cum.

Amount required for extraction of 70 cum of round timber/firewood as per SOR=70x3841=Rs. 2,68,870.00

(Rupees two lakh sixty eight thousand eight hundred seventy only).

Submitted by



Dhruba Das, FR
Range Officer, Mohanpur Range

Tree enumeration list

SL No.	Species	Measurement		Remarks
		Girth at BH (in cm)	Length in cm (Approx.)	
1	Neem	120	300	Fit for Firewood,2 br
2	Arjun	147	300	Fit for Firewood,2br
3	Bakul	65	200	Fit for Firewood
4	Acacia	100	400	2br
5	Acacia	105	150	Fit for Firewood
6	Bakul	73	300	Fit for Firewood
7	Arjun	70	300	Fit for Firewood
8	Pungamia	70	150	Fit for Firewood
9	Pungamia	45	150	Fit for Firewood
10	Kathal	95	200	2br
11	Kathal	56	250	Fit for Firewood
12	Neem	91	300	Fit for Firewood,2br
13	Jalpai	45	150	Fit for Firewood,2br
14	Neem	91	300	Fit for Firewood,2br
15	Agar .	50	300	Fit for Firewood
16	Agar	120	200	Fit for Firewood
17	Kathal	95	150	Fit for Firewood
18	Agar	45	250	Fit for Firewood
19	Neem	45	200	Fit for Firewood
20	Aam	40	150	Fit for Firewood
21	Acacia	130	150	Fit for Firewood
22	Ordinary	100	300	Fit for Firewood
23	Agar	60	150	Fit for Firewood
24	Arjun	40	150	Fit for Firewood
25	Pungamia	65	150	Fit for Firewood
26	Ordinary	50	250	Fit for Firewood,dead
27	Pungamia	40	150	Fit for Firewood
28	Acacia	75	150	Fit for Firewood
29	Acacia	65	400	Fit for Firewood
30	Acacia	95	400	
31	Acacia .	190	250	Fit for Firewood,
32	Acacia	70	300	Fit for Firewood
33	Agar	60	300	Fit for Firewood
34	Agar	55	150	Fit for Firewood
35	Agar	90	150	Fit for Firewood
36	Ordinary	100	150	Fit for Firewood
37	Ordinary	112	300	Fit for Firewood
38	Ordinary	60	200	Fit for Firewood
39	Bakul	70	150	Fit for Firewood
40	Ordinary	70	300	Fit for Firewood
41	Ordinary	80	150	Fit for Firewood
42	Ordinary	110	200	Fit for Firewood
43	Ordinary	120	350	Fit for Firewood

44	Mehoguni	65	200	Fit for Firewood
45	Mehoguni	65	250	Fit for Firewood
46	Kathal	90	200	Fit for Firewood
47	Arjun	60	200	Fit for Firewood
48	Pungamia	35	150	Fit for Firewood
49	Pungamia	95	150	Fit for Firewood
50	Arjun	72	200	Fit for Firewood
51	Jalpai	85	200	Fit for Firewood
52	Agar	70	150	Fit for Firewood
53	Jam	60	150	Fit for Firewood
54	Arjun	50	150	Fit for Firewood
55	Tetul	70	150	Fit for Firewood
56	Bahera	85	150	Fit for Firewood
57	Arjun	90	150	Fit for Firewood
58	Arjun	75	410	Fit for Firewood
59	Bahera	80	200	Fit for Firewood
60	Arjun	70	150	Fit for Firewood
61	Agar	60	200	Fit for Firewood
62	Neem	60	200	Fit for Firewood
63	Agar	55	200	Fit for Firewood
64	Neem	55	200	Fit for Firewood
65	Ordinary	50	150	Fit for Firewood
66	Mehoguni	35	150	Fit for Firewood
67	Rangi	88	250	
68	Rangi	89	300	
69	Jalpai	55	250	Fit for Firewood
70	Mehoguni	65	300	Fit for Firewood
71	Mehoguni	75	150	Fit for Firewood
72	Jam	40	150	Fit for Firewood
73	Mehoguni	40	150	Fit for Firewood
74	Mehoguni	55	150	Fit for Firewood
75	Mehoguni	65	300	Fit for Firewood
76	Mehoguni	55	300	Fit for Firewood
77	Pungamia	65	150	Fit for Firewood
78	Mehoguni	55	300	Fit for Firewood
79	Arjun	80	400	Fit for Firewood
80	Kathal	60	150	Fit for Firewood
81	Champa	60	250	Fit for Firewood
82	Arjun	80	300	Fit for Firewood
83	Amloki	65	150	Fit for Firewood
84	Kathal	55	150	Fit for Firewood
85	Arjun	85	150	Fit for Firewood
86	Arjun	45	200	Fit for Firewood
87	jam	60	150	Fit for Firewood
88	Ordinary	40	150	Fit for Firewood
89	Mehoguni	40	150	Fit for Firewood
90	Garjan	60	200	Fit for Firewood
91	Ordinary	95	200	Fit for Firewood
92	Arjun	109	250	Fit for Firewood
93	Arjun	85	250	Fit for Firewood

94	Pungamia	65	200	Fit for Firewood
95	Arjun	90	200	Fit for Firewood
96	Barai	45	150	Fit for Firewood
97	Ordinary	45	150	Fit for Firewood
98	Jam	70	200	Fit for Firewood
99	Arjun	73	200	Fit for Firewood
100	Nageswar	40	150	Fit for Firewood
101	Nageswar	40	150	Fit for Firewood
102	Aam	60	150	Fit for Firewood
103	Neem	50	200	Fit for Firewood
104	Neem	60	300	Fit for Firewood
105	Krishnachura	80	150	Fit for Firewood
106	Neem	80	250	Fit for Firewood
107	Champa	94	150	Fit for Firewood
108	Champa	92	200	Fit for Firewood
109	Acacia	137	700	2Br.
110	Teak	91	400	
111	Acacia	240	150	2br
112	Acacia	165	200	2br
113	Acacia	147	300	
114	Acacia	117	350	2br
115	Acacia	135	250	2br
116	Kathal	85	200	Fit for Firewood
117	Pungamia	170	150	Fit for Firewood
118	Champa	72	250	Fit for Firewood
119	Bat	140	150	Fit for Firewood
120	Bakul	45	150	Fit for Firewood
121	Mehoguni	115	150	Fit for Firewood
122	Neem	70	250	Fit for Firewood
123	Acacia	84	250	
124	Neem	47	300	Fit for Firewood
125	Kathal	90	150	Fit for Firewood
126	Arjun	90	300	Fit for Firewood
127	Agar	107	150	Fit for Firewood
128	Agar	50	150	Fit for Firewood
129	Agar	70	150	Fit for Firewood
130	Agar	80	150	Fit for Firewood
131	Arjun	75	150	Fit for Firewood
132	Plum	120	250	Fit for Firewood
133	Plum	120	250	Fit for Firewood
134	Plum	90	150	Fit for Firewood
135	Plum	110	200	Fit for Firewood
136	Plum	120	250	Fit for Firewood
137	Plum	120	250	Fit for Firewood
138	Plum	120	200	Fit for Firewood
139	Plum	90	150	Fit for Firewood
140	Plum	90	150	Fit for Firewood
141	Plum	90	150	Fit for Firewood
142	Plum	80	150	Fit for Firewood
143	Plum	105	300	Fit for Firewood

144	Plum	100	300	Fit for Firewood
145	Plum	110	300	Fit for Firewood
146	Plum	120	400	Fit for Firewood
147	Plum	110	300	Fit for Firewood
148	Plum	110	300	Fit for Firewood
149	Plum	110	300	Fit for Firewood
150	Plum	120	300	Fit for Firewood
151	Plum	120	250	Fit for Firewood
152	Plum	110	300	Fit for Firewood
153	Plum	120	250	Fit for Firewood
154	Plum	70	150	Fit for Firewood
155	Plum	80	150	Fit for Firewood
156	Plum	90	200	Fit for Firewood
157	Plum	110	300	Fit for Firewood
158	Plum	120	300	Fit for Firewood
159	Jalpai	85	250	Fit for Firewood
160	Kadam	110	250	Fit for Firewood
161	Ordinary	119	400	Fit for Firewood
162	Acacia	107	300	
163	Chalta	70	150	Fit for Firewood
164	Acacia	105	150	Fit for Firewood
165	Bakul	45	150	Fit for Firewood
166	Agar	40	150	Fit for Firewood
167	Arjun	45	150	Fit for Firewood
168	Acacia	122	150	Fit for Firewood
169	Agar	75	150	Fit for Firewood
170	Agar	80	300	Fit for Firewood
171	Rangi	107	300	2br
172	Bakul	70	150	Fit for Firewood
173	Champa	45	150	Fit for Firewood
174	Mehoguni	70	250	Fit for Firewood
175	Kathal	75	200	Fit for Firewood
176	Acacia	105	250	
177	Mehoguni	75	150	Fit for Firewood
178	Bakul	80	150	Fit for Firewood
179	Acacia	70	200	Fit for Firewood
180	Bakul	55	200	Fit for Firewood
181	Champa	40	150	Fit for Firewood
182	Chalta	80	150	Fit for Firewood
183	Bakul	55	150	Fit for Firewood
184	Bakul	60	150	Fit for Firewood
185	Kathal	130	250	2br
186	Acacia	225	150	Fit for Firewood
187	Champa	60	150	Fit for Firewood
188	Kathal	100	150	Fit for Firewood
189	Champa	70	300	Fit for Firewood
190	Bakul	75	150	Fit for Firewood
191	Bakul	40	150	Fit for Firewood
192	Agar	95	150	Fit for Firewood
193	Bakul	45	150	Fit for Firewood

194	Agar	45	150	Fit for Firewood
195	Casica	75	200	Fit for Firewood
196	Ordinary	98	150	Fit for Firewood
197	Acacia	131	200	2br
198	Arjun	75	300	Fit for Firewood
199	Kathal	95	200	Fit for Firewood
200	Arjun	95	200	Fit for Firewood
201	Arjun	98	150	Fit for Firewood
202	Arjun	83	150	Fit for Firewood
203	Champa	40	150	Fit for Firewood
204	Arjun	90	200	Fit for Firewood
205	Arjun	137	200	2br
206	Krishnachura	183	150	Fit for Firewood
207	Krishnachura	113	150	Fit for Firewood
208	Radhachura	87	200	Fit for Firewood
209	Agar	65	150	Fit for Firewood
210	Agar	40	150	Fit for Firewood
211	Agar	70	200	Fit for Firewood
212	G.Neem	65	200	Fit for Firewood
213	Ashok	60	150	Fit for Firewood
214	Neem	67	200	Fit for Firewood
215	Neem	72	250	Fit for Firewood
216	Gouava	55	150	Fit for Firewood
217	Neem	40	150	Fit for Firewood
218	Neem	42	150	Fit for Firewood
219	Neem	48	200	Fit for Firewood
220	Aam	40	150	Fit for Firewood
221	Gouava	37	150	Fit for Firewood
222	Krishnachura	100	150	Fit for Firewood
223	Krishnachura	88	150	Fit for Firewood
224	Ordinary	60	200	Fit for Firewood
225	jam	37	150	Fit for Firewood
226	Neem	48	200	Fit for Firewood
227	Agar	70	150	Fit for Firewood
228	Agar	75	150	Fit for Firewood
229	Pungamia	60	150	Fit for Firewood
230	Agar	92	150	Fit for Firewood
231	Amloki	78	150	Fit for Firewood
232	Aam	40	150	Fit for Firewood
233	Agar	85	150	Fit for Firewood
234	Agar	70	150	Fit for Firewood
235	Aam	47	150	Fit for Firewood
236	Kathal	40	150	Fit for Firewood
237	Kathal	68	150	Fit for Firewood
238	Agar	72	150	Fit for Firewood
239	Agar	56	200	Fit for Firewood
240	Agar	40	150	Fit for Firewood
241	Agar	45	150	Fit for Firewood
242	Ordinary	52	200	Fit for Firewood
243	Agar	64	150	Fit for Firewood

244	Agar	67	160	Fit for Firewood
245	Agar	72	150	Fit for Firewood
246	Kathal	67	200	Fit for Firewood
247	Kathal	68	150	Fit for Firewood
248	Agar	80	300	Fit for Firewood
249	Ordinary	86	300	Fit for Firewood
250	Pungamia	58	150	Fit for Firewood
251	Pungamia	70	150	Fit for Firewood
252	Pungamia	72	150	Fit for Firewood
253	Pungamia	70	150	Fit for Firewood
254	Pungamia	75	155	Fit for Firewood
255	Ordinary	97	2500	Fit for Firewood
256	Ordinary	45	150	Fit for Firewood
257	Pungamia	120	155	Fit for Firewood
258	Kathal	98	190	Fit for Firewood
259	Champa	67	200	Fit for Firewood
260	Agar	70	155	Fit for Firewood
261	Agar	82	200	Fit for Firewood
262	jam	82	185	2br
263	Neem	48	250	Fit for Firewood
264	Agar	95	150	Fit for Firewood
265	Agar	69	150	Fit for Firewood
266	Agar	78	300	Fit for Firewood
267	Arjun	67	155	Fit for Firewood
268	Agar	37	200	Fit for Firewood
269	Mehoguni	45	150	Fit for Firewood
270	Ordinary	46	150	Fit for Firewood
271	jam	55	200	Fit for Firewood
272	Gouava	62	150	Fit for Firewood
273	jam	80	150	Fit for Firewood
274	Champa	70	200	Fit for Firewood
275	Jarul	75	200	Fit for Firewood
276	Neem	72	190	Fit for Firewood
277	Agar	69	220	Fit for Firewood
278	Agar	89	160	Fit for Firewood
279	Agar	80	150	Fit for Firewood
280	Kathal	75	150	Fit for Firewood
281	Agar	79	150	Fit for Firewood
282	Kathal	95	150	Fit for Firewood
283	Agar	80	150	Fit for Firewood
284	Acacia	142	800	2br
285	Acacia	105	600	2br
286	Neem	72	220	Fit for Firewood

Field inquiry is done in presence of following officials:


Range Officer
Mohanpur Forest Range
Under Sadar Forest Sub-Division.


Assistant Engineer
TIDC Ltd.




RANAN DAS,
Range Assistant
Mohanpur Forest Range

APPENDIX-7

Environmental Sensitivity of Linear (15m both sides of road, SWD, Water supply & power supply)

and

Area-based (500mt radius of building and other infrastructure) components proposed within Bodhjungnagar IE

Road No. ¹	Proposed Structure	Environmental Sensitivity within 15m of Both Sides of Road	Location Map
1	<p>Name of Proposed Structure: Road No- 01</p> <p>Location: –Bodhjungnagar IE</p> <p>Start Point Lat-Long: - 23°52'54.23"N, 91°21'53.82"E</p> <p>End Point Lat-Long: - 23°53'9.88"N, 91°20'58.13"E</p> <p>Road Length: - 2713 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is one small religious infrastructure surrounded by the proposed Road. (Mandir). • 19 trees are proposed to be cut. • The natural drainage channel that crosses the proposed road. • There is one pond located approximately 50 meters from the proposed road. • There are two existing culverts that cross the proposed road. • The Terrain is Plain Land. 	
2	<p>Name of Proposed Structure: Road No- 02</p> <p>Location: – Bodhjungnagar IE</p> <p>Start Point Lat-Long: - 23°52'58.09"N, 91°21'29.36"E</p> <p>End Point Lat-Long: - 23°53'9.69"N, 91°21'3.96"E</p> <p>Road Length: - 1138 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 13 trees are proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There is one pond located approximately 100 meters from the proposed. • There are five existing culverts that cross the proposed road. • The Terrain is Plain Land. 	

¹ Road number 21 & 32 are not proposed to take up under this project, as they are not connecting to existing /proposed industries & existing /proposed components

<p>3</p>	<p>Name of Proposed Structure: - Road No- 03 Location: – Bodhjunnagar IE Start Point Lat-Long: - 23°53'21.66"N, 91°21'35.54"E End Point Lat-Long: - 23°53'47.82"N, 91°21'39.80"E Road Length: - 852 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 04 trees are proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There is no water body located proposed road. • There is one existing culvert that cross the proposed road. • The Terrain is Plain Land. 	
<p>4</p>	<p>Name of Proposed Structure: - Road No- 04 Location: – Bodhjunnagar IE Start Point Lat-Long: - 23°52'59.83"N, 91°21'13.49"E End Point Lat-Long: - 23°53'10.95"N, 91°21'15.10"E Road Length: - 359 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 07 trees are proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There is no water body located the proposed road. • There is one existing culvert that cross the proposed road. • The Terrain is Plain Land. 	
<p>5</p>	<p>Name of Proposed Structure: - Road No- 05 Location: – Bodhjunnagar IE Start Point Lat-Long: - 23°53'38.33"N, 91°21'37.25"E End Point Lat-Long: - 23°53'22.17"N, 91°22'3.93"E Road Length: - 396 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 12 trees are proposed to be cut. • There is one natural drainage channel that crosses the proposed road. • There are two ponds located approximately 100-125 meters from the proposed road but pond outside of industrial estate boundary. • There is no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	

<p>6</p>	<p>Name of Proposed Structure: - Road No- 06 Location: – Bodhjunnagar IE Start Point Lat-Long: - 23°52'52.60"N, 91°21'53.61"E End Point Lat-Long: - 23°53'32.90"N, 91°21'49.25"E Road Length: - 2641 meter</p>	<ul style="list-style-type: none"> • There is one Educational Institutional Building (CIPET Building) Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 10 trees are proposed to be cut • There is one natural drainage channel that crosses the proposed road. • There is one pond located approximately 100 meters from the proposed road but pond outside of industrial estate boundary. • There is two existing culverts that cross the proposed road. • The Terrain is Plain Land. 	
<p>7</p>	<p>Name of Proposed Structure: - Road No- 07 Location: – Bodhjunnagar IE Start Point Lat-Long: - 23°52'53.46"N, 91°21'53.78"E End Point Lat-Long: - 23°52'52.30"N, 91°21'51.70"E Road Length: - 85 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 2 trees are proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There is no water body located the proposed road. • There is no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	
<p>8</p>	<p>Name of Proposed Structure: - Road No- 08 Location: – Bodhjunnagar IE Start Point Lat-Long: - 23°52'57.38"N, 91°21'38.68"E End Point Lat-Long: - 23°53'1.65"N, 91°21'41.87"E Road Length: - 174 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 04 trees are proposed to be cut • There is no natural drainage channel that crosses the proposed road. • There is one pond located approximately 100 meters from the proposed road. • There are three existing culverts that cross the proposed road. • The Terrain is Plain Land. 	

<p>9</p>	<p>Name of Proposed Structure: - Road No- 09 Location: – Bodhjunnagar IE Start Point Lat-Long: - 23°53'1.19"N, 91°22'2.48"E End Point Lat-Long: - 23°53'9.77"N, 91°21'42.79"E Road Length: - 678 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 9 trees are proposed to be cut. • There is one natural drainage channel that crosses the proposed road. • There is one pond located approximately 50 meters from the proposed road. • There is two existing culverts that cross the proposed road. <p>The Terrain is Plain Land.</p>	
<p>10</p>	<p>Name of Proposed Structure: - Road No- 10 Location: – Bodhjunnagar IE Start Point Lat-Long: - 23°52'51.94"N, 91°21'52.51"E End Point Lat-Long: - 23°53'11.61"N, 91°21'0.49"E Road Length: - 1828 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 14 trees are proposed to be cut. • There is one natural drainage channel that crosses the proposed road. • There is one pond located approximately 50 meters from the proposed road. • There are two existing culverts that cross the proposed road. <p>he Terrain is Plain Land.</p>	
<p>11</p>	<p>Name of Proposed Structure: - Road No- 11 Location: – Bodhjunnagar IE Start Point Lat-Long: - 23°52'53.12"N, 91°21'48.79"E End Point Lat-Long: - 23°52'56.83"N, 91°21'40.57"E Road Length: - 485 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 04 trees are proposed to be cut • There is no natural drainage channel that crosses the proposed road. • There is no water body located the proposed road but. • There is one existing culvert that cross the proposed road. <p>The Terrain is Plain Land.</p>	




<p>12</p>	<p>Name of Proposed Structure: - Road No- 12 Location: – Bodhjunnagar IE Start Point Lat-Long: - 23°52'57.41"N, 91°21'54.15"E End Point Lat-Long: - 23°53'1.76"N, 91°21'58.07"E Road Length: - 204 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 06 trees are proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There is one pond located approximately 100 meters from the proposed road. • There is no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	<p>Bodhjunnagar IE Road No-12 Map</p> <p>Legend</p> <ul style="list-style-type: none"> • Bodhjunnagar IE • Existing Road • Other Road • Road No-12 <p>Google Earth</p>
<p>13</p>	<p>Name of Proposed Structure: - Road No- 13 Location: – Bodhjunnagar IE Start Point Lat-Long: - 23°53'5.66"N, 91°21'39.48"E End Point Lat-Long: - 23°53'14.61"N, 91°21'33.96"E Road Length: - 342 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 04 trees are proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There is no water body located the proposed road. • There is no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	<p>Bodhjunnagar IE Road No-13 Map</p> <p>Legend</p> <ul style="list-style-type: none"> • Bodhjunnagar IE • Existing Road • Other Road • Road No-13 <p>Google Earth</p>
<p>14</p>	<p>Name of Proposed Structure: - Road No- 14 Location: – Bodhjunnagar IE Start Point Lat-Long: - 23°53'9.59"N, 91°21'3.93"E End Point Lat-Long: - 23°53'15.75"N, 91°21'27.62"E Road Length: - 782 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 10 trees are proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There is one pond located approximately 100 meters from the proposed road. • There is no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	<p>Bodhjunnagar IE Road No-14 Map</p> <p>Legend</p> <ul style="list-style-type: none"> • Bodhjunnagar IE • Existing Road • Other Road • Road No-14 <p>Google Earth</p>

<p>15</p>	<p>Name of Proposed Structure: - Road No- 15 Location: – Bodhjungnagar IE Start Point Lat-Long: - 23°53'8.33"N, 91°21'26.31"E End Point Lat-Long: - 23°53'4.13"N, 91°21'24.25"E Road Length: - 187 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 02 trees are proposed to be cut • There is no natural drainage channel that crosses the proposed road. • There is no water body located approximately 100 meters from the proposed road. • There is no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	
<p>16</p>	<p>Name of Proposed Structure: - Road No- 16 Location: – Bodhjungnagar IE Start Point Lat-Long: - 23°52'59.20"N, 91°21'14.15"E End Point Lat-Long: - 23°53'4.62"N, 91°21'27.12"E. Road Length: - 420 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 06 trees are proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There is no water body located the proposed road but pond outside of industrial estate boundary. • There is no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	
<p>17</p>	<p>Name of Proposed Structure: - Road No- 17 Location: – Bodhjungnagar IE Start Point Lat-Long: - 2 3°53'29.07"N, 91°21'35.25"E. End Point Lat-Long: - 23°53'29.48"N, 91°21'33.89"E Road Length: - 41 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 03 trees are proposed to cut • There is no natural drainage channel that crosses the proposed road. • There is no water body located proposed road but pond outside of industrial estate boundary. • There is no existing culvert that cross the proposed road. • The Terrain is Plain Land. 	

<p>18</p>	<p>Name of Proposed Structure: - Road No- 18 Location: – Bodhjunnagar IE Start Point Lat-Long: - 23°53'17.81"N, 91°21'45.00"E. End Point Lat-Long: - 23°53'22.67"N, 91°21'47.75"E Road Length: - 247 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 06 trees are proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There is no water body located the proposed road. • There is no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	<p>Bodhjunnagar IE Road No-18 Map</p> <p>Legend</p> <ul style="list-style-type: none"> • Bodhjunnagar IE • Existing Road • Other Road • Road No-18
<p>19</p>	<p>Name of Proposed Structure: - Road No- 19 Location: – Bodhjunnagar IE Start Point Lat-Long: - 23°53'20.69"N, 91°21'35.42"E. End Point Lat-Long: - 23°53'11.01"N, 91°21'34.75"E. Road Length: - 395 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 05 trees are proposed to be cut • There is no natural drainage channel that crosses the proposed road. • There is no water located the proposed road. • There is no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	<p>Bodhjunnagar IE Road No-19 Map</p> <p>Legend</p> <ul style="list-style-type: none"> • Bodhjunnagar IE • Existing Road • Other Road • Road No-19
<p>20</p>	<p>Name of Proposed Structure: - Road No- 20 Location: – Bodhjunnagar IE Start Point Lat-Long: - 23°52'59.62"N, 91°21'47.82"E End Point Lat-Long: - 23°53'1.28"N, 91°21'46.45"E Road Length: - 66 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 01 tree is proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There is no water located the proposed road. • There is no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	<p>Bodhjunnagar IE Road No-20 Map</p> <p>Legend</p> <ul style="list-style-type: none"> • Bodhjunnagar IE • Existing Road • Other Road • Road No-20


<p>22</p>	<p>Name of Proposed Structure: - Road No- 22</p> <p>Location: – Bodhjungnagar IE</p> <p>Start Point Lat-Long: - 23°53'32.68"N, 91°21'35.28"E</p> <p>End Point Lat-Long: - 23°53'32.58"N, 91°21'36.48"E Road Length: - 36 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 05 trees are proposed to be cut • There is no natural drainage channel that crosses the proposed road. • There is one pond located approximately 50 meters from the proposed road. • There are three existing culverts that cross the proposed road. • The Terrain is Plain Land. 	
<p>23</p>	<p>Name of Proposed Structure: - Road No- 23</p> <p>Location: – Bodhjungnagar IE</p> <p>Start Point Lat-Long: - 23°52'57.73"N, 91°21'37.48"E</p> <p>End Point Lat-Long: - 23°52'57.75"N, 91°21'29.42"E Road Length: - 420 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 09 trees are proposed to be cut. • There is one natural drainage channel that crosses the proposed road. • There is one pond located approximately 50 meters from the proposed road. • There are three existing culverts that cross the proposed road. • The Terrain is Plain Land. 	
<p>24</p>	<p>Name of Proposed Structure: - Road No- 24</p> <p>Location: – Bodhjungnagar IE</p> <p>Start Point Lat-Long: - 23°53'12.39"N, 91°21'23.47"E</p> <p>End Point Lat-Long: - 23°53'15.34"N, 91°21'36.77"E Road Length: - 396 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 06 trees are proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There is no water located the proposed road. • There is no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	



<p>25</p>	<p>Name of Proposed Structure: - Road No- 25 Location: – Bodhjungnagar IE</p> <p>Start Point Lat-Long: - 23°53'36.09"N, 91°21'44.98"E</p> <p>End Point Lat-Long: - 23°53'37.79"N, 91°21'45.96"E</p> <p>Road Length: - 63 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • No trees are proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There are two ponds located approximately 150-225 meters from the proposed road but pond outside of industrial estate boundary. • There are no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	
<p>26</p>	<p>Name of Proposed Structure: - Road No- 26 Location: – Bodhjungnagar IE</p> <p>Start Point Lat-Long: - 23°53'14.90"N, 91°21'7.68"E.</p> <p>End Point Lat-Long: - 23°53'16.89"N, 91°21'17.64"E</p> <p>Road Length: - 369 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 05 trees are proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There is no water located the proposed road. • There is no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	
<p>27</p>	<p>Name of Proposed Structure: - Road No- 27 Location: – Bodhjungnagar IE</p> <p>Start Point Lat-Long: - 23°53'1.63"N, 91°21'42.03"E</p> <p>End Point Lat-Long: - 23°53'2.57"N, 91°21'49.48"E.</p> <p>Road Length: - 232 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • No trees are proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There is no water located the proposed road. • There are no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	



<p>28</p>	<p>Name of Proposed Structure: - Road No- 28 Location: – Bodhjunnagar IE</p> <p>Start Point Lat-Long: - 23°53'22.65"N, 91°21'22.70"E</p> <p>End Point Lat-Long: - 23°53'17.90"N, 91°21'21.73"E Road Length: - 151 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • No trees are proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There is no water located the proposed road. • There are no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	 <p>Bodhjunnagar IE Road No-28 Map</p> <p>Legend</p> <ul style="list-style-type: none"> • Bodhjunnagar IE • External Road • Other Road • Road No-28
<p>29</p>	<p>Name of Proposed Structure: - Road No- 29 Location: – Bodhjunnagar IE</p> <p>Start Point Lat-Long: - 23°52'49.95"N, 91°21'53.24"E End Point Lat-Long: - 23°52'50.62"N, 91°21'54.55"E Road Length: - 173 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 6 trees are proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There is no water body located the proposed road. • There are no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	 <p>Bodhjunnagar IE Road No-29 Map</p> <p>Legend</p> <ul style="list-style-type: none"> • Bodhjunnagar IE • External Road • Road • Road No-29 • Road No-28
<p>30</p>	<p>Name of Proposed Structure: - Road No- 30 Location: – Bodhjunnagar IE</p> <p>Start Point Lat-Long: - 23°53'12.35"N, 91°21'5.69"E,</p> <p>End Point Lat-Long: - 23°53'13.17"N, 91°21'9.54"E Road Length: - 149 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • No trees are proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There is one pond located approximately 50 meters from the proposed road. • There is no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	 <p>Bodhjunnagar IE Road No-30 Map</p> <p>Legend</p> <ul style="list-style-type: none"> • Bodhjunnagar IE • External Road • Other Road • Road No-30



<p>31</p>	<p>Name of Proposed Structure: - Road No- 31 Location: – Bodhjunnagar IE Start Point Lat-Long: - 23°53'37.64"N, 91°21'42.01"E End Point Lat-Long: - 23°53'38.64"N, 91°21'42.16"E Road Length: - 33 meter</p>	<ul style="list-style-type: none"> • There is no Educational Institutional Building Surrounded by the proposed Road. • There is no major habitation surrounded by the proposed Road. • There is no significant protected forest & Wildlife sanctuary.in and around proposed road. • There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 04 trees are proposed to be cut. • There is no natural drainage channel that crosses the proposed road. • There are two ponds located approximately 150-225 meters from the proposed road but pond outside of industrial estate boundary. • There are no existing culverts that cross the proposed road. • The Terrain is Plain Land. 	<p>Bodhjunnagar IE Road No-31 Map</p> <p>Legend</p> <ul style="list-style-type: none"> • End Point △ General Road △ Road △ Road No-31 • Start Point
<p>33</p>	<p>Name of Proposed Structure: - Road No- 33 Location: – Bodhjunnagar IE Start Point Lat-Long: - 23°53'4.02"N, 91°21'24.34"E End Point Lat-Long: - 23°53'2.03"N, 91°21'24.42"E Road Length: - 64 meter</p>	<ul style="list-style-type: none"> •There is no Educational Institutional Building Surrounded by the proposed Road. •There is no major habitation surrounded by the proposed Road. •There is no significant protected forest & Wildlife sanctuary.in and around proposed road. •There is no religious infrastructure surrounded by the proposed Road. (Mandir/Masjid/Church etc). • 05 trees are proposed to be cut. •There is no natural drainage channel that crosses the proposed road. •There is no water body located approximately 100 meters from the proposed road. •There are no existing culverts that cross the proposed road. •The Terrain is Plain Land. 	<p>Bodhjunnagar IE Road No-33 Map</p> <p>Legend</p> <ul style="list-style-type: none"> • End Point △ General Road △ Road △ Road No-33 • Start Point



Environmental sensitivity within 500m of proposed aerial components


Sl. No	Proposed Structure	Environmental Sensitivity	Photograph
1	<p>Name of Proposed Structure-Social Infrastructure Common Facility Centre (i)Administrative Offices: (ii) Multipurpose Hall, & conference hall; (iii)Creche; (iv)Dispensary:(v) Canteen & Food Preparation Area;(vi)Miscellaneous:</p> <p>Location - Near Existing Admin Building Lat-Long- 23°52'56.30"N, 91°21'52.45"E Area: plot area of 6,330.37 sq. m (0.63 ha.) with a built-up area of 1261 sq. m..</p>	<ul style="list-style-type: none"> • Located behind the Existing TIDCL Admin Building • One Govt. Educational Institutional Building which having approx. 125 m distance from proposed site. • One existing fire station which having approx.200 m distance from proposed site. • No major habitation nearby this location. • No forest and wildlife area. • 10 no.s trees are proposed to cut during construction phase. • One existing infrastructure (TIDCL Admin Building) within proposed site. • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • The Terrain is Undulating, Site is low lying land. 	
2	<p>Name of Proposed Structure-Social Infrastructure Other Common Facility</p> <p>Food kiosk :</p> <p>Lat-Long- 23°53'15.28"N, 91°21'43.96"E Area: 12 Sqm</p>	<ul style="list-style-type: none"> • Located behind the Existing TIDCL Admin Building • One Govt. Educational Institutional Building which having approx. 125 m distance from proposed site. • One existing fire station which having approx.200 m distance from proposed site. • No major habitation nearby this location. • No forest and wildlife area. • 10 nos trees are proposed to cut during construction phase. • One existing infrastructure (TIDCL Admin Building) within proposed site. • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • The Terrain is Undulating, Site is low lying land. 	



Sl. No	Proposed Structure	Environmental Sensitivity	Photograph
3	<p>Name of Proposed Structure-Social Infrastructure Other Common Facility</p> <p>Fire Station:</p> <p>Lat-Long- 23°52'59.51"N, 91°21'54.90"E "E Area: 174 Sqm.</p>	<ul style="list-style-type: none"> • It's Located behind the Existing CIPET Admin Building and Existing Fir Station. • One govt. Educational Institutional Building located at a distance of approx. 50 m distance from proposed site. • No major habitation nearby this location. • There is no significant protected forest and wildlife in and around the project area. • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • 3 nos trees are proposed to cut during construction phase. • No existing infrastructure within proposed site. • One natural drainage channel which having approx.50 m distance from proposed site. • The Terrain is Undulating. 	 <p>GPS Map Camera</p> <p>Agartala, Tripura, India V9M8+379, Bodjung Nagar, Agartala, Laxmipur, Tripura 799210, India Lat 23.883516° Long 91.365513° 13/02/24 12:16 PM GMT +05:30</p>
4	<p>Name of Proposed Structure-Social Infrastructure Other Common Facility</p> <p>Industrial Sheds:</p> <p>Lat-Long- 23°53'0.42"N, 91°21'22.57"E Area: plot area of 4134.25 sq.m. has been earmarked for industrial shed (G+1) with built up area of 2400 sqm for industrial sheds.</p>	<ul style="list-style-type: none"> • Located nearby existing industrial shed. • One govt. Educational Institutional Building located at a distance of 100m from proposed site. • One existing fire station located at a distance of approx. 75m from the proposed site. • No major habitation nearby this location. • There is no significant protected forest & wildlife in and around the project area. • No Religious infrastructure near to the Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed to be cut during construction phase. • No existing any infrastructure within proposed site. • One natural drainage channel which having approx.100m distance from proposed site. The Terrain is Undulating 	 <p>GPS Map Camera</p> <p>Laxmipur, Tripura, India V9M7+2WW, Laxmipur, Tripura 799210, India Lat 23.883938° Long 91.364351° 13/02/24 12:33 PM GMT +05:30</p>




Sl. No	Proposed Structure	Environmental Sensitivity	Photograph
5	<p>Name of Proposed Structure-Social Infrastructure Other Common Facility</p> <p>Truck Parking (TR-01): Lat-Long- 23°53'21.76"N , 91°21'9.67"E Area: 268.19 Sqm.</p>	<ul style="list-style-type: none"> •Located nearby Existing CIPET building. •There is one govt. Educational Institutional Building which having approx. 25m distance from proposed site. •One existing fire station located at a distance of 50m from proposed site. •No major habitation nearby this location. •There is no significant protected forest and wildlife in and around the project area •No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). •6 trees are proposed to cut during construction phase. •One existing infrastructure (sump) within proposed site. •One natural drainage channel located at a distance of 100m from proposed site. •The Terrain is Undulating. 	
6	<p>Name of Proposed Structure-Social Infrastructure Other Common Facility</p> <p>Truck Parking (TR-02): Lat-Long- 23°53'22.31"N, 91°21'12.13"E Area: 1687.05 Sqm.</p>	<ul style="list-style-type: none"> •Located nearby Existing CIPET Hostel. •One govt. Educational Institutional Building located at a distance of 300m from proposed site. •No major habitation near to this location within industrial boundary. •There is no significant protected forest and wildlife sanctuary in and around the proposed component. •No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). •8 trees are proposed to be cut during construction phase. •No existing infrastructure within proposed site. •One natural drainage channel located at a distance of 200m from proposed site. •The Terrain is Undulating, and site is low line. 	


Sl. No	Proposed Structure	Environmental Sensitivity	Photograph
7	<p>Name of Proposed Structure-Social Infrastructure Other Common Facility</p> <p>Truck Parking (TR-03):</p> <p>Lat-Long- 23°53'22.57"N, 91°21'15.85"E</p> <p>Area: 1216.55 Sqm.</p>	<ul style="list-style-type: none"> • Located nearby Existing Abhisar Build well Pvt Ltd. • There is one govt. Educational Institutional Building located at a distance of 250m distance from proposed site. • No major habitation nearby this location within industrial boundary. • There is no significant protected forest and wildlife sanctuary within are close to proposed component. • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed to cut during construction phase. • No existing any infrastructure within proposed site. • One natural drainage channel which having approx. 200m distance from proposed site. • The Terrain is Undulating, and site is low line. 	
8	<p>Name of Proposed Structure-Social Infrastructure Other Common Facility</p> <p>Truck Parking (TR-04):</p> <p>Lat-Long- 23°53'22.58"N 91°21'18.70"E</p> <p>Area: 463.12 Sqm.</p>	<ul style="list-style-type: none"> • Located nearby Existing Pran Beverage Industries. • One govt. Educational Institutional Building located at a distance of 500m from proposed site. • No major habitation nearby this location within industrial boundary. • There is no significant protected forest & wildlife sanctuary in and around the project • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • 1 Tree is proposed to cut during construction phase. • No existing infrastructure within proposed site. • One natural drainage channel located at a distance of 50m from proposed site. • The Terrain is Undulating, and site is low line. 	



Sl. No	Proposed Structure	Environmental Sensitivity	Photograph
9	<p>Name of Proposed Structure-Social Infrastructure Other Common Facility</p> <p>Truck Parking (TR-05):</p> <p>Lat-Long- 23°53'22.44"N 91°21'21.47"E</p> <p>Area: 601.43 Sqm.</p>	<ul style="list-style-type: none"> •Located nearby Existing TIDCL Industrial Shed and in front of Electrical 1330 KVA Sub Station. •No major habitation nearby this location within industrial boundary. •There is no significant protected forest & wildlife sanctuary in and around the project area •No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). •2 trees are proposed to cut during construction phase. •One existing electric transformer in the site. •No existing infrastructure within proposed site. •one natural drainage channel which having approx.100m. •The Terrain is Undulating, and site is low line. 	 <p>The photograph shows a dirt clearing with a large pile of cut logs in the center. In the background, there are trees and some industrial structures. A GPS overlay in the bottom right corner provides the following information: Laxmipur, Tripura, India; V9J5+XH, Laxmipur, Tripura 799210, India; Lat 23.882824°; Long 91.358046°; 15/02/24 04:01 PM GMT +05:30. A small Google map inset is visible in the bottom left corner of the photo.</p>
10	<p>Name of Proposed Structure-Social Infrastructure Other Common Facility</p> <p>Truck Parking (TR-06):</p> <p>Lat-Long- 2 3°53'23.11"N 91°21'22.68"E "E</p> <p>Area: 772.23 Sqm.</p>	<ul style="list-style-type: none"> •It's Located behind the Delwara steel industries Pvt.Ltd. •No govt. Educational Institution Building. •No major habitation nearby this location. •There is no significant protected forest & wildlife sanctuary in and around the project area •No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). •No trees are proposed to cut during construction phase. •No existing infrastructure within proposed site. •The Terrain is Undulating. 	 <p>The photograph shows a dirt road leading towards a building in the distance. The area is surrounded by trees and vegetation. The text "Truck parking 06" is overlaid in yellow on the right side of the image.</p>




Sl. No	Proposed Structure	Environmental Sensitivity	Photograph
11	<p>Name of Proposed Structure-Social Infrastructure Other Common Facility</p> <p>Weigh bridge & Parking:</p> <p>Lat-Long- 23°52'54.04"N, 91°21'55.30"E</p> <p>Area: 1441.59 sqm</p>	<ul style="list-style-type: none"> •Located nearby Existing Gate No-01. •One govt. Educational Institution Building located at a distance of 150m from proposed site. •No major habitation nearby this location within industrial boundary. •There is no significant protected forest & wildlife sanctuary in and around the project area •No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • 6 trees are proposed to cut during construction phase. •No existing infrastructure within proposed site. •One natural drainage channel which having approx.175m distance from proposed site. •The Terrain is Undulating, and site is low line. 	
12	<p>Name of Proposed Structure-Social Infrastructure Other Common Facility</p> <p>Weigh bridge & Parking/ Public Toilet:</p> <p>Lat-Long- 23°53'10.48"N, 91°20'59.21"E</p> <p>Area: 2180.99sqm</p>	<ul style="list-style-type: none"> •Located nearby Existing Gate No-02. •One govt. Educational Institution Building which having approx. 350m distance from proposed site. •No major habitation nearby this location within industrial boundary. •There is no significant protected forest in and around the project area and Wildlife sanctuary. •No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). •6 trees are proposed to cut during construction phase. •One natural drainage channel located at distance of 175m from proposed site. •The Terrain is Undulating, and site is low line. 	
13	<p>Name of Proposed Structure-Social Infrastructure Other Common Facility</p> <p>Parking/Weighbridge/public toilet:</p> <p>Lat-Long- 23°53'19.06"N, 91°21'36.57"E</p> <p>Area: 2180.99sqm</p>	<ul style="list-style-type: none"> • Located nearby Existing Gate No-01. • One govt. Educational Institution Building located at a distance of 350m from proposed site. • No major habitation nearby this location within industrial boundary. • There is no significant protected forest & wildlife sanctuary in and around the project • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • 6 trees are proposed to cut during construction phase. • No existing infrastructure within proposed site. • One natural drainage channel which having approx.175m distance from proposed site. • The Terrain is Undulating, and site is low line. 	




Sl. No	Proposed Structure	Environmental Sensitivity	Photograph
14	<p>Name of Proposed Structure-Social Infrastructure Other Common Facility</p> <p>Bus Shelter: 4 bus stops propose has been planned in near Gate 1&2 and other one proposed road no-01 near existing CRPF base camp</p>	<ul style="list-style-type: none"> • Located nearby Existing road No-01. • No major habitation nearby this location within industrial boundary. • There is no significant protected forest & wildlife sanctuary in and around the project • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No existing infrastructure within proposed site. • One natural drainage channel which having approx.175m distance from proposed site. • The Terrain is Undulating, and site is low line. 	
15	<p>Name of Proposed Structure-Social Infrastructure Other Common Facility Recreational Area: Location - Near Existing Admin Building</p> <p>Lat-Long- 23°52'56.63"N, 91°21'52.37"E</p> <p>Area: Total buildup area 56 Sq.m of 1261 sqm is planned common facilitation center.</p>	<ul style="list-style-type: none"> • Located behind the Existing TIDCL Admin Building. • One Govt. Educational Institutions Building located at a distance of 125 m from proposed site. • One Existing fire station located at a distance of 200m from proposed site. • No major habitations nearby this location. • There is no significant protected forest & wildlife sanctuary in and around the project • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • 10 trees are proposed to cut during construction phase. • One existing infrastructure (TIDCL Admin Building) within proposed site. • The Terrain is Undulating, Site is low lying land. 	
16	<p>Name of Proposed Structure-Social Infrastructure Other Common Facility Public Toilets (PT-01)/ Weigh bridge/ Parking:</p> <p>Location: - gateNo-02</p> <p>Lat-Long - 23°53'10.48"N, 91°20'59.21"E</p> <p>Area: 2180.99sqm</p>	<ul style="list-style-type: none"> • Located behind the Gate No-02. • No govt. Educational Institution Building • No major habitation nearby this location. • There is no significant protected forest & wildlife in and around the project area • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed to cut during construction phase. • No existing any infrastructure within proposed site. • The Terrain is Undulating 	




Sl. No	Proposed Structure	Environmental Sensitivity	Photograph
17	<p>Name of Proposed Structure- Social Infrastructure Other Common Facility</p> <p>Public Toilets (PT-02): Location – R.S Footwear Lat-Long- 23°53'17.97"N, 91°21'17.74"E</p>	<ul style="list-style-type: none"> • Located nearby R.S. footwear industries. • No govt. Educational Institution Building. • No major habitation near this location. • There is no significant protected forest & wildlife in and around the project • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed to cut during construction phase. • There are no existing any infrastructure within proposed site. • The Terrain is Undulating. 	 <p>Bodhju Nagar, Tripura, India V904+CG6, Garmcha Kobra - Bodhjung Nagar Rd, Bodhju Nagar, Tripura 799210, India Lat: 23.89433° Long: 91.355262° 13/02/24 03:22 PM GMT +05:30</p>
18	<p>Name of Existing and Proposed Structure- Water supply, pumping stations, and Underground reservoirs</p> <p>Proposed 7 nos Deep Tube Well. Proposed Deep Tube Well (DTW-01) Lat-Long- 23°53'43.30"N, 91°21'37.92"E</p>	<ul style="list-style-type: none"> • Located nearby Existing Entry-Exit Gate No-3 and nearby Pallapali Rubber. • No major habitation nearby this location within industrial boundary. • There is no significant protected forest in and around the project area and Wildlife sanctuary. • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed to cut during construction phase. • No existing infrastructure within proposed site. 	 <p>Bodhju Nagar, Tripura, India V9W6+CG6, Bodhju Nagar, Tripura 799210, India Lat: 23.895348° Long: 91.360794° 13/02/24 03:53 PM GMT +05:30</p>
19	<p>Name of Existing and Proposed Structure- Water supply, pumping stations, and Underground reservoirs</p> <p>Proposed Deep Tube Well (DTW-02) Lat-Long- 23°53'23.30"N, 91°21'28.97"E "E</p>	<ul style="list-style-type: none"> • No major habitation nearby this location within industrial boundary. • There is no significant protected forest & wildlife in and around the project area • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed to cut during construction phase. • No existing any infrastructure within proposed site. • One Pond which having approx.75m distance from proposed site. • The Terrain is Undulating, and site is low line. 	 <p>Bodhju Nagar, Tripura, India V9B5+V6F, Garmcha Kobra - Bodhjung Nagar Rd, Bodhju Nagar, Tripura 799210, India Lat: 23.892593° Long: 91.364665° 13/02/24 03:30 PM GMT +05:30</p>




Sl. No	Proposed Structure	Environmental Sensitivity	Photograph
20	<p>Name of Existing and Proposed Structure- Water supply, pumping stations, and Underground reservoirs</p> <p>Proposed Deep Tube Well (DTW-03) Lat-Long- 23°53'16.76"N, 91°21'8.60"E</p>	<ul style="list-style-type: none"> • Located nearby existing Rado & Company. • No govt. Educational Institution Building. • No major habitation nearby this location. • There is no significant protected forest & wildlife in and around the project area • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed to cut during construction phase. • No existing any infrastructure within proposed site. • The Terrain is Undulating. 	
21	<p>Name of Existing and Proposed Structure- Water supply, pumping stations, and Underground reservoirs</p> <p>Proposed Deep Tube Well (DTW-04) Lat-Long- 23°53'1.30"N, 91°21'18.84"E "E</p>	<ul style="list-style-type: none"> • Located nearby Existing Tripura Ispat Ltd. • One govt. Educational Institutions Building located at a distance of 350m from proposed site. • No major habitation nearby this location within industrial boundary. • There is no significant protected forest & wildlife sanctuary in and around the project area • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed to cut during construction phase. • No existing any infrastructure within proposed site. • One natural drainage channel which having approx. 150m distance from proposed site. • The Terrain is Undulating, and site is low line. 	
22	<p>Name of Existing and Proposed Structure- Water supply, pumping stations, and Underground reservoirs</p> <p>Proposed Deep Tube Well (DTW-05) Lat-Long- 23°52'53.74"N, 91°21'29.31"E</p>	<ul style="list-style-type: none"> • Located nearby Existing TIDCL Industrial Shed and in front of Electrical 1330 KVA Sub Station. • No major habitation nearby this location within industrial boundary. • There is no significant protected forest & wildlife in and around the project area • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • 2 trees are proposed to cut during construction phase. • One existing electric transformer in the site. • No existing infrastructure within proposed site. • One natural drainage channel which having approx. 50m distance from proposed site. • The Terrain is Undulating, and site is low line. 	

Sl. No	Proposed Structure	Environmental Sensitivity	Photograph
23	<p>Name of Existing and Proposed Structure- Water supply, pumping stations, and Underground reservoirs</p> <p>Proposed Deep Tube Well (DTW-06)</p> <p>Lat-Long- 23°53'17.42"N, 91°21'42.36"E.</p>	<ul style="list-style-type: none"> • Located nearby by CRPF camp. • No major habitation nearby this location. • There is no significant protected forest & wildlife in and around the project area. • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed cut during construction phase. • No existing infrastructure within proposed site. • No water body at Proposed site. • The Terrain is Undulating and Low line area. 	
24	<p>Name of Existing and Proposed Structure- Water supply, pumping stations, and Underground reservoirs</p> <p>Proposed Deep Tube Well (DTW-07)</p> <p>Lat-Long- 23°53'3.50"N, 91°22'8.76"E.</p>	<ul style="list-style-type: none"> • Located nearby Existing Abhishek Build well Pvt Ltd. • One govt. Educational Institutions Building located at a distance of 250m from proposed site. • No major habitation nearby this location within industrial boundary. • There is no significant protected forest & wildlife in and around the project area. • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed to cut during construction phase. • No existing infrastructure within proposed site. • One natural drainage channel located at a distance of 200m distance from proposed site. • The Terrain is Undulating 	
25	<p>Name of Proposed Structure- Water supply, pumping stations and Underground reservoirs.</p> <p>Proposed Water Treatment Plant (WTP-01)</p> <p>Lat-Long- 23°53'21.07"N, 91°21'37.15"E</p>	<ul style="list-style-type: none"> • Located nearby Delta Four Corporation Industries • No major habitation nearby this location within industrial boundary. • There is no significant protected forest & wildlife in and around the project area • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • 2 trees are proposed to cut during construction phase. • No existing infrastructure within proposed site. • No water body nearby proposed site • The Terrain is Undulating, and site is low line. 	




Sl. No	Proposed Structure	Environmental Sensitivity	Photograph
26	<p>Name of Proposed Structure- Water supply, pumping stations and Underground Reservoirs Proposed Over Head Tank (OHT-1 &2) at Zone -1</p> <p>Location – Zone -2</p> <p>Lat-Long- 23°53'21.07"N, 91°21'37.15"E</p>	<ul style="list-style-type: none"> • Located nearby Delta Four Corporation Industries • There is no major habitation near to this location within industrial boundary. • There is no significant protected forest & wildlife in and around the project area • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • 2 trees are proposed to during construction site. • No existing infrastructure within proposed site. • There is no water body nearby proposed site. • The Terrain is Undulating, and site is low line. 	 <p>A landscape photograph showing a field with utility poles and a GPS overlay. The overlay text reads: "Bodhu Nagar, Tripura, India V9Q6+3V2, Bodhu Nagar, Tripura 799210, India Lat 23.888707° Long 91.360663° 15/02/24 12:48 PM GMT +05:30".</p>
27	<p>Name of Proposed Structure- Water supply, pumping stations and Underground Reservoirs Proposed Over Head Tank (OHT-3&4) at Zone -1</p> <p>Location – Zone -2</p> <p>Lat-Long- 23°53'21.07"N, 91°21'37.15"E</p>	<ul style="list-style-type: none"> • Located near the administrative office. • No govt. Educational Institution Building. • No major habitation nearby this location. • There is no significant protected forest & wildlife in and around the project area • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • 2 trees are proposed to cut during construction site. • One existing infrastructure (UGSR, Pump room etc.) within proposed site. • The Terrain is Undulating. 	 <p>A photograph of a building with a red roof and a yellow wall, with a GPS overlay. The overlay text reads: "Bodhu Nagar, Tripura, India V9M6+848, Bodhu Nagar, Tripura 799210, India Lat 23.885714° Long 91.361704° 15/02/24 12:34 PM GMT +05:30".</p>
28	<p>Name of Proposed Structure- Water supply, pumping stations and Underground Reservoirs Existing Over Head Tank (OHT-5) at Zone -1</p> <p>Location – Opposite ABM Rubber Industry</p> <p>Lat-Long- 23°53'24.13"N, 91°22'5.64"E</p>	<ul style="list-style-type: none"> • Located in existing OHT and Pump house and nearby warehouse in zone-1 (Rubber Park). • No govt. Educational Institution Building. • No major habitation nearby this location. • There is no significant protected forest & wildlife in and around the project area • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed to cut during construction phase. • No existing infrastructure within proposed site. • The Terrain is Undulating. 	 <p>A photograph of an existing Over Head Tank (OHT-5) structure, which is a circular tank supported by a metal frame, surrounded by greenery.</p>



Sl. No	Proposed Structure	Environmental Sensitivity	Photograph
29	<p>Name of Proposed Structure-Electrical and Power Supply System Existing 132 KV Sub-Station</p> <p>Lat-Long- 23°53'1.24"N, 91°21'30.20"E</p> <p>Area: 48476 Sqm.</p>	<ul style="list-style-type: none"> • Located nearby by Existing Industrial Shed (Prime & Pure Food Industries and Shree Vam Industries) and behind the Existing Pran Beverage Food Industries. • No major habitation nearby this location. • There is no significant protected forest & wildlife in and around the project area and Wildlife sanctuary. • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • 11 trees are proposed to cut during construction phase. • No existing infrastructure within proposed site. • One natural drainage channel which having approx. 150m distance from proposed site. • Terrain is Undulating. 	
30	<p>Name of Proposed Structure-Electrical and Power Supply System Existing 33 KV Sub-Station-01</p> <p>Lat-Long- 23°53'23.12"N, 91°21'49.68"E</p> <p>Area: 1680 Sqm.</p>	<ul style="list-style-type: none"> • Located nearby by Existing Industries Laxmi Rubber and Dharampal Prem Chand Ltd. • No major habitation nearby this location. • There is no significant protected forest & wildlife in and around the project area. • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed cut during construction phase. • No existing any infrastructure within proposed site. One water body (Pond) which having approx.150m distance from proposed site. • The Terrain is Undulating. 	
31	<p>Name of Proposed Structure-Electrical and Power Supply System 33 KV Sub-Station-02</p> <p>Lat-Long- 23°53'22.75"N, 91°21'30.89"E</p> <p>Area: 1480 Sqm.</p>	<ul style="list-style-type: none"> • Located nearby by CRPF camp. • No major habitation nearby this location. • There is no significant protected forest & wildlife in and around the project area • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed to cut during construction phase. • No existing infrastructure within proposed site. • No water body at Proposed site. • The Terrain is Undulating and Low line area. 	

Sl. No	Proposed Structure	Environmental Sensitivity	Photograph
32	<p>Name of Proposed Structure-Electrical and Power Supply System</p> <p>Installation of 15 solar plants nine locations. - Proposed ISWM Plant Solar Plant 3x25 Kw</p> <p>Lat-Long- 2 3°53'21.05"N, 91°21'3.62"E Area: 750 Sqm.</p>	<ul style="list-style-type: none"> • Located nearby by Rado Industries. • No major habitation nearby this location. • There is no significant protected forest & wildlife sanctuary in and around the project area • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • 01 tree proposed to cut during construction phase. • No existing any infrastructure within proposed site. • No water body at Proposed site. • The Terrain is Undulating and Low line area. 	 <p>Agartala, Tripura, India V9P3+829, Bodhjung Nagar, Agartala, Radhakrishnorenagar, Tripura 799210, India Lat 23.894551° Long 91.362319° 15/02/24 03:31 PM GMT +05:30</p>
33	<p>Name of Proposed Structure-Electrical and Power Supply System</p> <p>2) Installation of 15 solar plants nine locations. - WPS at Zone 1 Solar Plant 25 kw</p> <p>Lat-Long- 23°53'33.98"N, 91°21'52.51"E Area: 250 Sqm.</p>	<ul style="list-style-type: none"> • Located nearby Existing Aristo Texcon Pvt Ltd. • No major habitation nearby this location within industrial boundary. • There is no significant protected forest & wildlife in and around the project area • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed cut during construction phase. • No existing infrastructure within proposed site. • One Pond which having approx. 75m distance from proposed site. • The Terrain is Undulating, and site is low line. 	 <p>Bodhju Nagar, Tripura, India V9Q6+3V2, Bodhju Nagar, Tripura 799210, India Lat 23.888707° Long 91.360663° 15/02/24 12:48 PM GMT +05:30</p>
34	<p>Name of Proposed Structure-Electrical and Power Supply System</p> <p>Installation of 15 solar plants nine locations. - Food Laboratories Solar Plant 2x25 Kw</p> <p>Lat-Long- 23°53'15.28"N, 91°21'43.96"E Area: 500 Sqm.</p>	<ul style="list-style-type: none"> • Located behind the Existing Food testing laboratory. • No Govt. Educational Institution Building. • No major habitation nearby this location. • There is no significant protected forest& wildlife in and around the project area and Wildlife sanctuary. • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed cut during construction phase. • There is one existing infrastructure within proposed site. The Terrain is Plain, 	 <p>Bodhju Nagar, Tripura, India V9Q6+3V2, Bodhju Nagar, Tripura 799210, India Lat 23.887474° Long 91.362103° 15/02/24 12:42 PM GMT +05:30</p>

Sl. No	Proposed Structure	Environmental Sensitivity	Photograph
35	<p>Name of Proposed Structure-Electrical and Power Supply System</p> <p>4) Installation of 15 solar plants nine locations. - Truck Parking Solar Plant 1x25 Kw</p> <p>Lat-Long- 23°52'58.87"N, 91°21'54.45"E</p> <p>Area: 250 Sqm.</p>	<ul style="list-style-type: none"> • Located nearby Existing CIPET building. • One govt. Educational Institution Building located at a distance of 25m from proposed site. • One existing fire station located at a distance of 50m distance from proposed site. • No major habitation nearby this location. • There is no significant protected forest in and around the project area and Wildlife sanctuary. • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed cut during construction phase. • No existing infrastructure within proposed site. • One natural drainage channel located at distance of 100m distance from proposed site. • The Terrain is Undulating. 	 <p>Agartala, Tripura, India 91.363586°E, 23.881449°N, Agartala, Laxmipur, Tripura 799210, India Lat 23.881449° Long 91.363586° 13/02/24 12:01 PM GMT +05:30</p>
36	<p>Name of Proposed Structure-Electrical and Power Supply System</p> <p>Installation of 15 solar plants nine locations. - CIPET Administrative Block (Zone1) Solar Plant 1x25 Kw 1x50 Kw</p> <p>Lat-Long- 23°52'58.05"N, 91°21'57.12"E</p> <p>Area: 750 Sqm.</p>	<ul style="list-style-type: none"> • Located nearby Existing CIPET Admin building. • One existing fire station which having approx. 100m distance from proposed site. • No major habitation nearby this location. • There is no significant protected forest in and around the project area and Wildlife sanctuary. • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed to cut at construction site. • No existing infrastructure within proposed site. • One natural drainage channel which having approx. 150m distance from proposed site. • The Terrain is Undulating. 	 <p>Agartala, Tripura, India 91.363586°E, 23.881449°N, Agartala, Laxmipur, Tripura 799210, India Lat 23.881449° Long 91.363586° 13/02/24 02:29 PM GMT +05:30</p>
37	<p>Name of Proposed Structure-Electrical and Power Supply System</p> <p>6) Installation of 15 solar plants nine locations. - TIDC Admin Block (Near CFC) Solar Plant 1x50 Kw</p> <p>Lat-Long- 23°52'54.24"N, 91°21'52.83"E</p> <p>Area: 500 Sqm.</p>	<ul style="list-style-type: none"> • Located behind the Existing TIDCL Admin Building. • One Govt. Educational Institutions Building which having approx. 125m distance from proposed site. • One Existing fire station which having approx. 200m distance from proposed site. • No major habitation nearby this location. • There is no significant protected forest & wildlife sanctuary in and around the project area • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • 10 trees are proposed to cut during construction phase. • One existing infrastructure (TIDCL Admin Building) within proposed site. • Terrain is Undulating, Site is low laying land. 	

Sl. No	Proposed Structure	Environmental Sensitivity	Photograph
38	<p>Name of Proposed Structure-Electrical and Power Supply System</p> <p>Installation of 15 solar plants nine locations. - CIPET Academic Block Solar Plant 1x50 Kw</p> <p>Lat-Long- 23° 52'58.05"N, 91°21'57.12"E.</p> <p>Area: 500 Sqm.</p>	<ul style="list-style-type: none"> • Located nearby Existing CIPET Academic building. • One existing fire station located at a distance of 100m from proposed site. • No major habitation nearby this location. • There is no significant protected forest in and around the project area and Wildlife sanctuary. • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed cut during construction phase. • No existing any infrastructure within proposed site. • One natural drainage channel which having approx.50m distance from proposed site. • The Terrain is Undulating. 	 <p>GPS Map Camera Agartala, Tripura, India V9J7+VF3, Agartala, Laxmipur, Tripura 799210, India Lat 23.881425° Long 91.363588° 13/02/24 02:30 PM GMT +05:30</p>
39	<p>Name of Proposed Structure-Electrical and Power Supply System</p> <p>Installation of 15 solar plants nine locations. -WTP Solar Plant 2x25 Kw 2x50 Kw</p> <p>Lat-Long- 23°53'10.62"N, 91°21'40.17"E</p> <p>Area: 1500 Sqm.</p>	<ul style="list-style-type: none"> • Located nearby Existing Himalaya Infracon Pvt. Ltd. • No major habitation nearby this location. • There is no significant protected forest & wildlife in and around the project area • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed cut during construction phase. • No existing any infrastructure within proposed site. • One natural drainage channel located at a distance from proposed site. • The Terrain is Undulating and low line area. 	 <p>GPS Map Camera Bodhju Nagar, Tripura, India V9M6+P48, Bodhju Nagar, Tripura 799210, India Lat 23.885714° Long 91.361704° 15/02/24 12:34 PM GMT +05:30</p>
40	<p>Name of Proposed Structure-Electrical and Power Supply System</p> <p>Installation of 15 solar plants nine locations. - Solar Control Room and 2x25 kw at Truck Parking</p> <p>Lat-Long- 23°53'2.62"N, 91°22'7.46"E.</p> <p>Area: 500 Sqm.</p>	<ul style="list-style-type: none"> • Located nearby Existing Abhisar Build well Pvt Ltd. • One govt. Educational Institutions Building which having approx.250m distance from proposed site. • No major habitation nearby this location within industrial boundary. • There is no significant protected forest & Wildlife in and around the project area • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed cut during construction phase. • No existing infrastructure within proposed site. • One natural drainage channel which having approx. 200m distance from proposed site. • The Terrain is Undulating. 	 <p>GPS Map Camera Ramchandranagar, Tripura, India V9M9+X4P, Ramchandranagar, Tripura 799035, India Lat 23.884326° Long 91.36889° 13/02/24 03:00 PM GMT +05:30</p>

Sl. No	Proposed Structure	Environmental Sensitivity	Photograph
41	<p>Name of Proposed Structure-Industrial Safety and Security</p> <p>-Boundary Wall Location – Bodhjungnagar IE</p> <p>Lat-Long- 23°53'11.94"N, 91°21'12.63"E</p> <p>Length: 6.338 Kms.</p>	<ul style="list-style-type: none"> • Located in Mohanpur Block of West Tripura district and is 12 km from Agartala city centre. • The national highway NH-108 B is 2.5 Kms away from the Industrial Estate and it further connects to NH-8, ensuring smooth connectivity to other parts of the region. 	
42	<p>Name of Proposed Structure-Industrial Safety and Security ICCC (Command and Control Centre) Data Centre Room</p> <p>Location – Near Existing Admin Building</p> <p>Lat-Long- 23°52'54.24"N, 91°21'52.83"E</p>	<ul style="list-style-type: none"> • Located behind the Existing TIDCL Admin Building. • One Govt. Educational Institution Building located at a distance of 125m from proposed site • One Existing fire station located at a distance of 200m from proposed site. • No major habitation nearby this location. • There is no significant protected forest & wildlife in and around the project area • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • 10 trees are proposed to cut during construction phase. • One existing infrastructure within proposed site (Admin Building) • Terrain is Undulating, Site is low lying land. 	
43	<p>Name of Proposed Structure-Industrial Safety and Security Gate & Security Cabin</p> <p>Location - Entry-Exit Gate No-01</p> <p>Lat-Long- 23°52'50.71"N, 91°21'53.83"E</p>	<ul style="list-style-type: none"> • Located behind the Existing Entry-Exit Gate No-01. • One govt. Educational Institution Building located at a distance of 200 m from proposed site. • One existing fire station located at a distance of 250m from proposed site. • There is no significant protected forest& wildlife in and around the project area. • No trees are proposed cut during construction phase. • No existing any infrastructure within proposed site (Except Entry Gate, Existing Road and Guard room). • One natural drainage channel located at a distance of 350m from proposed site. • The Terrain is Plain Surface. • No Religious infrastructure nearby Proposed site. 	

Sl. No	Proposed Structure	Environmental Sensitivity	Photograph
		(Mandir/masjid/Church/etc).	
44	<p>Name of Proposed Structure-Industrial Safety and Security Gate & Security Cabin</p> <p>Location – Entry-Exit Gate No-02</p> <p>Lat-Long- 23°53'10.11"N, 91°20'57.99"E</p>	<ul style="list-style-type: none"> • Located nearby Existing Entry-Exit Gate No-02. • No major habitation nearby this location within industrial boundary. • There is no significant protected forest & wildlife in and around the project area. • No trees are proposed cut during construction phase. • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No existing infrastructure within proposed site (Except Entry Gate, Existing Road and Guard room). • No water body nearby proposed site • The Terrain is Plan Surface. 	
45	<p>Name of Proposed Structure-Common Effluent Treatment Plant (CETP)</p> <p>Augmentation of 500 KLD CETP</p> <p>Location – Existing CETP</p> <p>Lat-Long- 23°53'35.65"N, 91°21'42.55"E</p> <p>Area: 4568 Sqm.</p>	<ul style="list-style-type: none"> • Located nearby Kurrian Associates. • No major habitation nearby this location. • There is no significant protected forest& wildlife in and around the project area. • No Religious infrastructure nearby Proposed site. (Mandir/masjid/Church/etc). • No trees are proposed to be cut during construction phase. • One existing infrastructure within proposed site. • One water body (Pond) located at a distance of 50m from proposed site. • The Terrain is Undulating 	

APPENDIX-8

**LIST OF SPECIES FOR BIO-ENGINEERING
INTERVENTION, CONSERVATION &
RESTORATION WITHIN INDUSTRIAL ESTATE**

LIST OF SPECIES FOR BIO-ENGINEERING INTERVENTION, CONSERVATION & RESTORATION WITHIN INDUSTRIAL ESTATE

Sl. No	Scientific name	Common name	Family	Habit	Origin	Where to plant
1	<i>Gmelina arborea</i>	Gamai	Verbenaceae	Tree	Native	Hilltop/plains
2	<i>Microcos paniculata</i>	Pichandi	Malvaceae	Tree	Native	Hilltop/plains
3	<i>Toona ciliata</i>	rongil	Meliaceae	Tree	Native	Hilltop/slope/plains
4	<i>Tectona grandis</i>	segun	Lamiaceae	Tree	Native	Hilltop/plains
5	<i>Trema orientalis</i>	Indian charcoal tree	Cannabaceae	Tree	Native	Hilltop/slope/near water body
6	<i>Lannea coromandelica</i>	Indian ash tree	Anacardiaceae	Tree	Native	Hilltop/slope
7	<i>Peltophorum pterocarpum</i>	Copper pod tree	Fabaceae	Tree	Native	Hilltop/plains
8	<i>Neolamarckia cadamba</i>	kadam	Rubiaceae	Tree	Native	Hilltop/plains
9	<i>Lagerstroemia speciosa</i>	Pride of india	Lythraceae	Tree	Native	Near water body
10	<i>Albizia procera</i>	Koroi	Fabaceae	Tree	Native	Hilltop/plains
11	<i>Ficus benghalensis</i>	Bat	Moraceae	Tree	Native	Hilltop/slope/plains
12	<i>Artocarpus lacucha</i>	monkey fruit	Moraceae	Tree	Native	Hilltop/plains
13	<i>Stereospermum tetragonum</i>	yellow snake tree	Bignoniaceae	Tree	Native	Hilltop/slope
14	<i>Antidesma montanum</i>	mountain currant tree	Phyllanthaceae	Tree	Native	Hilltop/slope
15	<i>Chaetocarpus castanocarpus</i>		Peraceae	Tree	Native	Hilltop/near water body
16	<i>Sterculia villosa</i>	elephant rope tree	Sterculiaceae	Tree	Native	Slope/near water body
17	<i>Aphanomixis polystachya</i>	pithraj tree	Meliaceae	Tree	Native	Hilltop/slope
18	<i>Dillenia pentagyna</i>	Nepali elephant apple	Dilleniaceae	Tree	Native	Hilltop/slope
19	<i>Holigarna amottiana</i>	Black Varnish Tree	Anacardiaceae	Tree	Native	Hilltop/plains
20	<i>Schima wallichii</i>	needlewood tree	Theaceae	Tree	Native	Hilltop/plains
21	<i>Melia azedarach</i>	jangli neem	Meliaceae	Tree	Native	Hilltop/slope/plains
22	<i>Cassia fistula</i>	golden shower tree	Fabaceae	Tree	Native	Hilltop/slope/plains
23	<i>Careya arborea</i>	Patana oak	Lecythidaceae	Tree	Native	Hilltop/plains/plains
24	<i>Ficus religiosa</i>	Asathwa	Moraceae	Tree	Native	Slope/plains

Sl. No	Scientific name	Common name	Family	Habit	Origin	Where to plant
25	<i>Ziziphus oenoplia</i>	jackal jujube	Rhamnaceae	Tree	Native	Slope/plains
26	<i>Parkia javanica</i>	tree bean	Mimosaceae	Tree	Exotic	plains/hilltop
27	<i>Dipterocarpus turbinatus</i>	Garjan	Dipterocarpaceae	Tree	Native	Hilltop/plains
28	<i>Mallotus philippensis</i>	Kamala tree	Euphorbiaceae	Tree	Native	Hilltop/plains
29	<i>Aquilaria Malaccensis</i>	Agar	Thymelaeaceae	Tree	Native	plains/slopes (critically endangered)
30	<i>Carallia brachiata</i>	Corkwood	Rhizophoraceae	Tree	Native	plains/lowlands/near water body
31	<i>Oroxylum indicum</i>	Indian trumpet tree	Bignoniaceae	Tree	Native	Hilltop/plains (Threatened)
32	<i>Bridelia tomentosa</i>	Khy	Phyllanthaceae	Tree	Native	plains/slopes
33	<i>Ardisia neriifolia</i>	Coralberry	Primulaceae	Shrub	Native	plains/slopes
34	<i>Clerodendrum infortunatum</i>	Bhat	Lamiaceae	Shrub	Native	plains
35	<i>Clerodendrum paniculatum</i>	Pagoda Flower	Lamiaceae	Shrub	Native	plains
36	<i>Urena lobata</i>	Caesarweed	Malvaceae	Shrub	Native	plains
37	<i>Lantana camera</i>	Yellow Sage	Verbenaceae	Shrub	Exotic	Slope/plains
38	<i>Thyrsostachys oliveri</i>	Kanakaich bamboo	Poaceae	Herb	Native	Slope/plains
39	<i>Bambusa balcooa</i>	barak bamboo	Poaceae	Herb	Native	plains
40	<i>Bambusa cucharensis</i>	Bom bamboo	Poaceae	Herb	Native	plains (endemic to north east India)
41	<i>bambusa pallida</i>	makhla bamboo	Poaceae	Herb	Native	Slope/plains
42	<i>Bambusa polymorpha</i>	Paura bamboo	Poaceae	Herb	Native	Slope/plains
43	<i>Bambusa Tulda</i>	Mirtinga bamboo	Poaceae	Herb	Native	Slope/plains
44	<i>Bambusa vulgaris</i>	Bari bamboo	Poaceae	Herb	Native	plains
45	<i>Dendrocalamus longispathus</i>	Rupai bamboo	Poaceae	Herb	Native	plains
46	<i>Melocana baccifera</i>	Muli bamboo	Poaceae	Herb	Native	Slope/plains
47	<i>Schizostachyum dullooa</i>	Dolu bamboo	Poaceae	Herb	Native	Plains
48	<i>Dendrocalamus hamitonii</i>	Pencha bamboo	Poaceae	Herb	Native	Plains
49	<i>Artocarpus chaplasha</i>	chaplaiash	Moraceae	Tree	Native	Hilltop/plains

Sl. No	Scientific name	Common name	Family	Habit	Origin	Where to plant
50	<i>Baccaurea ramiflora</i>	latkan	Phyllanthaceae	Tree	Native	Hilltop/plains
51	<i>Bischofia javanica</i>	bishop wood	Phyllanthaceae	Tree	Native	Hilltop/plains
52	<i>Butea monosperma</i>	palash	Fabaceae	Tree	Native	Hilltop/plains
53	<i>Nymphaea pubescens</i>	Pink water lily	Nymphaeaceae	Herb	Native	Water body
54	<i>Pontederia crassipes</i>	kochuripana	Pontederiaceae	Herb	Native	Water body
55	<i>Musa flaviflora</i>	wild banana	Musaceae	Herb	Native	Slope/plains
56	<i>Musa balbisiana</i>	aitta kola	Musaceae	Herb	Native	Slope/plains
57	<i>Curcuma aromatica</i>	wild turmeric	Zingiberaceae	Herb	Native	plains/near water body
58	<i>Ficus hispida</i>	Dumur	Moraceae	Tree	Native	Slope/plains
59	<i>Canna indica</i>	Kolaboti	Cannaceae	Herb	Exotic	Slope/plains
60	<i>Polygonum hydropiper</i>	Water pepper	Polygonaceae	Herb	Native	Near water body
61	<i>Saccharum spontaneum</i>	wild sugarcane	Poaceae	Herb	Native	Slope/plains
62	<i>Thysanolaena latifolia</i>	tiger grass	Poaceae	Herb	Native	Slope/plains
63	<i>Ruellia tuberosa</i>	Snapdragon root	Acanthaceae	Herb	Exotic	plains
64	<i>Tectaria spp.</i>	Least Halberd	Tectariaceae	Fern	Native	Near water body/slopes
65	<i>Dryopteris spp.</i>	male fern	Dryopteridaceae	Fern	Native	Near water body/slopes
66	<i>Aglaomorpha quercifolia</i>	Oak leaf fern	Polypodiaceae	Fern	Native	Near water body/slopes
67	<i>Pteris vittata</i>	Chinese brake	Pteridaceae	Fern	Native	Near water body/slopes
68	<i>Lygodium spp</i>	vine-like fern	Lygodiaceae	Fern	Native	Near water body/slopes
69	<i>Adiantum capillus- veneris</i>	venus hair fern	Pteridaceae	Fern	Native	Near water body/slopes
70	<i>Cystopteris fragilis</i>	common fragile fern	Dryopteridaceae	Fern	Native	Near water body/slopes
71	<i>Cymbidium spp.</i>	boat orchids	Orchidaceae	Herb	Native	Tree trunk
72	<i>Wedelia chinensis</i>	Bhringraj	Asteraceae	Herb	Native	Near water body/slopes/plains

APPENDIX-09

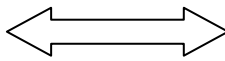
Disaster Management and Emergency Response Plan for Infrastructure Development Construction Phase at Industrial Estate

DISASTER MANAGEMENT & EMERGENCY RESPONSE PLAN				At Bodhjungnagar Site Level
HIERARCHY ACTION IN CASE OF EMERGENCY				
Issued By	Checked By	Approved By	Date of Issue	Revision
Incident Controller/ Manager (Projects)	Site Controller/ GM (Projects)	PMSC/ PMU (DIC & TIDCL)		0

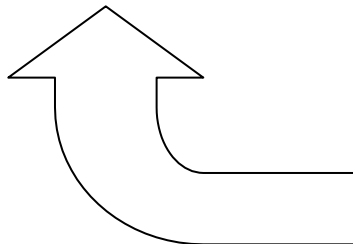
IN CASE OF EMERGENCY PLEASE CONTACT



EXTERNAL AGENCY	
NAME	TELEPHONE NUMBER
Police	
Fire	
Ambulance	
Hospital(s)	
Dist. Collector Officer	
Any other agency	



Name of the Contractor		
NAME	DESIGNATION	TELEPHONE NUMBER
	Project Manager/ Incident Controller	
	Site Controller / Emergency Controller	
	Safety In-charge / Assembly Area Coordinator	
	Security/ Watch ward	



CLIENT – DIC/ TIDCL (represented through Project Management and Supervision Consultant)		
NAME	DESIGNATION	TEL. NUMBER
	Project Director, PMU	
	Team Leader, PIU(s)/ Executive Engineer,	
	Team Leader, PMSC	
	Environmental Specialist, PMSC	

Disaster Management Plan (DMP) & Emergency Preparation Plan of M/s..... (Name of the Contractor-Package Specific)

(Important Note: Needs to be updated/ prepared by the respective Contractor of the awarded package in consultation with District Disaster Management Authority, scrutinized & checked by PMSC and approved by PMU to be prepared separately for each of the industrial estates)

1. Background

2. The Disaster Management Act 2005 envisages disaster and its management as Disaster - Disaster means a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or manmade cause, or by accident or negligence which result in substantial loss of life or human suffering or damage to, or degradation of, environment, and is of such nature or magnitude as to be beyond the coping capacity of the community of the affected area.

3. Disaster Management Plan (DMP) and Emergency Preparedness Plan (EPP)

4. Disaster or Emergency and its Possibility

5. A disaster, and therefore an emergency, occurring as a result of a malfunction of the normal operating procedures or an intervention of an outside natural phenomenon force such as earthquake, floods, landslides, winds or sabotage, that may affect several sections within it and/or may cause serious injuries, loss of lives, extensive damage to property or serious disruption outside the works.

6. Apart from natural phenomenon, major fire and disruption, serious accidents may take place through explosion in Gas/Fuel Tankers, heavy leakage and subsequent fire in the oil tankers etc. near construction camp/ establishment sites.

7. Objective of Disaster Management Plan

8. In order to be in a state of readiness to face any accident or disaster caused during the project construction, a Disaster Management Plan shall be prepared. Such a plan ought to cover possible disaster, on and off-site emergency preparedness plan, establishment of Emergency Control Centres (ECC), location of emergency services, and duties of the officers/staff during emergency.

9. Basic Contents of DMP

10. Basically, the DMP shall contain the following aspects:

- Description of the Site
- On-site Emergency Plan
- Off-site Emergency Plan

11. **Disaster Management** - Disaster Management implies continuous and integrated process of planning, organizing, coordinating and implementing measures which are necessary as expedient for

- Prevention of danger or threat to any disaster.
- Mitigation or reduction of risk of any disaster or its severity or consequences.
- Capacity building.
- Preparedness to deal with any disaster.
- Prompt response to any threatening disaster situation or disaster.
- Assessing the severity of magnitude of effect of every disaster.
- Evacuation rescue & relief.
- Rehabilitation and reconstruction.

12. BASIC DEFINITIONS

1. **On-Site Plans** - address incidents originating at any of construction/ operation sites or establishment sites.

2. **Off-Site Plans** - address incidents originating at any of construction/ operation sites or establishment sites outside but affecting the Project Work

3. **Risk** - The chance of an adverse event occurring in some period or in a specific circumstance, in the process of engaging in an activity.

4. **Hazard** - A phenomenon which may cause disruption to persons and their infrastructure; and is an undesirable outcome in the process of engaging in an activity.
 5. **Disaster** - An event which can cause immense damage and disruption and causing loss to live of workforce and property.
 6. **Emergency** - Serious sudden situation or occurrence that happens unexpectedly and demands immediate action to correct or to protect lives and/or property.
 7. **Crisis** - Unstable situation of extreme danger. and may lead to the following elements: - Surprise- -Rapid flow of events-Lack of or insufficient information-Internal conflict-confusion.
 8. **Disaster Management** - Set of actions and processes designed to lessen disastrous effects before, during and after a disaster.
 9. **Preparedness** - Measures undertaken in advance to ensure that individuals and agencies will be ready to react, such as emergency plans, logistical support and resource, inventories, and emergency information & communications systems.
 10. **Response** - Those measures undertaken immediately after a disastrous or hazardous event has occurred and for a limited period thereafter, primarily to save human life, property, treating the injured, prevent further injury and other forms of property loss and to mitigate disruption. They include response plan activation, declaration and communication of emergency to the concerned potential population and facilities at risk, opening and staffing of emergency operation centres, mobilization of resources, issuance of warnings and directions and provision of aid.
 11. **Mitigation** - Those measures and activities aimed at reducing or eliminating hazards or lessening the impact of the event.
 12. **Prevention** - Mitigation of hazard effects through public education, early warning or detection systems, safety systems, building and land- use codes and regulation.
 13. **Recovery** - Those measures undertaken to restore normal conditions. The time frame for recovery begins as soon as a reduction in critical response activities permits the re-allocation of resources and could include physical restoration and reconstruction.
 14. **All Clear** – Direction given by the incident coordinator (or authorized person) that the emergency has been revoked and that there is no further damage.
 15. **Assembly Areas** – On decision of evacuation, the place where people will move first to assembly area where further instruction will be given.
 16. **Suspect Device** – Any item that contains an explosive or mechanical device designated to explode by means of timer, touching, impact or by remote control a suspect device may appear suspicious by its placement, the circumstances surrounding its location or other information that may cause any person to become suspicious and decide that further investigation is necessary.
13. **Key Objectives of the Plan**
- To build a safe and disaster resilient project construction sites by developing
 - a holistic,
 - proactive,
 - multi-disaster oriented and
 - technology driven strategy through
 - prevention,
 - mitigation,
 - preparedness and
 - response
14. **Objective of Disaster Management Plan**
- To improve state of preparedness to meet any contingency
 - To reduce response time in organizing assistance by
 - defining responsibilities,
 - procedures for facilitating the curtailment and/ or restoration of Asset(s).

- To identify
- major resources,
- manpower, material & equipment needed to make the plan operational
- Making optimum use of resources.
- Closure of emergency, its analysis and identification of lessons learnt

15. Scope of Disaster Management Plan

- Landslides
- Floods
- earthquake
- Cloud burst
- Fire
- Terrorist Attack
- Any other hazard

16. Prevention of Disasters

17. Design the system after considering factors like:

- Highest flood level
- Seismic zones
- Wind zones
- Fire protection system
- Physical Security arrangements
- Another critical parameter

18. Disaster Management Cell at Contractor

- Management level at Contractor's Corporate Office
- Site level at respective project sites

19. Site level Disaster Management Committee

- Site Manager
- Site Engineers
- Safety In charge

20. Disaster Management at Site Level Responsibilities

- To maintain and update emergency call out list of persons:
- for emergency control,
- key personnel of Client
- fire safety
- first aid, medical emergencies
- Security, Police, District Administration Authorities
- Display communication details of nodal officers to be contacted in emergency
- Fixing of permanent notice boards at all suitable locations at project operation/ establishment sites displaying information, map, escape routes, precautions to be taken during emergency.
- To arrange food, drinking water, Tent for office space at site, accommodation for deployed employees/ workers (all levels)

21. Appointment of Key Persons and their Role at Project Road/ Site Level

1. Site Controller (SC)

The General Manager (however called) or his nominated deputy will assume overall responsibility for the Site and its personnel.

2. Incident Controller (IC)

Project Manager or an Officer of similar rank will be nominated to act as the IC. Immediately on learning about an emergency, he will rush to the incident site and take overall charge and report to the SC.

Liaison Officer (LO)

Personnel/Administrative Manager or his nominated Officer of deputy rank will work as LO and will be stationed at the Nodal Control Centres during emergency to handle Police, District Administration, Hospitals and other enquiries.

Forward Area Controller (FAC)

Departmental In charge of the concerned area will be the FAC to take care of the respective departments during emergency.

Task Specific Team Leaders (TLs)

As number of specified activities may have to be carried out, for which specific teams have to be formulated and their roles or duties defined, each of them will be headed by a Team Leader, in accordance. The following teams are suggested:

- Task Force
- Repair Team
- Fire Fighting Team
- Communication Team
- Security Team
- Manpower Team
- Safety Team
- Transport Team
- Medical Team

Emergency Control Centres (ECC)

Emergency Control Room is to be set up and marked on the site plan for the knowledge of all concerned. ECC is the focal point and it should be well connected with internal and external telephones and furnished with list of personnel and their addresses.

Assembly Points

Assembly points, the pre-determined safe places, where people will be directed after evaluation from the hazardous locality, have to be set up and marked on the site plan. Escape routes from assembly points have to be clearly defined and depicted.

Alarms

Suitable sirens will be provided at Site, which could be operated from the Nodal Control Rooms. The coding of the siren should be as per the standards and well circulated within the facility.

Tie Ups for Aid with Institutions (Hospitals, Wards, Police Stations etc.)

It is essential to have mutual aid arrangements among the industries in the neighborhood which would help in the case of a major disaster.

Training and Mock Drills

Proper training of the key personnel and other non-key personnel, who will take part in case of an emergency, should be arranged through engagement of district level disaster management authorities. Mock drills shall be performed to test the performance of the procedure laid

Emergency Callout List

Sl. No.	Name of Official/ Agency	Mobile No.	Landline No.	Address
1	Site Manger			
2	Site Engineer			
3	Safety In charge			
4	Team Leader, PMSC			
5	Resident Engineer, PMSC			
6	Executive Engineer, PIU			
7	Environmental Specialist PMU			
8	Project Director, PMU			
9	Nearest Fire Station-I			
10	Nearest Fire Station-II			
11	Nearest Hospital-I			
12	Nearest Hospital-II			
13	Police Station			
14	District Magistrate			
15	Superintendent of Police			
16	District Disaster Management Cell			
17	State Disaster Management Cell			
18	National Disaster Management Cell			

APPENDIX-10

FORMAT FOR RECEIVING GRIEVANCES FROM AGGRIEVED PERSON(S)

Grievance Registration Format

(to be translated in the local language)

The _____ Project welcomes complaints, suggestions, queries and comments regarding project implementation.

Aggravated persons may provide grievance with their name and contact information to enable us to get in touch for clarification and feedback.

In case someone chooses not to include personal details and wants the information provided to remain confidential, please indicate by writing/typing ***(CONFIDENTIAL)*** above the grievance format.

Thank you.

Date		Place of registration			
Contact Information/Personal Details					
Name		Gender	* Male * Female	Age	
Home Address					
Place					
Phone no.					
E-mail					
Complaint/Suggestion/Comment/Question: Please provide the details (who, what, where, and how) of your grievance below: If included as an attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or an update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of Official registering grievance)	
Mode of communication: Note/Letter E-mail Verbal/Telephonic Web	
Reviewed by: (Names/Positions of Official(s) reviewing grievance)	
Action Taken:	
Whether Action Taken Disclosed:	Yes No
Means of Disclosure:	

APPENDIX-11

Terms of Reference for Engagement of following experts through PMSC

- **Independent Consultant (for Environmental Safeguard)**
- **Environmental Safeguard cum Climate Change Expert**
- **Environmental Safeguard**
- **Bio-Diversity Expert**
- **Landscape Architect cum Horticultural Expert**

Terms of Reference for Engagement of Independent Consultant for Environmental Safeguard at PMU/TIDCL

A. Minimum Qualification Requirements

The Independent Consultant for Environmental Safeguard should have an advanced (masters) degree in environmental sciences or relevant field with experience in environmental/social assessments in infrastructure development sector. A thorough understanding of ADB's Safeguards Policy Statement, 2009 and other related guidelines, policies, and procedures of Government of India concerning environmental and social safeguards is preferable.

- Minimum General Experience : **15 years**
- Minimum Specific Experience : **8 years**
(relevant to assignment)

B. Detailed Tasks and/or Expected Output

- a) Ensure implementation of ADB-cleared EMPs by PIU and contractors including reporting to DoIC/ TIDCL and ADB.
- b) Support DoIC/ TIDCL and PIUs and other officers with environmental responsibilities in ensuring compliance with loan covenants related to environmental safeguards as well as state and national environment laws and regulations.
- c) Develop an environment, health, and safety (labour) training plan and provide formal environmental management trainings at the appropriate stage in project implementation as set out in the EMPs (and agreed training plan) including preparation of all training materials in a format that can be used for future reference, document attendees for trainings through photographs and attendance list.
- d) Develop environment management checklists based on the EMPs for use by officers and PIU and contractor's staff with environmental responsibilities, to undertake daily checks in their supervision and monitoring activities during pre-construction, construction, and maintenance phases.
- e) Support DoIC/ TIDCL, PIUs and their contractors in understanding the national laws and regulations, international good practices for environmental management, and the mitigation and monitoring requirements set out in the IEE and EMPs including the corrective actions required for each of the prioritized industrial estates.
- f) Assist PIUs to monitor and supervise implementation of the project EMP by themselves and their contractors.
- g) Review and confirm that necessary provisions of the disclosed EMP (updated versions if any since bidding stage) are included in the contracts for further implementation and compliance.
- h) Assist DoIC/ TIDCL to update the IEE/prepare addendum to IEE to reflect any changes (such as location, alignment, length, design, addition of new sub-components etc.) including undertaking any site-specific assessment and identifying mitigation measures required.
- i) Review and confirm the detailed designs adequately incorporate all EMP measures and conform with the IFCs EHS guidelines.

- j) Review and confirm that all pre-construction requirements and relevant clearances and permits have been obtained prior to commencement of works.
 - k) Maintain records and copies of all clearances, permits, licenses and insurances obtained by DoIC/ TIDCL and contractors.
 - l) Review and approve the contractor's pre-construction documentation as required by the EMP (e.g. CEMP/SEMP) and confirm requirements as well as national laws and regulations.
 - m) Review documentation and undertake regular site visits to ensure the EMP implementation.
 - n) Facilitate monthly EHS meetings and undertake at least one site visit every month to all active project sites across all contract packages during the construction period to check PIUs supervision and monitoring activities and adequate implementation of EMP measures and, advise DoIC/ TIDCL and their contractors if improvements are needed, document each site visit in field visit note including photographs.
 - o) In addition to monthly site visits carry out at least quarterly in-depth environmental audits and random spot checks of all contractors to verify compliance to applicable requirements during construction.
 - p) **Training and Capacity Building:** Provide training to project staff and contractors on environmental safeguard policies and procedures and strengthen the capacity of the PMU to manage environmental safeguards effectively.
 - q) Assist DoIC/ TIDCL to update the IEE (additional assessment and consultations) and EMPs in the event of unanticipated impact, including a change in scope or design, or the siting or routing of project components.
 - r) Record and help DoIC/ TIDCL to develop and implement corrective action as necessary to address exceedance of performance standards or non-compliance issues.
 - s) Support DoIC/ TIDCL to locally disclose the IEE/EMP per the EMP requirements, prepare a community liaison plan, and continue to disclose information on and conduct meaningful consultations with the affected communities especially in relation to sites with adjacent properties and the distribution line routings.
 - t) Support DoIC/ TIDCL to operationalize and effectively implement the grievance redress mechanism, including raising awareness of its existence with affected communities, resolving grievances related to environmental issues that have been submitted, and keeping adequate documentation.
 - u) **Risk Management:** Identify and manage environmental risks associated with the project. And ensure that any unanticipated environmental impacts are addressed promptly.
 - v) Support DoIC/ TIDCL to respond to any EHS related grievances.
 - w) Prepare operational procedures in line with the requirements set out in the EMP to be adopted by DoIC/ TIDCL and providing them with training on their operationalization.
 - x) Prepare a final EMR, setting out in detail the compliance level of all the EMP requirements and capacity strengthening of DoIC/ TIDCL to continue to comply with the EMP requirements during maintenance phase as part of the project completion report (PCR).
- C. Inputs required:** Appointed for one year to provide handholding support to the TIDCL and ensure 5-6 month overlapping period with Project Management and Supervision Consultant (PMSC) under the Tripura Industrial Infrastructure Development Project (TIIDP).

Terms of Reference for Engagement of Senior Environmental Safeguard cum Climate Change Expert (1 Position) through PMSC

A. Minimum Qualification Requirements

The Senior Environment Safeguard cum Climate Change Expert should have an advanced (masters) degree in environmental sciences or relevant field with experience in environmental/social assessments in infrastructure development sector. A thorough understanding of ADB's Safeguards Policy Statement, 2009 and other related guidelines, policies, and procedures of Government of India concerning environmental and social safeguards is preferable.

- Minimum General Experience : **15 years**
- Minimum Specific Experience : **8 years**
(relevant to assignment)

B. Detailed Tasks and/or Expected Output

- a) Ensure implementation of ADB-cleared EMPs by PIU and contractors including reporting to DoIC/ TIDCL and ADB.
- b) Support DoIC/ TIDCL and PIUs and other officers with environmental responsibilities in ensuring compliance with loan covenants related to environmental safeguards as well as state and national environment laws and regulations.
- c) Develop an environment, health, and safety (labour) training plan and provide formal environmental management trainings at the appropriate stage in project implementation as set out in the EMPs (and agreed training plan) including preparation of all training materials in a format that can be used for future reference, document attendees for trainings through photographs and attendance list.
- d) Develop environment management checklists based on the EMPs for use by officers and PIU and contractor's staff with environmental responsibilities, to undertake daily checks in their supervision and monitoring activities during pre-construction, construction, and maintenance phases.
- e) Support DoIC/ TIDCL, PIUs and their contractors in understanding the national laws and regulations, international good practices for environmental management, and the mitigation and monitoring requirements set out in the IEE and EMPs including the corrective actions required for each of the prioritized industrial estates.
- f) Assist PIUs to monitor and supervise implementation of the project EMP by themselves and their contractors.
- g) Review and confirm that necessary provisions of the disclosed EMP (updated versions if any since bidding stage) are included in the contracts for further implementation and compliance.
- h) Assist DoIC/ TIDCL to update the IEE/prepare addendum to IEE to reflect any changes (such as location, alignment, length, design, addition of new sub-components etc.) including undertaking any site-specific assessment and identifying mitigation measures required.
- i) Review and confirm the detailed designs adequately incorporate all EMP measures and conform with the IFCs EHS guidelines.

- j) Review and confirm that all pre-construction requirements and relevant clearances and permits have been obtained prior to commencement of works.
- k) Maintain records and copies of all clearances, permits, licenses and insurances obtained by DoIC/ TIDCL and contractors.
- l) Review and approve the contractor's pre-construction documentation as required by the EMP (e.g. CEMP/SEMP) and confirm requirements as well as national laws and regulations.
- m) Review documentation and undertake regular site visits to ensure the EMP implementation.
- n) Facilitate monthly EHS meetings and undertake at least one site visit every month to all active project sites across all contract packages during the construction period to check PIUs supervision and monitoring activities and adequate implementation of EMP measures and, advise DoIC/ TIDCL and their contractors if improvements are needed, document each site visit in field visit note including photographs.
- o) In addition to monthly site visits carry out at least quarterly in-depth environmental audits and random spot checks of all contractors to verify compliance to applicable requirements during construction.
- p) Prepare monthly/quarterly updates and assist DoIC/ TIDCL in preparing the semi-annual environmental monitoring reports in accordance with template agreed with ADB.
- q) Assist DoIC/ TIDCL to update the IEE (additional assessment and consultations) and EMPs in the event of unanticipated impact, including a change in scope or design, or the siting or routing of project components.
- r) Record and help DoIC/ TIDCL to develop and implement corrective action as necessary to address exceedance of performance standards or non-compliance issues.
- s) Support DoIC/ TIDCL to locally disclose the IEE/EMP per the EMP requirements, prepare a community liaison plan, and continue to disclose information on and conduct meaningful consultations with the affected communities especially in relation to sites with adjacent properties and the distribution line routings.
- t) Support DoIC/ TIDCL to operationalize and effectively implement the grievance redress mechanism, including raising awareness of its existence with affected communities, resolving grievances related to environmental issues that have been submitted, and keeping adequate documentation.
- u) Support DoIC/ TIDCL to respond to any EHS related grievances.
- v) Prepare operational procedures in line with the requirements set out in the EMP to be adopted by DoIC/ TIDCL and providing them with training on their operationalization.
- w) Prepare a final EMR, setting out in detail the compliance level of all the EMP requirements and capacity strengthening of DoIC/ TIDCL to continue to comply with the EMP requirements during maintenance phase as part of the project completion report (PCR).

C. Inputs required: Intermittent basis from commencement to completion of the construction works (infrastructure development) at the designated industrial estates (estimated 25 months of intermittent input spread over construction phase of 36 months and 1 year O&M phase/ DLP phase).

Terms of Reference for Engagement of Environmental Safeguard Expert (2 Positions) through PMSC

A. Minimum Qualification Requirements

The Environment Safeguard Expert should have an advanced (masters) degree in environmental sciences or relevant field with experience in environmental/social assessments in infrastructure development sector. A thorough understanding of ADB's Safeguards Policy Statement, 2009 and other related guidelines, policies, and procedures of Government of India concerning environmental and social safeguards is preferable.

- Minimum General Experience : **10 years**
- Minimum Specific Experience : **5 years**
(relevant to assignment)

B. Detailed Tasks and/or Expected Output

- a) Ensure implementation of ADB-cleared EMPs by PIU and contractors including reporting to DoIC/ TIDCL and ADB:
- b) Support DoIC/ TIDCL and PIUs and other officers with environmental responsibilities in ensuring compliance with loan covenants related to environmental safeguards as well as state and national environment laws and regulations.
- c) Develop an environment, health and safety (labour) training plan and provide formal environmental management trainings at the appropriate stage in project implementation as set out in the EMPs (and agreed training plan) including preparation of all training materials in a format that can be used for future reference, document attendees for trainings through photographs and attendance list.
- d) Develop environment management checklists based on the EMPs for use by officers and PIU and contractor's staff with environmental responsibilities, to undertake daily checks in their supervision and monitoring activities during pre-construction, construction and maintenance phases.
- e) Support DoIC/ TIDCL, PIUs and their contractors in understanding the national laws and regulations, international good practices for environmental management, and the mitigation and monitoring requirements set out in the IEE and EMPs including the corrective actions required for each of the prioritized industrial estates.
- f) Assist PIUs to monitor and supervise implementation of the project EMP by themselves and their contractors.
- g) Review and confirm that necessary provisions of the disclosed EMP (updated versions if any since bidding stage) are included in the contracts for further implementation and compliance.
- h) Assist DoIC/ TIDCL to update the IEE/prepare addendum to IEE to reflect any changes (such as location, alignment, length, design, addition of new sub-components etc.) including undertaking any site-specific assessment and identifying mitigation measures required.
- i) Review and confirm the detailed designs adequately incorporate all EMP measures and conform with the IFCs EHS guidelines.
- j) Review and confirm that all pre-construction requirements and relevant clearances and permits have been obtained prior to commencement of works.

- k) Maintain records and copies of all clearances, permits, licenses and insurances obtained by DoIC/ TIDCL and contractors.
- l) Review and approve the contractor's pre-construction documentation as required by the EMP (e.g. CEMP/SEMP) and confirm requirements as well as national laws and regulations.
- m) Review documentation and undertake regular site visits to ensure the EMP implementation.
- n) Facilitate monthly EHS meetings and undertake at least one site visit every month to all active project sites across all contract packages during the construction period to check PIUs supervision and monitoring activities and adequate implementation of EMP measures and, advise DoIC/ TIDCL and their contractors if improvements are needed, document each site visit in field visit note including photographs.
- o) In addition to monthly site visits carry out at least quarterly in-depth environmental audits and random spot checks of all contractors to verify compliance to applicable requirements during construction.
- p) Prepare monthly/quarterly updates and assist DoIC/ TIDCL in preparing the semi-annual environmental monitoring reports in accordance with template agreed with ADB.
- q) Assist DoIC/ TIDCL to update the IEE (additional assessment and consultations) and EMPs in the event of unanticipated impact, including a change in scope or design, or the siting or routing of project components.
- r) Record and help DoIC/ TIDCL to develop and implement corrective action as necessary to address exceedance of performance standards or non-compliance issues.
- s) Support DoIC/ TIDCL to locally disclose the IEE/EMP per the EMP requirements, prepare a community liaison plan, and continue to disclose information on and conduct meaningful consultations with the affected communities especially in relation to sites with adjacent properties and the distribution line routings.
- t) Support DoIC/ TIDCL to operationalize and effectively implement the grievance redress mechanism, including raising awareness of its existence with affected communities, resolving grievances related to environmental issues that have been submitted, and keeping adequate documentation.
- u) Support DoIC/ TIDCL to respond to any EHS related grievances.
- v) Prepare operational procedures in line with the requirements set out in the EMP to be adopted by DoIC/ TIDCL and providing them with training on their operationalization.
- w) Prepare a final EMR, setting out in detail the compliance level of all the EMP requirements and capacity strengthening of DoIC/ TIDCL to continue to comply with the EMP requirements during maintenance phase as part of the project completion report (PCR).

C. Inputs required:

- (1) Continuous basis from commencement to completion of the construction works (infrastructure development) at the designated industrial estates (estimated 35 months of intermittent input spread over construction phase of 36 months and 1 year O&M phase/ DLP phase).
- (2) Intermittent basis from commencement to completion of the construction works (infrastructure development) at the designated industrial estates (estimated 25 months

of intermittent input spread over construction phase of 36 months and 1 year O&M phase/ DLP phase).

**Terms of Reference for Engagement of Bio-Diversity Expert
(Designated from Tripura Forest Department)**

A. Minimum Qualification Requirements

The Bio-Diversity Expert should have a postgraduate degree in botany/ taxonomy/ environmental sciences with experience in bio-diversity studies for environmental assessment/ management plans in infrastructure development works. A thorough understanding of ADB's Safeguards Policy Statement, 2009 and other related guidelines, policies, and procedures of Government of India concerning environmental and social safeguards is preferable.

- Minimum General Experience : **8 years**
 - Minimum Specific Experience : **5 years**
- (candidate with Ph.D in Botany or Biodiversity will be preferred)

B. Detailed Tasks and/or Expected Output

- a) Assist the PMU, PIU and contractors in bio-diversity related matters during day-to-day implementation of ADB-cleared EMPs at all industrial estates.
- b) Assist implementing bio-diversity management checklists based on the EMPs for use by PIU and contractor's staff with environmental responsibilities, to undertake daily checks in their supervision and monitoring activities during pre-construction, construction, and maintenance phases.
- c) Support PIUs and their contractors in understanding the good practices for bio-diversity management, and the mitigation and monitoring requirements set out in the IEE and EMPs including the corrective actions required for each of the prioritized industrial estates.
- d) Assist PMU to update the IEE (additional assessment and consultations) and EMPs in the event of unanticipated impact on biodiversity, including a change in scope or design, or the siting or routing of project components.
- e) Assist PMU/ PIU to record and help DoIC/ TIDCL to develop and implement corrective action as necessary to address exceedance of performance standards or non-compliance issues related to biodiversity matters.
- f) Assist PMU/ PIU to respond to any bio-diversity matters related like species identification prior to site selection, species selection for open area/ green area development during pre-construction, construction, and maintenance phases.

C. Inputs required: One Bio-Diversity Expert will be designated from Tripura Forest Department to oversee and guide the bio-diversity aspects of the project and will be available for entire project implementation period and O&M/DLP phase.

Terms of Reference for Engagement of Landscape Architect cum Horticultural Expert through PMSC

A. Minimum Qualification Requirements

The Landscape Architect cum Horticultural Expert should have a postgraduate degree in Architect with experience in all types of landscaping architect/ horticulture for development works. A thorough understanding of ADB's Safeguards Policy Statement, 2009 and other related guidelines, policies, and procedures of Government of India concerning environmental and social safeguards is preferable.

- Minimum General Experience : **10 years**
- Minimum Specific Experience : **5 years**
(relevant to assignment)

B. Detailed Tasks and/or Expected Output

- (i) Assist the PMU, PIU and contractors in horticulture related matters during day-to-day implementation of ADB-cleared EMPs at all industrial estates:
- (ii) Support PIUs and their contractors in understanding the good practices for horticulture management and monitoring requirements including the corrective actions required for each of the prioritized industrial estates.
- (iii) Assist PMU/ PIU to record and help DoIC/ TIDCL to develop and implement corrective action as necessary to address non- compliance issues related to horticulture related matters.
- (iv) Assist PMU/ PIU to respond to any horticulture related matters like species identification prior to site selection, site preparation, species selection for open area/ green area development during pre-construction, construction and maintenance phases.

C. Inputs required: Intermittent basis from commencement to completion of the construction works (infrastructure development) at the designated industrial estates (estimated 04 months of intermittent input spread over construction phase of 36 months and 1 year O&M phase/ DLP phase).

Appendix-12

Detailed Calculations of Budgetary Provision for EMP Implementation

Table-1: Land/ Additional Industrial Plot Development, Common facilities, utility facility and Social Infrastructure {Package No-TIDCL-CW11-ADB-PIU1-BJN-01}

Sl. No.	Description of Items of Work	Unit	Qty.	Final (in INR)	Amount (in INR)
A	Construction Phase-30 months				
1	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Ambient Air Quality Monitoring , Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-30 months of 2 locations, once a quarter (15 samples) of two sector/Component	Nos.	15	7,129.02	106,935.30
2	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Water Quality Monitoring . Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-30 months of 2 locations, once a quarter (15 samples) of two sector/Component	Nos.	15	10,693.53	160,402.95
3	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Noise Level Monitoring . Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-30 months of 2 locations, once a quarter (15 samples) of two sector/Component	Nos.	15	4,277.41	64,161.15
4	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Soil Quality Monitoring . Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-30 months of 2 locations, once a quarter (15 samples) of two sector/Component	Nos.	15	12,119.33	181,789.95
Total (A)					513,289.35
B	Maintenance/ DLP phase- 60 months				
5	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Ambient Air Quality Monitoring , Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of four sector/Component of two sector/Component	Nos.	10	7,129.02	71,290.20
6	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Water Quality Monitoring . Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	10,693.53	106,935.30
7	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Noise Level Monitoring . Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	4,277.41	42,774.10
8	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Soil Quality Monitoring . Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	12,119.33	121,193.30
Total (B)					42,192.90
Total Cost (A + B)					855,482.25

Table-2: Tree Felling and Provision for Planting of Sapling within Bodhjunnagar IE

Sl. No	Reference	Reference/ SOR Item #	Description of Items of Work	Unit	Qty.	Final Rate (in INR)	Amount (in INR)
A Tree felling Cost							
1	Rate given by Forest Department	Office of the Subdivisional Forest Officer, Sadar forest sub division, Agartala West Tripura wide letter no-No.F.6-5/Deptt./Timber/SSD/Vol -IV/2023-24/507-09,Date-14-05-2024	Extraction of 286 Nos. of tree from the land of Industry Department at Bodhjunnagar IE (G/P) including transportation	Nos	286	68,870.00	268,870.00
Total (A)							268,870.00
B Provision for Planting of Saplings							
1	SOR 2023 PWD(R&B) Road & Bridge	Chapter - 11: Horticulture 11.6	Planting of Trees and their Maintenance for Two Year Planting of trees by the roadside (Avenue trees) in 0.60 m dia holes, 1 m deep dug in the ground, mixing the soil with decayed farmyard/sludge manure, planting the saplings, backfilling the trench, watering, fixing the tree guard and maintaining the plants for two year.	Nos	1430	2,634.52	3,767,367.74
2		Chapter - 11: Horticulture 11.7	Making Tree Guard 53 cm dia and 1.3 m High as per Design from Empty Drums Compensatory Afforestation Making tree guard 53 cm dia and 1.3 m high as per design from empty drum, slit suitably to permit sun and air including providing and fixing 2 nos MS sheet rings 50 x 0.5 mm with rivets, complete in all respect.	Nos	1430	665.20	951,236.00
Total (B)							4,718,603.74
Total (A + B)							4,987,473.74
Total Estimate (Round-off)							4,987,474.00

Table-3: Widening of Roads and Construction of Storm water drain with utility Corridor (Package No- TIDCL-CW01-ADB-PIU1-BDN-01, TIDCL-CW02-ADB-PIU1-BDN-02 and TIDCL-CW03-ADB-PIU1-BDN-03)

Sl. No.	Description of Items of Work	Unit	Qty.	Final (in INR)	Amount (in INR)
Package No- TIDCL-CW01-ADB-PIU1-BDN-01					
A	Construction phase-36 months				
1	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Ambient Air Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-36 months of 2 locations, once a quarter (18 samples) of two sector/Component	Nos.	18	7,129.02	128,322.36
2	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Water Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-36 months of 2 locations, once a quarter (18 samples) of two sector/Component	Nos.	18	10,693.53	192,483.54
3	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Noise Level Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-36 months of 2 locations, once a quarter (18 samples) of two sector/Component	Nos.	18	4,277.41	76,993.38
4	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Soil Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-36 months of 2 locations, once a quarter (18 samples) of two sector/Component	Nos.	18	12,119.33	218,147.94
Total (A)					615,947.22
B	Maintenance/ DLP phase- 60 months				
5	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Ambient Air Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of four sector/Component of two sector/Component	Nos.	10	7,129.02	71,290.20
6	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Water Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	10,693.53	106,935.30
7	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Noise Level Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	4,277.41	42,774.10
8	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Soil Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	12,119.33	121,193.30
Total (B)					342,192.90
Total Cost (A + B) of [CW-01]					958,140.12

Sl. No.	Description of Items of Work	Unit	Qty.	Final (in INR)	Amount (in INR)
Package No- TIDCL-CW02-ADB-PIU1-BDN-02					
A	Construction phase-30 months				
1	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Ambient Air Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-30 months of 2 locations, once a quarter (15 samples) of two sector/Component	Nos.	15	7,129.02	106,935.30
2	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Water Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-30 months of 2 locations, once a quarter (15 samples) of two sector/Component	Nos.	15	10,693.53	160,402.95
3	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Noise Level Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-30 months of 2 locations, once a quarter (15 samples) of two sector/Component	Nos.	15	4,277.41	64,161.15
4	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Soil Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-30 months of 2 locations, once a quarter (15 samples) of two sector/Component	Nos.	15	12,119.33	181,789.95
Total (A)					513,289.35
B	Maintenance/ DLP phase- 60 months				
5	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Ambient Air Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of four sector/Component of two sector/Component	Nos.	10	7,129.02	71,290.20
6	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Water Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	10,693.53	106,935.30
7	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Noise Level Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	4,277.41	42,774.10
8	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Soil Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	12,119.33	121,193.30
Total (B)					342,192.90
Total Cost (A + B) of [CW-02]					855,482.25

Sl. No.	Description of Items of Work	Unit	Qty.	Final (in INR)	Amount (in INR)
Package No- TIDCL-CW03-ADB-PIU1-BDN-03					
A	Construction phase-30 months				
1	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Ambient Air Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-30 months of 2 locations, once a quarter (15 samples) of two sector/Component	Nos.	15	7,129.02	106,935.30
2	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Water Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-30 months of 2 locations, once a quarter (15 samples) of two sector/Component	Nos.	15	10,693.53	160,402.95
3	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Noise Level Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-30 months of 2 locations, once a quarter (15 samples) of two sector/Component	Nos.	15	4,277.41	64,161.15
4	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Soil Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-30 months of 2 locations, once a quarter (15 samples) of two sector/Component	Nos.	15	12,119.33	181,789.95
Total (A)					513,289.35
B	Maintenance/ DLP phase- 60 months				
5	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Ambient Air Quality Monitoring. . Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of four sector/Component of two sector/Component	Nos.	10	7,129.02	71,290.20
6	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Water Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	10,693.53	106,935.30
7	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Noise Level Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	4,277.41	42,774.10
8	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Soil Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	12,119.33	121,193.30
Total (B)					342,192.90
Total Cost (A + B) of [CW-03]					855,482.25
Package No- (TIDCL-CW01-ADB-PIU1- TIDCL-CW01 +CW02+ CW-03) BJNI-01,02,03					26.69

**Table-4: Refurbishment of CETP and Construction of Water supply infrastructure
{Package No-TIDCL-CW13-ADB-PIU1-BJN-03}**

Sl. No.	Description of Items of Work	Unit	Qty.	Final (in INR)	Amount (in INR)
A	Construction phase-36 months				
1	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Ambient Air Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-36 months of 2 locations, once a quarter (18 samples) of two sector/Component	Nos.	18	7,129.02	128,322.36
2	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Water Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-36 months of 2 locations, once a quarter (18 samples) of two sector/Component	Nos.	18	10,693.53	192,483.54
3	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Noise Level Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-36 months of 2 locations, once a quarter (18 samples) of two sector/Component	Nos.	18	4,277.41	76,993.38
4	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Soil Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-36 months of 2 locations, once a quarter (18 samples) of two sector/Component	Nos.	18	12,119.33	218,147.94
Total (A)					615,947.22
B	Maintenance/ DLP phase- 60 months				
5	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Ambient Air Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of four sector/Component of two sector/Component	Nos.	10	7,129.02	71,290.20
6	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Water Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	10,693.53	106,935.30
7	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Noise Level Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	4,277.41	42,774.10
8	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Soil Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	12,119.33	121,193.30
Total (B)					342,192.90
Total Cost (A + B)					958,140.12

Table-5: Industrial Safety & Security, Civil Work (Watch Tower, Upgradation of Boundary Wall, New Construction of Boundary Wall etc. {Package No- TIDCL-CW12- ADB-PIU1-BJN-02})

Sl. No.	Description of Items of Work	Unit	Qty.	Final (in INR)	Amount (in INR)
A	Construction phase-24 months				
1	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Ambient Air Quality Monitoring, Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-24 months of 2 locations, once a quarter (12 samples) of two sector/Component	Nos.	12	7,129.02	85,548.24
2	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Water Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-24 months of 2 locations, once a quarter (12 samples) of two sector/Component	Nos.	12	10,693.53	128,322.36
3	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Noise Level Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-24 months of 2 locations, once a quarter (12 samples) of two sector/Component	Nos.	12	4,277.41	51,328.92
4	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Soil Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-24 months of 2 locations, once a quarter (12 samples) of two sector/Component	Nos.	12	12,119.33	145,431.96
Total (A)					410,631.48
B	Maintenance/ DLP phase- 60 months				
5	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Ambient Air Quality Monitoring, Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of four sector/Component of two sector/Component	Nos.	10	7,129.02	71,290.20
6	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Water Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	10,693.53	106,935.30
7	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Noise Level Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	4,277.41	42,774.10
8	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Soil Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 1 location, once in 6 months (10 samples) of two sector/Component	Nos.	10	12,119.33	121,193.30
Total (B)					342,192.90
Total Cost (A + B)					752,824.38

Table-6: Upgradation of Electrical & power supply and Installation of solar plant and mechanical accessories works {Package No-TIDCL-EW01-ADB-PIU1-BJN-01}

Sl. No.	Description of Items of Work	Unit	Qty.	Final (in INR)	Amount (in INR)
A	Construction phase-36 months				
1	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Ambient Air Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-36 months of 2 locations, once a quarter (18 samples) of two sector/Component	Nos.	18	7,129.02	128,322.36
2	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Water Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-36 months of 2 locations, once a quarter (18 samples) of two sector/Component	Nos.	18	10,693.53	192,483.54
3	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Noise Level Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-36 months of 2 locations, once a quarter (18 samples) of two sector/Component	Nos.	18	4,277.41	76,993.38
4	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Soil Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Construction phase-36 months of 2 locations, once a quarter (18 samples) of two sector/Component	Nos.	18	12,119.33	218,147.94
Total (A)					615,947.22
B	Maintenance/ DLP phase- 60 months				
5	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Ambient Air Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 2 locations, once in 6 months (20 samples) of four sector/Component of two sector/Component	Nos.	20	7,129.02	142,580.40
6	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Water Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 2 locations, once in 6 months (20 samples) of two sector/Component	Nos.	20	10,693.53	213,870.60
7	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Noise Level Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 2 locations, once in 6 months (20 samples) of two sector/Component	Nos.	20	4,277.41	85,548.20
8	Provision for carrying out environmental monitoring within IE through NABET Accredited Laboratory Soil Quality Monitoring. Monitoring locations shall cover all active construction sites, workforce camp site, material stack yard for Maintenance/ DLP phase- 60 months of 2 locations, once in 6 months (20 samples) of two sector/Component	Nos.	20	12,119.33	242,386.60
Total (B)					684,385.8
Total Cost (A + B)					1,300,333.02

APPENDIX-13

Format for Environmental Monitoring Report (Semi-annual)

Environmental Monitoring Report

Loan Number: -----

Reporting period: (month/year to month/year)

(Title of Project)

Prepared by: -----

Implementing Agency: -----

Executing Agency: -----

Date: (dd/ mm/ yyyy)

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1. Introduction
2. Compliance status with National /State /Local statutory environmental requirements
3. Compliance status with the environmental covenants as stipulated in the Loan Agreement
4. Compliance status with environmental management and monitoring plans and environmental assessment and review framework/procedures as stipulated in the environmental documentation as agreed with ADB
5. Approach and methodology engaged for environmental monitoring of the project
6. Monitoring of environmental receptors/ attributes (e.g. ambient air, surface water, ground water, land, ecological aspects, noise, hazardous/toxic wastes, etc.)
7. Any other environmental aspects, impacts observed during implementation which were not covered earlier
8. Details of complaints received from public and actions taken thereof to resolve
9. Follow-up actions and conclusions

1. Introduction

- overall project description;
- project objectives;
- environmental category;
- environmental performance indicators, if any;
- overall project progress, agreed milestones and implementation schedules;
- any other information useful for assessing environmental performance of the project

2. Compliance status with National /State /Local statutory environmental requirements

- Tabular presentation of statutory environmental requirements for the project at national, state and local levels (applicable to the borrower, sub-borrowers, contractors, vendors, etc. as the case may be), and the status of compliance thereof.
- If the project is not in compliance with any of those requirements, the report would provide actions proposed for achieving compliance within an agreed time frame duly approved by the respective regulatory agencies.

3. Compliance status with the environmental covenants as stipulated in the Loan Agreement

- Tabular presentation of environmental covenants as stipulated in the Loan Agreement and the status of compliance thereof.
- If the project is not in compliance with any of those requirements, the report would provide actions proposed for achieving compliance within a time frame to be reviewed and approved by the ADB.

4. Compliance status with environmental management and monitoring plans as stipulated in the environmental documentation as agreed with ADB

- Tabular presentation of environmental management and monitoring plans and environmental assessment and review framework/procedures as agreed and the status of implementation thereof.
- The status chart would provide details of actions proposed to be taken by various agencies, including contractors/vendors for implementation, the current status of compliance.
- In case any corrective measures are warranted, the status chart would outline the corrective action plan with an agreed time frame duly agreed by all those agencies concerned for ADB's review and concurrence.
- In case of corrective measures are implemented based on the earlier monitoring, the status chart would elaborate clearly the improvements noticed and further steps required if any.

5. Approach and methodology engaged for environmental monitoring of the project

- Monitoring basis
 - rationale for selection of sampling/ monitoring locations,
 - selection of environmental receptors /attributes for monitoring,

- linkage with environmental performance indicators agreed upon,
- phases of project – design, construction, operation
- Standards /monitoring methods to be employed for assessment
- Monitoring Quality Control

6. Monitoring of environmental receptors/ attributes (e.g. ambient air, surface water, ground water, land, ecological aspects, noise, hazardous/toxic wastes, etc.)

- Type of environmental receptor/attribute to be monitored (for each type)
 - Method of monitoring
 - Duration and frequency of monitoring
 - Equipment /instrumentation to be used for monitoring
 - Sampling locations/ sites for monitoring (linked with Enclosure-1: location map)
 - Reporting monitoring results (provide tabular presentation)
 - Detailed analyses of monitoring reports and conclusions (use histograms or any other methods)
 - Correlate the monitoring results with statutory requirements at national/state/local levels
 - Corrective actions proposed in case on non-compliance /improvements noticed due to corrective actions taken during the reporting period, and further actions required if any.
 - Recommendations /Suggestions.

7. Any other environmental aspects, impacts observed during implementation which were not covered earlier

8. Details of Grievance Redress Committee and complaints received from public and actions taken thereof to resolve

9. Follow-up actions and conclusions

Enclosure-1

Location Map for Environmentally Sensitive Sites and Monitoring Stations