Initial Environmental Examination

Updated

Project Number: 53262-001
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IND: Agartala City Urban Development Project – Maharaja Bir Bikram College Lake Revitalization in Agartala City

Prepared by Project Management Unit, Agartala Smart City Limited, Government of Tripura forthe Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 15 October 2022)

Currency unit	–	Indian rupee (₹)
₹1.00	=	$0.012
$1.00	=	₹82.4

ABBREVIATIONS

ADB	—	Asian Development Bank
AMC	—	Agartala Municipal Corporation
ASCL	—	Agartala Smart City Limited
ASCP	—	Agartala Smart City Plan
CTE	—	Consent to Establishment
CTO	—	Consent to Operate
CGWB	—	Central Ground Water Board
CPCB	—	Central Pollution Control Board
EIA	—	Environmental Impact Assessment
EMP	—	Environmental Management Plan
GAPA	—	Greater Agartala Planning Area
GRC	—	Grievance Redress Committee
GRM	—	Grievance Redress Mechanism
GOI	—	Government of India
H and S	—	Health and safety
IEE	—	Initial Environmental Examination
INR	—	Indian Rupee
MOEFCC	—	Ministry of Environment, Forests and Climate Change
MBB	—	Maharaja Bir Bikram
NAAQS	—	National Ambient Air Quality Standards
OHSA	—	Occupational Health and Safety Administration
PIU	—	Project Implementation Unit
PMU	—	Project Management Unit
PMC	—	Project Management Consultant
PCR	—	Physical Cultural Resources
REA	—	Rapid Environmental Assessment
SEIAA	—	State Environment Impact Assessment Authority
SEMP	—	Site Environment Management Plan
TSECL	—	Tripura State Electricity Corporation Limited
TSPCB	—	Tripura State Pollution Control Board
SPS	—	Safeguard Policy Statement
UDD	—	Urban Development Department
ULB	—	Urban local body

WEIGHTS AND MEASURES

^{o}C	–	Degree Celsius
km	–	kilometer
m	–	meter
nos.	–	numbers
m^2	–	square meters
km^2	–	square kilometer
Kmph	–	kilometer per hour
cum	–	cubic meter

NOTE

In this report, "$" refers to United States dollars.

CONTENTS

APPENDICES

EXECUTIVE SUMMARY

1. The proposed project is aligned with Government of India's Smart Cities Mission (SCM), launched in 2015 with the aim of making urban areas more livable, citizen-friendly, sustainable and resilient, improving urban equality and living conditions with a focus on creating 100 "smartcities". The project aims to support; (i) urban development: by making the city more livable; (ii) economic development: by promoting the city as an economic and commercial hub in the region; environmentally sustainable development; and (iii) capacity development of implementing institution. The project is aligned with India CPS 2018–2022, which emphasizes support to national flagship programs including SCM, inclusive urbanization, and development of competitive cities.[1]

2. The project is aligned with the following impact: Agartala established as an economic-commercial hub in the northeast India with improved quality of life. The project will have the following outcome: Livability in Agartala city improved.

3. **Impact and Outcome of the Project.** The project will have three outputs.

- **Output 1**: **Urban roads and drainage upgraded.** This will include (i) construction of 23 km of climate-resilient roads that will decongest the city's central and east zones, along with associated facilities including improved paved surface, geometric traffic junctions transformation, lighting, footpaths, dedicated parking, bollards, signaling, Elderly-Women-Children-Differently abled (EWCD)[1]responsive features, and a utility corridor with shifting of electrical lines; and (ii) construction and rehabilitation of 48 km of new or existing stormwater drains[2]. These activities will improve public health by reducing urban floods and air quality.
- **Output 2**: **Tourist places renovated and made more eco-friendly.** This will include (i) rejuvenation of 50,000 square meter (m^2) within the Maharaja Bir Bikram College lake area, through upgrading of eco-park, development of a water recreation area and lakeside public area, creation of a thematic/botanical garden,garden gazebos, enhancement of the lake water quality with artificial wetlands and adequate aeration, and use of waste and effluent management strategies; and (ii) renewal of 100,000 m^2 of open spaces in the Ujjayanta Palace area, through beautification of garden spaces, renewal of existing water fountains, renovation of existing drainage system, development of lake side walkway with resting areas and pergolas, leisure areas, decorative lighting and dedicated parking zone. All facilities will adopt EWCD responsive features and will also increase users' safety through improved lighting zones.

  Output 3: **Public awareness on sanitation and hygiene, and capacity of urban local bodies in urban service delivery improved.** The project will provide capacity-building for technical staff of AMC, ASCL, TUDA, and UDD on project management and operation and maintenance of urban infrastructure; own-source revenue generation and financial management; climate and disaster resilient urban planning; and environmental and social safeguards. This output will also provide capacity building for increased knowledge on tourism-related matters, community mobilization, and livelihood enhancement for shop keepers, street vendors and artisans around Ujjayanta Palace. It will also increase knowledge of eligible staff of the Public Health Division of AMC on preventive healthcare. Awareness

[1] Smart Cities Mission. Strategy. ADB. 2017. *Country Partnership Strategy: India, 2018–2022—Accelerating Inclusive Economic Transformation*. Manila..

[2] EWCD responsive features are related to adapted sidewalks, pedestrian crossings, street lightning, dedicated parking, bollards, signage, among others.

campaigns will be conducted on road safety; on water conservation, health, sanitation and hygiene; and mitigation of the transmission of communicable diseases such as the coronavirus disease (COVID-19). The project will also accomplish the preparation of at least six climate-resilient components for future investment projects.[3]

4. The **proposed Subproject**. MBB College lake Revitalization project is part of ACUDP, this will uplift the ambience of the area and will increase the tourism potential. The Environmental Assessment (Initial Environmental Examination) for the project is done as per the Asian Development Bank's Safeguard Policy Statement (SPS), June 2009 as well as EIA (Environmental Impact Assessment) Notification, 2006 by Ministry of Environment and Forests and Climate Change (MoEFCC), Government of India (GOI).

5. **Scope of Work**: The scope of works for the Revitalization of MBB College Lake campus outlines the following activities:

- Lake Preservation and Revitalization
- Preservation of existing Flora and Fauna
- Converting an unutilized space into an active community Public Space
- Inclusion of active and passive Recreational activities within the public zones.
- Up gradation of the existing roads and infrastructure.
- Creating a major tourist magnet.

6. The construction activities involved in the project are:

- Refurbishment of the existing pathway and Foot Bridge and pontoon bridge
- Renovation of existing gazebos.
- Construction of a new deck with ticket counter
- Construction of play area, Amphitheatre and food court.
- Installation of fountain plaza.
- Construction of public toilets
- Construction of Ghats
- Up gradation of Boundary
- Demolition and construction of watch towers

Details of Construction work in MBB College Lake Revitalization Project

Sr. No.	Item	Area m^2	Remark	Status
1	Refurbishment of the existing pathway	1450	2 M WIDE	
2	Foot Bridge.	12	2 M WIDE	
3	Pontoon bridge	140	3.5 M WIDE	New
4	Renovation of existing gazebos.	10	14 Nos.	
5	Construction of a new deck with ticket counter	1100	Varying Width	New
6	Ticket counter	35	2 Nos.	1 New
7	Construction of play area	200		New
8	Construction of Amphitheatre	225		New
9	Construction of food court.	160		New
10	Installation of fountain plaza.	350		New
11	Construction of public toilets	120	3 Nos.	1 New

[3] The subprojects include (i) Storm water drains, (ii) Sewerage, (iii) Urban Roads, (iv) Water Supply, (v) Open spacesand water bodies, and (vi) Housing for Economically weaker sections.

Sr. No.	Item	Area m^2	Remark	Status
12	Construction of Ghats	60		New
13	Up gradation of Boundary	860 RM	2.4 M HT	New
14	Demolition and construction of watch towers	112	2 Nos. (7.765 M HT)	

7. **Screening and assessment of potential environmental impacts:** ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement(SPS), 2009. This states that ADB needs environmental assessment of all project loans, program loans, sector loans, sector development program loans, and loans involving financial intermediaries, and private sector loans. Accordingly, this updated Initial Environmental Examination (IEE) has been conducted to assess the environmental impacts of the proposed MBB College Lake Revitalization under Agartala City Urban Development Project.

8. **Initial Environmental Examination (IEE):** This updated IEE report aims to (i) provide critical facts, significant finding, and recommended actions; (ii) present the national and local legal and institutional framework within which the environmental assessment has been carried out; (iii) provide information on existing geographic, ecological, social and temporal context including associated facilities within the subproject's area of influence; (iv) assess the subproject's likely positive and negative direct and indirect impacts to physical, biological, socioeconomic, and physical cultural resources in the subproject's area of influence; (v) identify mitigation measures and any residual negative impacts that cannot be mitigated; (vi) describe the process undertaken during project design to engage stakeholders and the planned information disclosure measures and the process for carrying out consultation with affected people and facilitating their participation during project implementation; (vii) describe the subproject's grievance redress mechanism for resolving complaints about environmental performance; (viii) present the set of mitigation measures to be undertaken to avoid, reduce, mitigate, or compensate for adverse environmental impacts; (ix) describe the monitoring measures and reporting procedures to ensure early detection of conditions that necessitate particular mitigation measures; and (x) identify who is responsible for carrying out the mitigation and monitoring measures. The updated IEE is prepared after detailed design and no major design changes are expected in the subproject during implementation. The ADB-cleared IEE report, November 2020 has been updated covering the (a) night works at some sections under the Project; and (ii) change of construction methodology (now, the piling work would be done using floating pontoon over the lake) under the Project. The updated IEE report shall supersede the earlier version of IEE and shall be contractually applicable to the contractor after approval from Agartala Smart City Limited (ASCL) and ADB.

9. **Categorization:** Potential negative impacts were identified in relation to pre-construction, construction, and operation of the improved infrastructure, but no permanent environmental impacts were identified as being due to either the subproject design or location. There would not be any changes and the environmental category remains "B", of the sub-project as per ADB's SPS, 2009. Further mitigation measures have been developed for above two (night works and change of construction methodology) to reduce all potential impact to acceptable levels. These were discussed with specialists responsible for the engineering aspects, and as a result some measures have already been included in the designs for the proposed project.

10. **Description of the Environment**: Information on baseline environment was collected from primary survey for Air quality, water quality, noise level, soil quality and ecological

assessment conducted during December 2018 - January 2019 and secondary sources of data for the macro environmental parameters like climate, physiography (geology and geomorphology), of the project influence area. The Lake is surrounded by majorly residential and institutional land use. The vegetation found in this area mainly consists of naturally grown herbs and shrubs. The study/ project area supports a number of indigenous as well as exotic floral species. Different species of grown up trees and grasses support and provide nesting sites for many species of resident bird speciesas well as migratory birds which visit here every year. Two large lakes used for fishery and the surrounding area with a lot of trees, shrubs and grasses add to the diversity of bird habitat in the lake premise.

11. **Potential Environmental Impacts and Mitigation Measures.** In this updated IEE, some of the temporary impacts were identified in relation to location, design, construction and operation of the improved infrastructure. Environmental impacts as being due to the project design or location were not significant as various measures are already included in site planning and detailed design. Thereare, no environmentally or archeologically sensitive areas within Agartala city. The city is mostly surrounded by agricultural areas, and there are no sensitive areas like forests.

12. **Potential Environmental Impact**: Detailed design of the components incorporated good environmental design and application of the effective mitigation measures. However due to the project sites being a natural habitat within urban areas and nature of works, unavoidable impacts include (i) health and safety hazards to workers during construction and operation, (ii) noise and dust generation from construction activities, (iii) increased road traffic due to interference of construction activities, and (iv) soil erosion/ silt runoff from construction stockpiles to the MBB College lake. In the operational phase, all facilities and infrastructure will operate with routine maintenance, which should not affect the environment. Facilities will need to be repaired from time to time, but environmental impacts will be much less than those of the construction period as the work will be affecting small areas only. Therefore, these works may have adverse, but temporary impacts arising mainly from the disturbance of residents, businesses and traffic due to construction work; safety risk to workers, public; access impediment to houses and business,disposal of large quantities of construction waste etc. These are all general impacts of construction in urban areas and there are well developed methods of mitigation that are suggested in the EMP.

13. **Environmental Management Plan:** Environmental Management Plan (EMP) deals with the implementation procedure of the guidelines and mitigation measures recommended to avoid, minimize and mitigate foreseen environmental impacts of the project. The implementation of environmental management plan needs suitable organization set up and the success of any environmental management plan depends on the efficiency of the group responsible for implementation of the program. It is proposed to carryout regular environmental monitoring to provide information to the management for periodic review and alteration of the environmental management plan is necessary to ensure that environmental protection is optimized at all stages of the project. PIU is responsible for implementing all environmental monitoring and management works during implementation of MBB College Lake Revitalization project to achieve certain level of quality in the project and ensure that all statutory requirements are met during the project implementation. The engineering staff of PIU, supervision consultancy and the contractor who would be responsible for the implementation of the EMP, need to be trained on environmental issues of MBB College Lake revitalization project. EMP implementation budget for the proposed project is Rs. 51,79,972.

14. Implement all site-specific occupational health and safety (OHS) Plan as per the "Standard Operating Procedure for Prevention and Risk Minimization of Corona Virus Disease (COVID-19) at the Facilities and Work Sites" developed by PMU) and implemented measures such as: (a) excluding public from the site; (b) personal hygiene, disinfection and

maintaining social distancing; (c) ensuring all workers are provided with and use personal protective equipment including face mask; (d) OHS Training and COVID 19 awareness training for all site personnel. EMP guides the environmentally-sound construction of the subproject. The contractor has submitted to PIU, for review and approval, site Specific Health and Safety Plan in response to COVID 19 (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program as per EMP; (iv) application of Health and Safety Plan for personal protection and protection from COVID 19 infection.

15. A copy of the approved EMP will always be kept on site during the construction period. The EMP has been made binding on contractor operating on the site and included in the BID and contract documents. Non-compliance with, or any deviation from, the conditions set out in this documents constitutes failure in compliance. Contractor has done baseline environmental monitoring prior to commencement of civil works.

16. **Institutional Arrangement:** Agartala Smart City Limited (ASCL) is the executing agency (EA) and implementing agency (IA) for the Project, responsible for management, coordination and execution of all activities funded under the loan. The PMU has responsible for implementing the Project, while the PIUs at project level support the PMU. The Project Management Consultant (PMC) and PIUs support the PMU. TheBoard of Directors of ASCL will provide policy related directions and project oversight to PMU.

17. The PMU is headed by a Project Director and responsible for: 1) approval of detailed project reports; 2) technical sanction on tender/bid evaluation; 3) overall monitoring, supervision& project implementation, and 4) any other matter related to implementation of Social and Environment Safeguard as per ADB SPS requirements from time to time. The Board of Directors of ASCL may assign any other requirements related to ADB assisted project to PMU from time to time. The PMU has a Safeguard and Gender Cell (SGC) to oversee all safeguards and gender related activities. SGC at PMU level has overall responsibility of implementation of project in compliance with ADB SPS 2009, country legislations, and project- specific policies relating to Grievance Redress Mechanism as agreed between ASCL and ADB. The SGC headed by Nodal Officer (Environmental and Social) is supported by environmental specialist of PMC team. ASCL has recruited individual consultant (Environment & safety expert) to provide project implementation support and ensure compliances with ADB requirements. The Nodal Officer has overall responsibility in implementation of the environmental safeguard requirements including appropriate monitoring and reporting responsibilities.

18. The PIUs is headed by Deputy Project Director (DPD) who have overall responsibility for safeguards management. An Environmental and Social Safeguards Unit (ESSU) is established for safeguards management which has staffed with one Assistant Engineer eachfor environmental and social safeguards. PMC has project implementation support to PIUs and include an Environment Management Specialist and a Social Management Specialist for facilitating safeguards management and reporting. During Implementation, contractor team has an Environmental, Health & Safety (EHS) Officer and a Social Safeguard Officer.

19. **Consultation Disclosure and Grievance Redress:** The stakeholders were involved in developing the IEE through discussions on-site and public consultation, after which views expressed were incorporated into the updated IEE and in the planning and development of the project. The updated IEE will be made available at public locations in the city and will be disclosed to a wider audience via the ADB and ASCL websites. The consultation process will be continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and can participate in its development and

implementation. The citizens of the Agartala City will be the major beneficiaries of this subproject. During the construction stage the project will provide employment opportunity and enhance the enterprise development of locals. There will also be skill development due to the project implementation. A project specific grievance redress mechanism is described within the updated IEE to ensure any public grievances are addressed quickly.

20. **Monitoring and Reporting:** The ASCL and Project consultants will be responsible for monitoring. The consultant will submit monthly monitoring reports to ASCL and ASCL will send semi-annual monitoring reports to ADB. ADB will post the Semi-annual environmental monitoring reports on its website.

21. IEE (November 2020) has been revised as the construction activity consists of piling work in water at Public Zone B area methodology has been changed to ensure minimum impact on Biodiversity of Public zone B area of Lake. Earlier the piling work was planned to be done in the dry area by construction of Coffer dam to prevent the entry of water into the working area. The whole construction area required dewatered after the preparation of Coffer dam and the Coffer dam was proposed to be constructed using bamboo and GI/ MS sheets. Once all the water from the proposed piling area was supposed to be removed, the biodiversity of area would be completely disturbed.

22. Now, the piling work would be done using floating pontoon over the lake. The new methodology of piling and its mitigation measures are given separately in this report. The updated methodology will have negligible impact on the biodiversity as the pile rig operation would be done using pontoon. No dewatering of the Public Zone B is required here and hence, the flora and fauna of the zone will not be affected. There would be temporary impact on the biodiversity during the hammering of pile case. The impact would be temporary and reversible. Once the construction of piles and deck is completed, the interaction of the fishes would be like the prevailing condition.

23. There is no cutting of trees involved. Rather, there is development Eco-park zone and botanical garden will enhance the ecology in the MBB College lake area.

24. **Conclusions:** The citizens of the Agartala will be the major beneficiaries. The subproject is primarily designed to improve environmental quality and living conditions of Agartala city by developing MBB College Lake as a major recreational centre. The proposed subproject is unlikely to cause significant adverse impacts on either the environment or the human health andsafety. The potential impacts that are associated with design, construction and operation can bemitigated to standard levels without difficulty through proper engineering design and the incorporation or application of recommended mitigation measures and procedures. Based on the findings of the updated IEE, there are no significant impacts and the classification of the subproject continue to be as Category "B". No further special study or detailed environmental impact assessment(EIA) needs to be undertaken to comply with ADB SPS (2009) or GOI EIA Notification (2006).

25. **Recommendations:** The following are recommendations applicable to the subproject to ensure no significant impacts:

- Obtain all statutory clearances at the earliest time possible and ensure conditions/ provisions are incorporated in the detailed design.
- Include this IEE in bid and contract documents.
- Conduct safeguards induction to the contractor upon award of contract.
- Strictly supervise EMP implementation
- Ensure contractor appointed qualified EHS officers prior to start of works;
- Documentation and reporting on a regular basis as indicated in the updated IEE.

- Continuous consultations with stakeholders.
- Contractor to ensure immediate repair of utilities for undisrupted services
- Contractor to ensure safe and secure access to all nearby households and commercial establishments.
- Timely disclosure of information and establishment of grievance redressal mechanism (GRM);
- Commitment from PMU, PIUs, project consultants, and contractors to protect the environment and the people from any impact during project implementation.
- Involvement of contractors, including subcontractors, in first level GRM.

I. INTRODUCTION

A. Project Background

26. The proposed project is aligned with Government of India's Smart Cities Mission (SCM), launched in 2015 with the aim of making urban areas more livable, citizen-friendly, sustainable and resilient, improving urban equality and living conditions with a focus on creating 100 "smart cities". The project aims to support; (i) urban development: by making the city more livable; (ii) economic development: by promoting the city as an economic and commercial hub in the region; (iii) environmentally sustainable development; and (iv) capacity development of implementing institution. The project is aligned with India CPS 2018–2022, which emphasizes support to national flagship programs including SCM, inclusive urbanization, and development of competitive cities.4

27. ADB approved the ACUDP on 27 October 2021, for an amount of $61 million, to support the GOT by improving Agartala's urban mobility and livability. The impact of project is to establish Agartala as an economic– commercial hub in northeast India with improved quality of life. The project will finance climate-resilient and inclusive roads and strengthen the capacity of concerned agencies to ensure improved urban services delivery. The outputs of the project are to (i) upgrade urban roads and drainage, (ii) renovate tourist places and made more eco-friendly, and (iii) create public awareness of sanitation and hygiene and improve capacity of concerned agencies in urban service delivery. The loan was signed on 12 November 2021 and declared effective on 23 December 2021. The loan closing date is 30 June 2029. For Capacity Development for the Agartala City Urban Development Project, a technical assistance of US$1 million, financed on a grant basis by ADB's Technical Assistance Special Fund (TASF-others) was signed on 31 December 2021.

B. Impact and Outcome of the Project

28. The project is aligned with the following impact: Quality of life for urban Agartala inhabitants improved[5] .The project will have the following outcome:

29. **Output 1**: Urban roads and drainage upgraded and enhanced. This will include (i) construction of 23 km of climate-resilient roads that will decongest the city's central and east zones, along with associated facilities including improved paved surface, geometric traffic junctions transformation, lighting, footpaths, dedicated parking, bollards, signalling, Elderly- Women-Children-Differently abled (EWCD) responsive features, and a utility corridor with shiftingof electrical lines; and (ii) construction and rehabilitation of 48 km of new or existing storm water drains. These activities will improve public health by reducing urban floods and air quality through reduction of Particulate Matter size less than 10 microns (PM_{10}).

30. **Output 2**: Tourist places renovated and made more eco-friendly. This will include (i) rejuvenation of 50,000 m^2 within the Maharaja Bir Bikram College lake area, through upgradingof eco-park, development of a water recreation area and lakeside public area, creation of a thematic/botanical garden, garden gazebos, enhancement of the lake water quality with artificial wetlands and adequate aeration, and use of waste and effluent management strategies; and (ii)renewal of 100,000 m^2 of open spaces in the Ujjayanta Palace area, through beautification of garden spaces, renewal of existing water fountains,

[4] Smart Cities Mission. Strategy. ADB. 2017. *Country Partnership Strategy: India, 2018–2022—Accelerating Inclusive Economic Transformation.* Manila.
[5] Government of India, Ministry of Housing and Urban Affairs. 2015. *Smart City Guidelines*. Delhi

renovation of existing drainage system, development of lake side walkway with resting areas and pergolas, leisure areas, decorative lighting and dedicated parking zone. All facilities will adopt EWCD responsive features and will also increase users' safety through improved lighting zones.

31. **Output 3**: Capacity of urban local bodies in urban service delivery strengthened. The project will provide capacity-building for the technical staff of Agartala Municipal Corporation, Agartala Smart City Limited, Tripura Urban (Planning and) Development Authority and Urban Development Department, with focus on female staff, on (i) project management and operation and maintenance of urban infrastructure; (ii) own-source revenue generation and financial management; (iii) climate resilient urban planning, gender analysis and mainstreaming, and (iv)gender-responsive budgeting in urban planning. This output will also provide capacity building for increased knowledge on tourism-related matters and livelihood enhancement for shop keepers and street vendors around Ujjayanta Palace. This output will also increase knowledge of eligible staff, with focus on female staff, of (i) the Public Health Division of AMC; and (ii) AMC and DWS on institutional reforms. Awareness campaigns will also be conducted on (i) road safety; and (ii) behavior change activities focusing on water conservation, health, sanitation and hygiene; and awareness on the spread of epidemics or pandemics such as COVID-19. The project will also accomplish the preparation of at least 6 climate-resilient subprojects for future investments projects.[6]

C. Purpose of the Initial Environmental Examination

32. ADB requires the consideration of environmental issues in all aspects of the bank's operations, and the requirements for environmental assessment are described in its Safeguard Policy Statement (SPS), 2009. The proposed projects are categorized as A, B, C or FI to determine the level of environmental assessment required.[7] The proposed subproject causes potential adverse environmental impacts which are less adverse in nature and few of them are reversible and mitigation measures can be designed more readily for the identified impacts. As per the ADB's Guidelines on Environmental Assessment the proposed project with minimal impacts is classified as Category 'B' project requiring Initial Environmental Examination (IEE).The Rapid Environmental Assessment Checklist as per ADB is attached as **Appendix 1** and **Appendix 2** provides initial screening of project activities by No mitigation measure scenario checklist.

33. **Scope of the IEE:** The IEE is prepared based on detailed design in the detailed project report (DPR), secondary sources of information, field reconnaissance surveys, primary field monitoring (environmental) survey and stakeholder consultation. There are no major design changes expected in the subproject during implementation. However, the IEE will be further updated/ revised if there are any changes in site/ locations and design of components during

[6] The subprojects include (i) Storm water drains, (ii) Sewerage, (iii) Urban Roads, (iv) Water Supply, (v) Open spacesand water bodies, and (vi) Housing for Economically weaker sections

[7] Per ADB SPS, the environmental categorization and level of environmental assessment required for each category are as follows: (i) 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 is required. (ii) CategoryB: 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 is required. (iii) 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. (iv) Category FI: A proposed project is classified as category FI if it involves investment of ADB funds to or through a financial intermediary.

constructionphase.

34. This updated IEE will be reviewed during pre-construction stage and project implementation and updated if there is any change in scope of works, change in location of component and change in cost due to addition or subtraction of components which can change the environmental impacts, and revised IEE shall supersede the earlier version of IEE and shall be contractually applicable to the contractor after approval from ASCL and ADB.

35. The implementation of the subprojects will be governed by Government of India and state of Tripura and other applicable environmental acts, rules, regulations, and standards. Environmental safeguards will be followed in accordance with the ADB's SPS 2009. During the design, construction, and operation of the project the borrower/client will apply pollution prevention and control technologies and practices consistent with international good practice, asreflected in internationally recognized standards.

D. Report Structure:

36. This Report contains the following ten sections including the executive summary at the beginning of the report.

- Executive Summary
- Introduction
- Description of the Project
- Policy, Legal and Administrative Framework
- Description of the Environment
- Anticipated Environmental Impacts and Mitigation Measures
- Public consultation and information disclosure
- Grievance Redress Mechanism
- Environmental management plan
- Conclusions and Recommendations

II. DESCRIPTION OF PROJECT

A. Subproject Location

37. Maharaja Bir Bikram (MBB) College is one of the premier educational institutes located on the College Tilla at Agartala. The college campus, which is about 3.0 km away from the City Centre of Agartala, is sprawled over an approximate land area of 264 acres. The Haora River flows along the south-east periphery of the lake. Interestingly, the geographical formation of the area is unique. The region has been found to have a higher elevation than the rest of Agartala. MBB College lake is a large horse-shoe shaped lake of 73,145 m^2 area, comprising 1/3rd of the total premises of the college. The lake is surrounded by a large hillock and dense forestations of various tropical plants and shrubs. The top of the hillock is flat, and it hosts a big play ground, a stadium, academic buildings, student hostels and a few residential apartments for the academicians. Having unusual shape and rich natural surroundings, the lake area has been identified as an important eco-zone and has got an immense potential for being developed into a pleasant tourism destination. The letter regarding legal status of MBB college lake is attached in **Appendix 3.**

B. Present Status of lake

38. **Existing Condition**: The MBB College Lake Precinct is situated within the institutional zone in the Shibnagar area. The immediate edge of the water body is mostly wooded and is a repository of local flora and migratory avifauna. It is well-connected and easily

accessible via public conveyance. The key observations based on the analysis of the existing conditions have been shown in the **Figure 1.**

Figure 1: Existing facilities and conditions on MBB lake

	
Bathing Ghat	**Dilapidated Angler's Deck**
	
Temporary Bamboo Structures for the fishingCompetition	**Dam Connecting Two Headlands Leading to Fisheries Office**
	
Natural Wilderness Edge	**Mud Embankment on Fisheries Department Side**
	
Dumping of idols in MBB College Lake	**Wastewater Discharge from Fisheries Office**

	
Solid waste dumping from MBB College Campus	**Solid waste dumping from MBB College Campus**

39. Dumping of idols, solid waste and wastewater discharge has led to the release of pollutants into the lakes and destruction of their natural habitats, thus making them unfit for use.The prime objective of the project is to strengthen ecotourism in city with a redesigned waterfront at Maharaja Bir Bikram (MBB) College. The lake zone is ideally situated to be developed as an important tourist zone, with emphasis on ecotourism.

C. Proposed Subproject Components

40. The scope of works for the MBB College Lake Revitalization project outlines the following activities:

- Lake Preservation and Revitalization
- Preservation of existing Flora and Fauna
- Converting an unutilized space into an active community Public Space
- Inclusion of active and passive Recreational activities within the public zones.
- Up gradation of the existing roads and infrastructure.
- Creating a major tourist magnet.

41. The construction activities involved in the project are:

- Refurbishment of the existing pathway and Foot Bridge and pontoon bridge
- Renovation of existing gazebos.
- Construction of a new deck with ticket counter
- Construction of play area, Amphitheatre and food court.
- Installation of fountain plaza.
- Construction of public toilets
- Construction of Ghats
- Upgradation of Boundary
- Demolition and construction of watch towers (these are made of steel material and no asbestos is used)

42. The details of the construction activities proposed in the MBB College Lake revitalization project is presented in **Table 1** below:

Table 1: Details of Construction work in MBB Revitalization Project

Sr. No	Item	Area m^2	Remark	Status
1	Refurbishment of the existing pathway	1450	2 M Wide	
2	Foot Bridge.	12	2 M Wide	
3	Pontoon bridge	140	3.5 M Wide	New
4	Renovation of existing gazebos.	10	14 Nos.	
5	Construction of a new deck with ticket counter	1100	Varying in Wide	New
6	Ticket counter	35	2 Nos.	1 New
7	Construction of play area	200		New
8	Construction of Amphitheatre	225		New
9	Construction of food court.	160		New
10	Installation of fountain plaza.	350		New
11	Construction of public toilets	120	3 Nos.	1 new
12	Construction of Ghats	60		New
13	Upgradation of Boundary	860 RM	2.4 M HT	New
14	Demolition and construction of watch towers	112	2 Nos. (7.765M HT)	

D. Design Considerations:

43. The various design considerations and features proposed for the subproject are described below:

44. **Lake Park Area**: The existing Eco-park area has been retained with minor reconfiguring for a better experiential impact. Existing gazebos have been retained and refurbished to result inthe Gazebo Plaza area. Appropriate lighting shall be incorporated to enhance the structure at night. Common use area and light activity zones have been ear marked for yoga and light the physical activities. The yoga zone has restricted access and can be utilized by the elderly for laughter therapy.

45. **Jetty Area**: The existing lake precinct does not have a dedicated jetty area or fishing zone. The fishing decks are arbitrarily located, and temporary bamboo jetties are set up during the fishing season. The jetty is proposed along eco zone for same. Swimming is encouraged asa recreational activity, up to a boundary of 30 m from the banks along the Palm walk and Public Zone B.

46. **Landscaping and theme garden**: The existing area is rich in local flora, which shall be delineated as the botanical zone, this will involve landscaping with variety of native and exotic plants to add to the natural beauty of the place. This will also attract Birds and insects like butterflies and honeybees. These gardens shall also be incorporated to add to the exotic flavour.

47. **Amphitheatre Plaza**: An Amphitheatre is planned within the Public Zone with a maximum capacity of 100 people. This would primarily act as a viewing deck and gathering space, whilst providing infrastructure for the various cultural and social activities for the citizens.

48. **Public Art and Sculptures**: Several public arts are proposed on the walls and canvas of the area not only for decoration but also to encourage local talents and local art and culture of the region. Again, at strategic locations, sculptures and murals are proposed for similar purpose.

49. **Parking**: It is expected that the footfall is going to increase manifold once MBB College

Lake is redeveloped. This would also lead to high demand of vehicle parking near the lake. Parking shall be off street in MBB college campus and a dedicated zone may be allocated by Tripura traffic police department during the evening hours, for a capacity of 80 (Approx.) cars. The parking space is calculated based on the National Building Code Standard and is prescribed for the Open Space and Parks.

50. **Barrier Free environment**: MBB College Lake Public area is almost at one level. The activities planned are at one level and do not have drastic elevation change except the Amphitheatre. Amphitheatre is planned to rise up from the ground level and the performing stageis at ground level, so it is easily accessible for the differently able visitors. Ramps have been provided at strategic locations for navigating the level change.

51. **Walking Loop**: A walking track has been proposed along the periphery of the lake for connectivity to the pedestrians. This will be attracting more visitors particularly the morning or evening walkers cum joggers. The path shall be well-illuminated and well-equipped with arrangements for seating, drinking water and toilets.

52. **Utilities and Amenities**: E-Toilets are proposed which are equipped with toilets for differently abled people as well. Water ATMs shall be provided for the drinking purpose at strategic locations.

53. **Seating Arrangement**: Seating arrangements have been proposed all around the site for the convenience of the visitors. Some of these are lake side arrangements while some are shaded or roadside arrangements. These are to be equipped with nearby water stations and restrooms for the tired walkers, elderly visitors and differently abled visitors.

54. **Bioremediation**: Bioremediation is a process used to treat contaminated water by altering the environmental conditions to stimulate growth of microorganisms and degrade the target pollutants. Therefore, floating islands are proposed to be used as landscape elements onthe lake waters to purify them and maintain the water quality once the footfall and level of contamination increases. For this purpose, a planter bed is anchored on the water surface containing soil and peat holes on them. On this bed phyto-remediation plants are grown, the roots of which push through the planting holes and matrix to hang down into the water. These roots absorb various contaminants from the water, thereby cleaning the same. E.g. Bulrush is used for nitrate reduction.

55. **Measures to maintain safety**: MBB College Lake is situated in a residential and institutional area. The park area was developed, and boundary wall was constructed to prevent misuse. Construction of a visually perforated boundary wall with decorative railing in specific areas, where the boundary wall does not exist is proposed for security. Controlled access areas(ticketed entry) are to be demarcated from the public zone by constructing boundary walls as read.

56. **Use of Existing features:** As the existing features / Structures in the MBB College LakeArea are mostly heritage and/or ecological or institutional in nature, they are mostly retained in the proposed Master Plan. Some of them need repair / replacement. The natural features of thesite shall be identified and enhanced to its maximum potential. Activities like bird-watching, Ayurveda, fly-fishing, forest-walking etc. shall be encouraged and catered for in the design. The details of existing features and its use in the proposed master plan is presented in **Table 2.**

Table 2: Existing features and its use in the proposed Master Plan

SR. NO.	Existing structures	Status	Used in Proposed Master Plan
1	Gazebo	Proposed	Refurbishment
2	Pathways	Proposed	Refurbishment
3	Entry Gates	Proposed	New Design
4	Public Toilets in Eco- park	Proposed	New Design
5	Ticket Booth at the Main Entry	Proposed	Refurbishment
6	Ghats	Proposed	New Design
7	Boundary Walls	Proposed	Up gradation
8	Watch Towers	Proposed	Demolition & New Design

E. Design Details

57. **The Design Concept**: Based upon the configuration, accessibility and existing use, the site was subdivided into different zones. The zones are shown in **Figure 2** and the description of each zone is provided below:

Figure 2: Proposed zones in MBB College Lake

58. **Eco park Zone**: This zone would contribute majorly towards the passive recreation and Informational functions of the site. The scheme is of controlled wilderness with specimen planting and labelling of plant species. Re-contouring of the entire pathway to provide a pleasant walking experience is proposed, with designated water access points to act as pause points. Designated seating zone - The Gazebo Plaza, would provide a gathering place within the site, and would also act as the starting point for conducted tours. The gazebos are structurally sound, and thus shall be maintained with appropriate

renovation as required. **Figure 3** shows plan of proposed Eco Park zone and **Figure 4** shows existing and proposed components within Eco park area.

Figure 3: Plan of Proposed Eco Park Zone

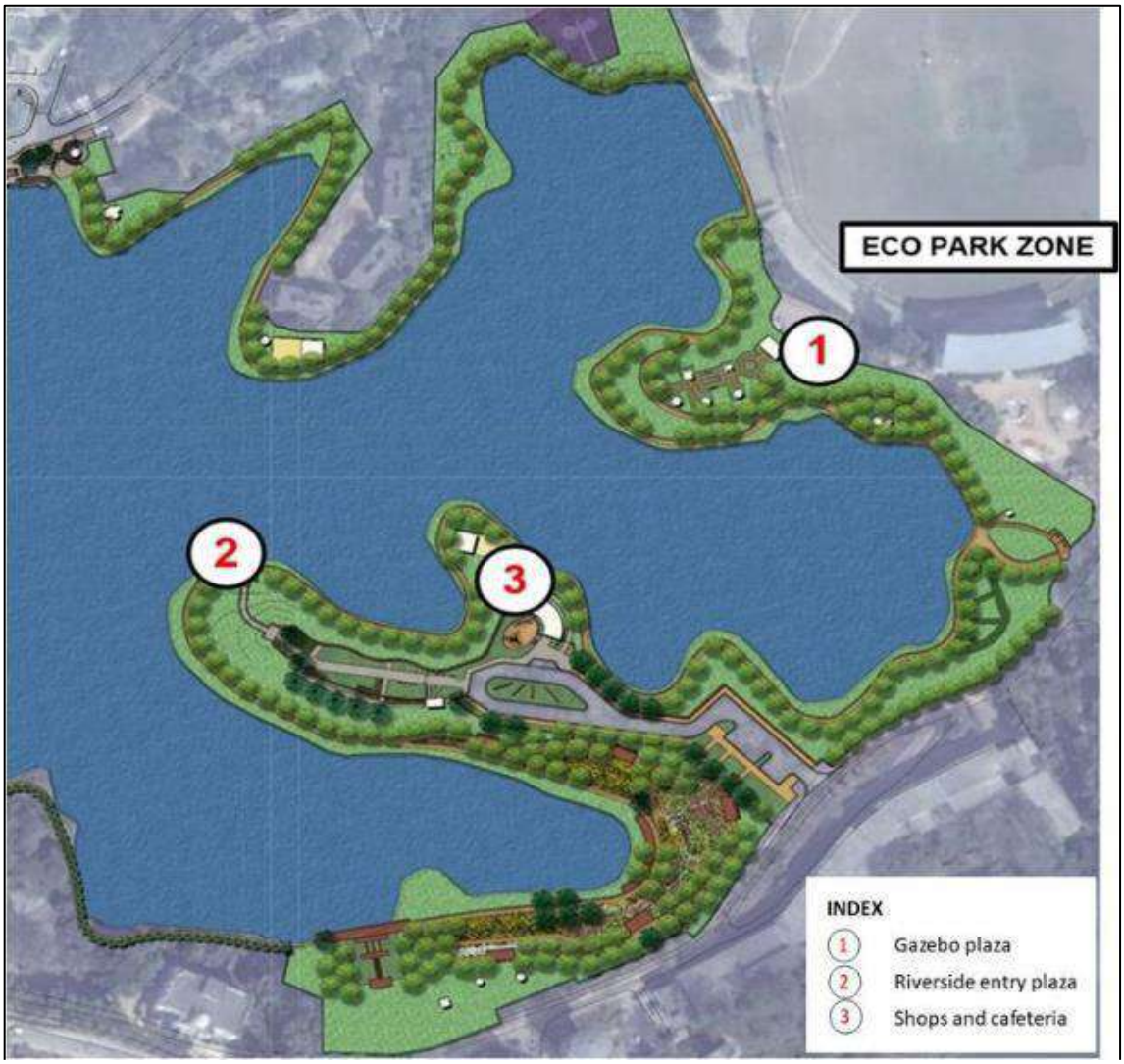


Figure 4: Existing and proposed subproject components – Eco Park Zone

Existing Conditions

Existing Pathway to gazebo plaza

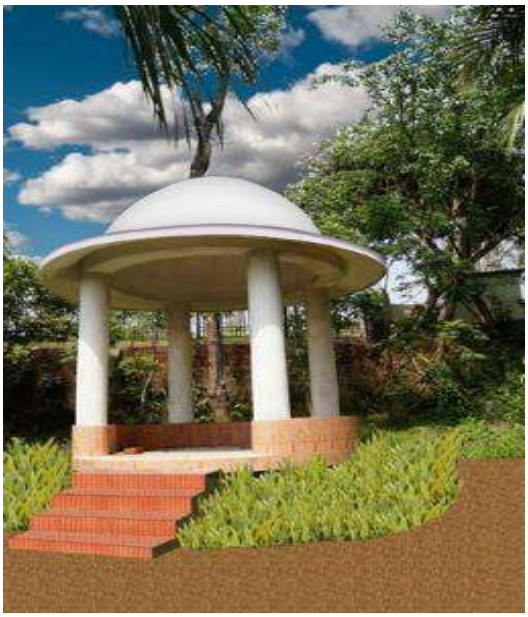
Proposed improvement

Proposed Pathway to gazebo plaza

Existing Nature Trail

Proposed Nature Trail

Existing Gazebo



Proposed Gazebo

Existing Footbridge

Proposed Footbridge

59. **Lakeview Cafeteria**: This Zone would cater majorly as a social hangout. Though it overlooks the Eco-park, the access is controlled via a convenience store – cum- ticket booth. The cafeteria would comprise of both indoor and outdoor seating covers, with associated green and plaza areas. A small tot may also be incorporated to keep toddlers busy. **Figure 5** shows plan of proposed lakeview cafeteria**. Figure 6** shows existing and proposed components of Cafeteria.

Figure 5: Plan of proposed Lakeview Cafeteria

Figure 6: Existing and proposed components – Lakeview Cafeteria

Existing Lakeview Cafeteria

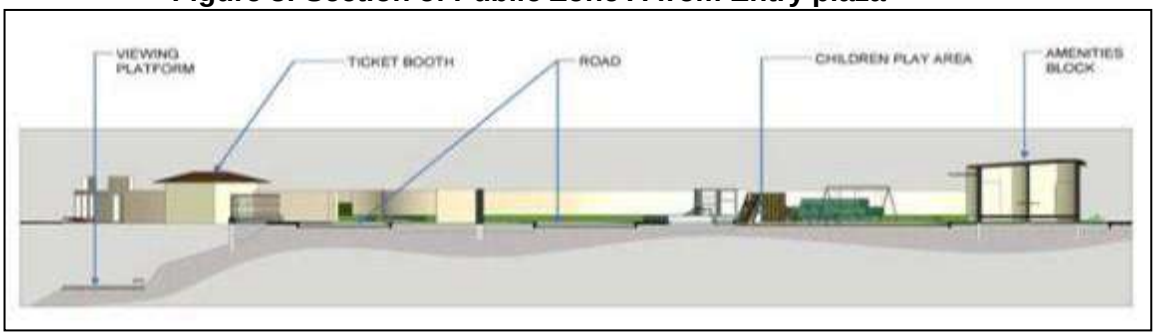
Proposed Lakeview Cafeteria

60. **Public Zone A**: - This area provides access to the Botanical and Eco park zones from

theloop road near the Law College building. It encompasses a free-access common area comprising of the sculpture court, eatery, memento shop, public conveniences and a supervised play area.The common ticket booth is also located within this zone. The other aspect to this precinct is within a gated enclosure, which contains the outdoor gym and the yoga area, along with grassedlawns for small gatherings. Framed views of the lake through strategically placed feature walls enhance the entire experience. Most of the area would be developed in terms of visualimprovement of the space, with dedicated sculpture areas, arrival zones, signage and information, and public art. **Figure 7** shows proposed plan of Public Zone A. **Figure 8** depicts section of public zone A from entry Plaza.

Figure 7: Proposed plan of Public Zone A

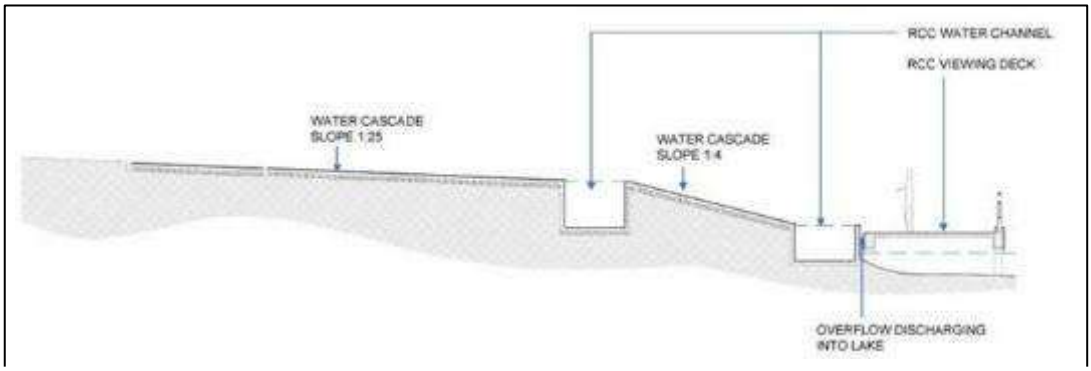
Figure 8: Section of Public Zone A from Entry plaza



61. **Botanical Zone**: - The Botanical Zone performs the function of an ecological archive. The proposal involves the grouping of plants as per a particular theme for study as well as for depository purpose. Areas like the Butterfly Garden or Fragrant Garden shall act as guidelines for replication at various scales including residential and public areas. An onsite nursery is to beestablished to provide the city residents with saplings and cuttings at a reasonable rate to encourage the green ethic. **Figure 9** shows proposed plan of Botanical Zone. Section through rain garden is shown in **Figure 10.**

Figure 9: Proposed plan of Botanical Zone

Figure 10: Section through Rain Garden



62. **Palm Walk**: This Zone would be an extension of the lakeside pedestrian loop and provides a beautiful backdrop to the view of the lake from the Eco park and Public zones. Access to/from the abutting properties would be restricted by way of a chain-link fence covered with creepers. The walkway commences at the boundary of the Botanical zone near the Rain Garden and ends at the Headland and Seating plaza created near the fisheries department office. This area would provide an all-encompassing view of the lake precinct, especially attractive at night. **Figure 11** shows proposed plan of Palm Walk.

Figure 11: Proposed plan of Palm Walk

63. **Commercial Zone**: This Zone is presently composed of a part of the lake that has been embanked to provide access to the offices of the Fisheries department. Due to its isolation and the stagnancy of water, there is much increase in turbidity as well as the amount of floating garbage. It is proposed that the connectivity between the water bodies to be restored, whilst access is provided via a floating pontoon bridge. The commercial surface water activities like swimming, boating, etc. are to be confined to this part of the precinct to maintain the ecological integrity of the site. **Figure 12** shows proposed plan of Commercial Zone.

Figure 12: Proposed plan of Commercial Zone

64. **Public Zone B**: This zone will be free access and will provide a space for all kinds of social and cultural activities, both planned and organic. Designated access areas would includeinfrastructure for public gathering, both in the cultural and commercial context. The spaces designed are multi-use and can adapt to a variety of functions and users over time. Major activityinvolved in this zone is piling work. This will involve construction of temporary embankment. Approximately 2440 cum soil will be used for embankment construction. The major purpose of embankment it to isolate the construction area from water during construction stage. The embankment will be dismantled once the construction activity is completed. The structures are designed as per IS1893 part 1 considering Seismic Zone V (Very severe) and coefficient of Z=0.36. Steel structures are designed considering IS 875 Part 3 for wind load. **Figure 13** shows proposed plan of Public Zone B. Existing and proposed components in Public Zone B shown in **Figure 14.**

Figure 13: Proposed plan of Public Zone B

Figure 14: Existing and proposed components – Public Zone B

Existing view of Public Zone B

Proposed view of Public Zone B

65. **Proposed amenities and Utilities:** The various amenities and utilities proposed for thesubproject are listed below:

66. **Water supply**: The proposed project area is covered under 24x7 municipal water supply availability by the AMC. There is one proposed public toilet in Eco Park along with the existing toilets within the Lake View cafeteria and the proposed public plaza. Drinking Water supply to the food kiosks will be managed individually by the vendors. Water for the proposed cafeteria shall be routed to the required zone from the nearest municipal tapping point.

67. **Electrification:** The broad scope of electrification at MBB College Lake comprises of providing ambient lighting along with provision for activities planned to be taken up. For Commercial zone, the scope is to provide ambient lighting and metered power points / feeders for the commercial activities such as water sports and others. For Public, Botanical, Ecological and Eco park & Cafeteria zones; the scope comprises of power supply distribution, from the TSECL meter end, along with the ambient lighting work. Commercial shops in these areas shallbe provided with a metered connection up to their premises. The scope also comprises of Landscape lighting to enhance the aesthetic and architectural outlook of the proposed activities by post tops, bollards, path-finders, up-down lighters, 2-way, 4-way, uplighters, wall highlighters, cove lighting and other luminaries. Power distribution equipment's and other Misc. Supplementary works for the subproject enumerated below:

(i) Diesel Generator set with AMF panel, Acoustic enclosure suitable for outdoor installation.
(ii) Main Outdoor Panels to cater the proposed zone-wise loads.
(iii) Installation of Lighting Feeder Pillar, Outdoor Fountain DBs, LT/HT meter, Indoor Distribution boards, outdoor power receptacles, Motor starters and Junction Boxes as required for power supply distribution for the proposed lighting & Pump loads.
(iv) Cabling and Earthing system.
(v) Civil works including Foundation for the Outdoor Fountain Panel, Main Outdoor Panels, Meter and Lighting DB, Lamp posts and other proposed lighting fixtures.

F. Analysis of Alternatives

68. **No Project Alternative**: The 'No project scenario' is analyzed with respect to the development of Agartala City as a requirement of reliable quality infrastructure for sustained growth of economy and consequent well-being of its citizens. Providing a better infrastructure will enhance the aesthetics and increase the number of visitors to the place. If the subproject is not implemented, it is very likely that the existing garden will deteriorate

further. In the absence of the proposed subproject, the Agartala Municipal Corporation (AMC) will also find it difficult to generate revenue. Therefore, 'project with alternatives' scenario, with its minor adverse impactsis more acceptable than 'No project scenario' which would mean an aggravation of the existing problems. Potential benefits of the proposed project are substantial and far reaching both in terms of the geographical spread and time.

69. **With Project Alternative**: Alternatives in terms of location (alignment) option is not available as the project is about improving the existing lake area. With the project, the existing area will be improved to more interactive place for citizens and will improve the visitors to the place. Therefore, this is a timely required project to facilitate the socioeconomic development ofthe densely populated city of Agartala and ultimately for the development of the country.

70. **Construction Material:** Material required for construction will be explored from the project area. Existing sites which are operated with relevant licenses and approvals will be used especially for extraction of metal and sand. Offshore sand could also be used for construction subjected to confirmation of quality. If new material extraction sites will be opened for this project,necessary licenses and approvals will be obtained from relevant agencies. The raw material requirement details for the proposed project are given in **Table 3** below.

Table 3: Quantities of construction material required

Sr. No.	Materials	Unit	Total
1	RCC M25	cu.m.	4715
2	Brickwork (1:4)	cu.m.	485
3	PCC (1:3:6)	cu.m.	1197
4	Steel	MT	471.54
5	Bitumen	cu.m.	116

71. The natural raw materials like sand, gravel and soil shall be procured / sourced from the authorized mines listed by Tripura Government as specified in the website http://trpenvis.nic.in/test/natural_resources.html. Of these raw materials, gravel is brought/ imported from mines in Assam state mainly from Harangajao mines which is at a distance of around 334 Km from Agartala, Bituminous macadam is brought is from Haldia in West Bengal state and partially from Assam state. Haldia is situated at a distance of 1670 Km from Agartala. The sourcing and transportation of raw material will result impact on air quality due to emissions from vehicles as well as mining activity.

72. **Construction Waste Quantity**: The estimated waste quantities from the project are given in the following **Table 4**. The construction waste material like RCC, excavated earth brickwork, used paver block broken tiles etc. will be reused as backfilling material. The scrap steel from dismantling of watch tower will be handed over to AMC for safe disposal.

Table 4: Waste Material Quantities

Sr. No.	Materials	Unit	Waste Quantity
1	RCC M25	cu.m.	60
2	Excavated Earth	cu.m.	1176
3	Brickwork (1:4)	cu.m.	32
4	Scrap Steel	MT	2.5
5	Used Paver blocks	cu.m.	175
6	Scarified Bitumen	cu.m.	27
7	Dismantled Plaster	cu.m.	65
8	Broken Tiles	cu.m.	2.5

G. Implementation Schedule

73. After the completion detailed designs, bids have been invited in May 2020 for the subproject to be implemented under the item rate modality. Bids awarded in Dec 2020 and contract sign on Feb 2021 and construction is planned within 18 months. After completion of construction and commissioning, scheme will be operated by operation contractor for 5 years, and after which the O&M will be carried out by ULB.

III. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. ADB Policy

74. ADB SPS requires that during the design, construction and operation of the project necessary compliance to all applicable laws and international conventions / treaties along with pollution prevention and control technologies and practices consistent with international good practice, are ensured.

75. **Screening and Categorization with that of ADB SPS, 2009**. ADB uses a classification system to reflect the significance of a project's potential environmental impacts. A project's category is determined by the category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence. Each proposed project is scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts. Projects are assigned to one of the following four categories:

- **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 facilitiessubject to physical works. An environmental impact assessment 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 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**. A proposed project is classified as category FI if it involves investment of ADB funds to or through a FI.

76. The environmental impacts of MBB College Lake Revitalization in Agartala City have been identified and assessed as part of the planning and design process. An environmental assessment using ADB's Rapid Environmental Assessment Checklist for Urban development (**Appendix-1**) was conducted, and results of the assessment show that the subproject is unlikelyto cause significant adverse impacts. Thus, this updated IEE has been prepared in accordance with ADB SPS's 2009 requirements for environment category B project.

77. **Environment Management Plan:** An EMP which addresses the potential impacts and risks identified by the environmental assessment has been prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the Project's impact and risks.

78. **Environmental Audit of Existing Facilities:** ADB SPS requires an environmental audit, if a subproject involves facilities and/or business activities that already exist or are under construction, including an on-site assessment to identify past or present concerns related to impacts on the environment. The objective of this compliance audit is to determine whether actions were in accordance with ADB's safeguard principles and requirements for borrowers/clients, and to identify and plan appropriate measures to address outstanding compliance issues.

79. The excess C&D waste for construction will be processed at C&D waste management site at DC Nagar Lunga, Therefore, the existing C&D processing site is an associated facility as per the ADB Safeguard Policy Statement 2009. Compliance with the environmental safeguards will ensure the subproject sustainability. The Environmental Audit Report of Existing C&D waste management site in Agartala is attached as **Appendix 4.**

80. **Public Disclosure**: The updated IEE will be put in an accessible place (e.g., local government offices, libraries, community centres, etc.), and a summary translated into local language for theproject affected people and other stakeholders. The following safeguard documents will be put up in ADB's website so that the affected people, other stakeholders, and the public can providemeaningful inputs into the project design and implementation:

- For environmental category A projects, a draft EIA report at least 120 days before Board consideration;
- Final or updated EIA and/or IEE upon receipt; and
- Environmental monitoring reports submitted by the Project Management Unit(PMU) during project implementation upon receipt.

81. **Consultation and Participation**. ADB SPS require borrower to conduct meaningful consultation[8] with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation. The consultation process and its results are to be documented and reflected in the environmental assessment report.

82. **Grievance Redress Mechanism**. ADB SPS require borrowers to establish a mechanism to receive and facilitate resolution of affected people's concerns, complaints, and grievances about the subproject's performance. The grievance mechanism shall be scaled to the risks and adverse impacts of the subproject.

83. **Monitoring and Reporting.** Borrower shall monitor, measure and document the implementation progress of the EMP. If necessary, the borrower shall identify the necessary corrective actions, and reflect them in a corrective action plan. Borrower shall prepare and submit to ADB semi-annual environmental monitoring reports that describe progress with implementation of the EMP and compliance issues and corrective actions, if any. For subprojects likely to have significant adverse environmental impacts during operation, reporting will continue at the minimum on an annual basis until ADB issues a project completion report.

84. **Unanticipated Environmental Impacts**. Where unanticipated environmental impacts

[8] As per ADB SPS, 2009, meaningful consultation means a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle;1 (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues

become apparent during subproject implementation, ADB SPS requires the borrower to update the environmental assessment and EMP or prepare a new environmental assessment and EMP to assess the potential impacts, evaluate the alternatives, and outline mitigation measures and resources to address those impacts.

85. **Occupational Health and Safety.** ADB SPS requires the borrower[9] to ensure that workers[10] are provided with a safe and healthy working environment, considering risks inherent to the sector and specific classes of hazards in the subproject work areas, including physical, chemical, biological, and radiological hazards. Borrower shall take steps to prevent accidents, injury, and disease arising from, associated with, or occurring during the course of work, including: (i) identifying and minimizing, so far as reasonably practicable, the causes of potential hazards to workers; (ii) providing preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances; (iii) providing appropriate equipment to minimize risks and requiring and enforcing its use; (iv) training workers and providing them with appropriate incentives to use and comply with health and safety procedures and protective equipment; (v) documenting and reporting occupational accidents, diseases, and incidents; and (vi) having emergency prevention, preparedness, and response arrangements in place. .(vii) Develop and implement site-specific occupational health and safety (OHS) Plan and Supplementary H & S plan for COVID 19 have been developed and implemented which included measures such as: (a) excluding public from the site; (b) maintaining social distancing for protection from COVID 19 infection; (c) ensuring all workers are provided with and use personal protective equipment (d) OHS Training and COVID 19 awareness H & S training for all site personnel.

86. **Community Health and Safety**. ADB SPS requires the borrower to identify and assess risks to, and potential impacts on, the safety of affected communities during the design, construction, operation, and decommissioning of the subproject, and shall establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts.

87. **Physical Cultural Resources**. Borrower is responsible for siting and designing the subproject to avoid significant damage to physical cultural resources. ADB SPS requires that such resources likely to be affected by the subproject are identified, and qualified and experienced experts assess the subproject's potential impacts on these resources using field- based surveys as an integral part of the environmental assessment process. When the designed location of a subproject component is in areas where physical cultural resources are expected to be found as determined during the environmental assessment process, chance finds procedures shall be included in the EMP.

88. ADB SPS International Best Practice Requirements. ADB SPS requires that, during the design, construction, and operation of the project, the executing agency shall apply pollution prevention and control technologies and practices that are consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines. (IFC's General EHS Guidelines[11] and Sector Specific Guidelines[12]). These standards contain performance levels and measures that are normally acceptable and applicable to projects. These

[9] In case where responsibility is delegated to subproject contractors during construction phase, borrower shall ensure that the responsibilities on occupational health and safety are included in the contract documents

[10] Including nonemployee workers engaged by the borrower/client through contractors or other intermediaries to work on project sites or perform work directly related to the project's core functions.

[11] https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES

[12] https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES

standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of India regulations differ from these levels and measures, the PMU and PIUs will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU and PIUs will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS. The updated IEEs shall alsoreflect meaningful consultation and disclosure process with a provision for grievance redress mechanism.

B. National and State Laws

89. The implementation of the subprojects will be governed by Government of India and State of Tripura and other applicable environmental acts, rules, regulations, and standards. These regulations impose restrictions on the activities to minimize or mitigate likely impacts on the environment. It is the responsibility of the project executing and implementing agencies to ensuresubprojects are consistent with the legal framework, whether applicable international, national, state or municipal or local. Key standards include those related to drinking water quality, air quality, and protected areas. Compliance is required in all stages of the subprojects including design, construction, and operation and maintenance.

90. **Environmental Assessment**. The GOI EIA Notification of 2006 (replacing the EIA Notification of 1994), sets out the requirement for Environmental Assessment in India. This states that Environmental Clearance (EC) is required for specified activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts.

91. Category A projects requires EC from the central Ministry of Environment, Forests and Climate Change (MoEFCC). The proponent is required to provide preliminary details of the project in the prescribed manner with all requisite details, after which an Expert Appraisal Committee (EAC) of the MoEFCC prepares comprehensive terms of reference (TOR) for the EIA study On completion of the study and review of the report by the EAC, MoEFCC considers the recommendation of the EAC and provides the EC if appropriate.

92. **Category B** projects require environmental clearance from the State Environment ImpactAssessment Authority (SEIAA). The State level EAC categorizes the project as either B1 (requiring EIA study) or B2 (no EIA study) and prepares TOR for B1 projects within 60 days. Oncompletion of the study and review of the report by the EAC, the SEIAA issues the EC based onthe EAC recommendation. The Notification also provides that any project or activity classified ascategory B will be treated as category A if it is in whole or in part within 10 km from the boundaryof protected areas, notified areas or inter-state or international boundaries.

93. None of the components of MBB College Lake revitalization project in Agartala falls underthe ambit of the EIA Notification 2006, and, therefore EIA Study or EC is not required for the subproject.

94. **Applicable environmental regulations**. Besides EIA Notification 2006, there are various other acts, rules, policies and regulations currently in force in India that deal with environmental issues that could apply to infrastructure development. The specific regulatory compliance requirements of the subproject are shown in the below **Table 5.**

Table 5: Applicable Environmental Regulations

Law	Description	Requirement	Relevance to Project Phase
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 the environmental resources. The policy also advocates collaboration method of different stakeholders to harness potential resources and strengthen environmental management.	All subprojects under ASCL should adhere to NEP principle of "enhancing and conservation of environmental resources and abatement of pollution".	All phases of the project
EIA Notification	The EIA Notification of 2006 and 2009 (replacing the EIA Notification of 1994), set out the requirement for environmental assessment in India. This states that Environmental Clearance is required for certain defined activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts. Category A projects requires Environmental Clearance from the National Ministry of Environment, Forest and Climate Change (MoEFCC). Category B projects require Environmental Clearance from the State Environmental Impact Assessment Authority (SEIAA).	None of the components of this subproject falls under the ambit of the notification	Not Applicable

Law	Description	Requirement	Relevance to Project Phase
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments	Control of water pollution is achieved through administering conditions imposed in consent issued under provision of the Water (Prevention and Control of Pollution) Act of 1974. These conditions regulate the quality and quantity of effluent, the location of discharge and the frequency of monitoring of effluents. Any component of the Project having the potential to generate sewage or trade effluentwill come under the purview of this Act, its rules and amendments. Such projects mustobtain Consent to Establish (CTE) under Section 25 of the Act from Tripura state Pollution Control Board (TSPCB) before starting implementation and Consent to Operate (CTO) before commissioning. The Water Act also requires the occupier of such subprojects to take measures for abating the possible pollution of receiving water bodies.	None of the components in this subproject requires CTE or CTO under this act. Consent to Establish & Operate Certificate has been obtained for the Solid waste management Facility at DC Nagar Lunga Site where the solid waste dumping of waste generated from this subproject is proposed from the TSPCB by AMC. Copy of certificate attached as **Appendix 4**	Construction and Operation phase
Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments.	The subprojects having potential to emit air pollutants into the atmosphere must obtain CTE under Section 21 of the Air (Prevention and Control of Pollution) Act of 1981 from TSPCB before starting implementation and CTO before commissioning the project. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution.	For the project, the following will require CTE and CTO from TSPCB: for (i) diesel generators to installed at lake area and if; (ii) hot mix plants; and (iii) stone crushers, installed for construction. All relevant forms, prescribed fees and procedures to obtain the CTE and CTO can be found in the TSPCB website (www.tspcb.gov.in). If procuring using third party, contractor to ensure that the plants, from where material is being purchased is having CTE/CTO and copy should be collected from third party and submitted in PIU. Consent to Establish & Operate Certificate has been obtained for the Solid waste management Facility at DC Nagar Lunga Site where the	Construction and Operation phase

Law	Description	Requirement	Relevance to Project Phase
		solid waste dumping of waste generated from this subproject is proposed from the TSPCB by AMC. Copy of certificate attached as **Appendix 4**.	
The Motor Vehicles Act, 1988 (59 Of 1988) (14 Oct. 1988)	The subprojects having potential to emit smoke and vapor carrying air pollutants, and enforcement of other applicable rules as per the motor vehicle act. As per Rule no 115. Emission of smoke, vapor, etc. from motor vehicles and Rule no 116. Test for smoke emission level and carbon monoxide level for motor vehiclesof The Central Motor Vehicles Rules, 1989	Pollution under control (PUC) certificate is available for all construction and vehicle used for the subproject.	Construction and maintenance
Environment (Protection) Act, 1986 and CPCB Environmental Standards.	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards notified.	**Appendix 5** provides applicable standards for ambient air quality which should be followed during construction phase. **Appendix 5** respectively also provides a comparison of national standards and internationally recognized guidelines with respect to ambient air and effluent discharge. ADB SPS requires adoption of stringent values for project implementation.	Construction and maintenance
Noise Pollution (Regulation and Control) Rules, 2002amended up to 2010.	Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.	**Appendix 6** provides applicable noise standards. Contractors are required to ensure all noise-producing activities during civil works conform to applicable standards	Construction and maintenance

Law	Description	Requirement	Relevance to Project Phase
National Institute of Occupational Safety and Health (NIOSH) Publication No. 98-126	NIOSH has laid down criteria for a recommended standard: occupational noise exposure. Thestandard is a combination of noise exposure levels and duration that no worker exposure shall equal or exceed.	Internationally recognized environmental standards. Contractors are required to provide hearing- protection equipment and ensure exposures of workers to noise- generating activities are within allowed NIOSH standards.	Construction and maintenance
Municipal Solid Wastes Management Rules, 2016	Rules to manage municipal solid waste generated; provides rules for segregation, storage, collection, processing and disposal.	Solid waste generated at proposed facilities shall be managed and disposed in accordance with the Rules. Authorization shall be obtained for the Solid waste management Facility at DC Nagar Lunga Site where the solid waste dumping of waste generated from this subproject is proposed from the TSPCB by AMC.	Construction and maintenance
Construction and Demolition Waste Management Rules, 2016	Rules to manage construction and to waste resulting from construction, remodelling, repair and demolition of any civil structure. Rules define C and D waste as waste comprising of building materials, debris resulting from construction, re-modelling, repair and demolition of any civil structure.	Construction and demolition waste generated from the project construction shall be managed and disposed as per the rules. Request for permission of dumping of the Construction and Demolition waste at the DC Nagar Lunga Site and allowing reuse of construction and demolition waste for further reuse is made by ASCL to AMC.	Constructionphase
Hazardous and Other Wastes (Management and Trans boundary Movement) Rules, 2016	According to the Rules, hazardous wastes are wastes having constituents specified in Schedule II of the Rules if their concentration is equal to or more than the limit indicated in the said schedule.	If during excavation works, the excavated material is analyzed to be hazardous, they are to be stored and disposed of only in such facilities as may be authorized by the TSPCB for the purpose.	Construction phase
Forest (Conservation) Act, 1980 and Forest Conservation Rules, 2003 as amended	As per Rule 6, every user agency, who wants to use any forest land for non-forest purposes, shall seek approval of the Central Government.	Not applicable as subprojects components are not located in designated forest area	Not Applicable

Law	Description	Requirement	Relevance to Project Phase
Wetlands (Conservation and Management) Rules, 2017	The Rules specify activities which are harmful and prohibited in the wetlands such as industrialization, construction, dumping of untreated waste and effluents, and reclamation. The Central Government may permit any of the prohibited activities on the recommendation of Central Wetlands Regulatory Authority.	As per Tripura Forest Department, Government of Tripura website, the MBB College lake is identified as wetland important from the point of view of Bio-diversity conservation and centers of socio-economic values and potential sources of eco-tourism in the state. The lake is ranked 3 and categorized as medium use. However, the lake is not identified as wetland under Wetland Conservation and Management Rules 2017. Hence NOC is not required.	Construction phase
Indian Wildlife (Protection) Act, 1972 amended 1993 and Rules 1995; Wildlife (Protection) Amendment Act, 2002	An Act to provide for the comprehensive protection of wild animals, birds and plants. This would cover matters concerning Appointment of forest authorities, hunting of wild animals, protection of specified plants, conservation of national parks and sanctuaries, trade commerce in relation to plants and animals and prevention of any offences. Wildlife protected areas are notified under this act. In Tripura State, there are 2 National Parks and 4 Wildlife Sanctuaries	Not applicable as subprojects components are not located in designated protected area.	Not Applicable
Manufacture, Storage, and Import of Hazardous Chemical Rules, 1989	Defines hazardous chemicals • Stipulates rules, procedures to manufacture, storage and import of hazardous chemicals • Requires permission, authorization from various agencies if the total storage exceeds specified quantity; requires emergency management plan	Requires permission, authorization from various agencies if the total storage exceeds specified quantity; for the hazardous material used for the project like fuel oil for DG sets, Waste fuel oil, grease residues, scarified bitumen, thinners, paints etc.	Construction phase

Law	Description	Requirement	Relevance to Project Phase
Mines and Minerals (Regulation and Development) Act, 1957 as amended in 1972 Mining of Minerals as per EIA notification 2006 and MoEFCC circular as per the Supreme Court Order 27.02.2012	• Permission of Mining of aggregates and sand • As per the circular all mining project (including minor minerals) irrespective of their lease areas of operation would now require environmental clearance.	Only licensed quarry will be used, and no new quarries will be developed for minor minerals like stone, soil, river sand etc. However, if new mining of more than 5ha is being explored the contractor may need to take environmental clearance	Construction phase
The Ancient Monument and Archaeological Sites and Remains (Amendment and Validation) Act 2010	The Rules designate areas within a radius of 100 m and 200 m from the "protected property/ monument/ area" as "prohibited area" and "regulated area" respectively. Henceforth, no permission for construction of any public projects or any other nature shall be granted in the prohibited areasof the protected monument and protected area. In respect of regulated area, the Competent Authority may grant permission for construction, reconstruction, repair and renovation based on recommendation of the National Monument Authority duly taking note of heritage bye-laws, which shall be prepared in respect of each protected monument and protected area	There are no cultural heritage sites identified near the project as protected monument or Archaeological site. In case of chance finds, measures are suggested in Environmental Management Plan (EMP) to take prompt action to ensure its removal or protection in situ.	Not Applicable
The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (LARR)	Private land acquisition is guided by the provisions and procedures under this Act. Before the acquisition of any land, the Government is required to consult the concerned Panchayat or Municipal Corporation and carry out a Social Impact Assessment in consultation with them. The Act provides a transparent process for land acquisition for industrialization, development of essential infrastructural facilities and urbanization by giving	Land acquisition is not applicable to this project.	Not Applicable

Law	Description	Requirement	Relevance to Project Phase
	adequate financial compensation to the affected people.		
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.	This rule is applicable if land acquisition of forest dwelling ST and other traditional forest dwelling communities may be required. This is not applicable for the subproject	Not Applicable
The Child Labour (Prohibition and Regulation) Amendment Act, 2016 The Child Labour (Prohibition and Regulation) Act, 1986	No child below 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 processes set forth in the Schedule, after his school hours or during vacations	No children between the age of 14 to 18 years will be engaged in hazardous working conditions.	Construction phase
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 environment and giving relief and compensation for damages to persons and property and for matters connected there with NGT has jurisdiction over matters related to Water Act, 1974; Water Cess Act, 1977; Forest (Conservation) Act, 1980; Air Act, 1981; Environment (Protection) Act, 1986; Public Liability Insurance Act, 1991; and Biodiversity Act, 2002. Consequently, no other court will have jurisdiction over the matters related to environment falling under the above referred Acts. Being a dedicated tribunal for environmental matters with the necessary expertise to handle environmental disputes.	Stakeholders / affected persons may approach NGT to resolve project induced environmental issues	Construction and Maintenance phase

Law	Description	Requirement	Relevance to Project Phase
Contract Labour (Regulation and Abolition) Act, 1970	The Act provides for certain welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor.	• Applicable to all construction works under ASCL • IA obtain a Certificate of Registration as the principle employer.	Construction and Maintenance phase
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 inter-state migrant workmen through an intermediary(who has recruited workmen in one state for employment in the establishment situated in another state). The inter-state 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.,	• Contractor shall register with Labour Department, if Inter-state migrant workmen are engaged. • Adequate and appropriate amenities and facilities to be provided to workers - housing, medical aid, traveling expenses	Construction and Maintenance phase
Minimum Wages Act, 1948.	The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions ofthe Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employment.	All construction workers should be paid not less than the prescribed minimum wage.	Construction and Maintenance phase
Workmen Compensation Act, 1923.	The Act provides for compensation in case of injury by accident arising out of and during employment.	Compensation for workers in case of injury by accident Appendix	Construction and Maintenance phase
Equal Remuneration Act, 1979.	The Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees in the matters of transfers, training and promotions etc.	Equal wages for work of equal nature to male and female workers.	Construction and Maintenance phase

Law	Description	Requirement	Relevance to Project Phase
Notification by Forest Department, Government of Tripura,	Guidelines for extraction of trees from non-forest area stipulates that permission for tree cutting shall be taken from State Forest department	All trees shall be saved as per construction design if further tree cutting required then necessary permission for non-forest tree cutting shall be taken from the Forest Department. No Tree Cutting is required.	Construction phase
Statutory Guidelines for protection and preservation of Lakes, Ponds and water bodies in Tripura. notification dated 24-05-2017	Guidelines for preserving the water bodies of Tripura including design guidelines for construction along the banks of the water body.	The guidelines are followed for the Revitalization project ofthe MBB College Lake. In addition to above Contractor to follow Guidelines of Department of Science, Technology and Environment for protection and preservation of lakes and water bodies.	Construction and Maintenance phase

C. International Conventions and Treaties

95. In addition to national and state rules and regulations, international conventions such as the International Union for Conservation of Nature and Natural Resources, Convention on Migratory Species of Wild Animals, Convention on International Trade in Endangered Species of Wild Fauna and Flora, and Ramsar Convention on Wetlands of International Importance are applicable in the selection and screening of subprojects under restricted/sensitive areas. India is a party to these conventions. The international conventions and their requirement to the subproject are given in **Table 6.**

Table 6: International Conventions and Their Requirement to the Subproject

International Convention	Description	Requirements & Status
International Union for Conservation of Nature and Natural Resources – 1st July 1975.	The International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species (also known as the IUCN Red List or Red Data List), founded in 1963, is a comprehensive inventory of the global conservation status of plant and animal species. The IUCN is an authority on the conservation status of species. A series of Regional Red Lists are produced by countries or organizations, which assess the risk of extinction to species within a political management unit. The IUCN Red List is set upon precise criteria to evaluate the extinction risk of thousands of species and subspecies.	These criteria are relevant to all species and all regions of the world. The aim is to convey the urgency of conservation issues to the public and policy makers, as well as help the international community to try to reduce species extinction. Not relevant to the target area of subproject.

International Convention	Description	Requirements & Status
Convention on Migratory Species of Wild Animals – 1st November 1983.	The Convention on Migratory Species of Wild Animals (CMS) was adopted in 1979 and entered into force on 1 November 1983. CMS, also known as the Bonn Convention, recognizes that states must be the protectors of migratory species that live within or pass through their national jurisdictions, and aims to conserve terrestrial, marine and avian migratory species throughout their ranges.	CMS Parties strive towards strictly protecting these species, conserving or restoring the places where they live, mitigating obstacles to migration and controlling other factors that might endanger them. Not relevant to the target area of subproject.
Convention on International Trade in Endangered Species of Wild Fauna and Flora – March 1973	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. CITES were first formed, in the 1960s. Annually, international wildlife trade is estimated to be worth billions of dollars and to include hundreds of millions of plant and animal specimens. The trade is diverse, ranging from live animals and plants to a vast array of wildlife products derived from them, including food products, exotic leather goods, wooden musical instruments, timber, tourist curios and medicines. Levels of exploitation of some animal and plant species are high and the trade in them, together with other factors, such as habitat loss, is capable of heavily depleting their populations and even bringing some species close to extinction.	Many wildlife species in trade are not endangered, but the existence of an agreement to ensure the sustainability of the trade is important to safeguard these resources for the future. Because the trade in wild animals and plants crosses borders between countries, the effort to regulate it requires international cooperation to safeguard certain species from over-exploitation. Not relevant to the subproject area.
Ramsar Convention, 3rd February, 1971**.**	The Ramsar Convention is an intergovernmental treaty that provides the framework for national action and international co-operation for the conservation and wise use of wetlands and their resources. India is one of the signatories to the treaty. The Ramsar convention made it mandatory for the signatory countries to include wetland conservation in their national land use plans.	ASCL will help the Government of India comply with this agreement. ASCL will not support subprojects that will locate in wetlands and other protected areas of the country
Montreal Protocol, 6th September 1987	India is a signatory of this convention which aims to reduction in the consumption and production of ozone-depleting substances (ODS), while recognizing differences in a nation's responsibilities. Ozone depleting substances are divided in two groups Chlorofluorocarbons (CFCs) and Hydro Chlorofluorocarbons (HCFCs)	Not applicable in this project as no ODS are involved in construction works.
Basel Convention on Transboundary Movement of Hazardous Wastes, 22nd March 1989	India is a signatory of this convention which aims to reduce trans-boundary movement and creation of hazardous wastes.	Contractor shall abide by Basel Convention as well as Hazardous Waste Rules, 2016 for storage handling, transport and disposal of hazardous waste emerged during construction works.

D. Clearances / Permissions to be obtained

96. Clearances / permissions to be obtained prior to start of construction. Below **Table 7** shows the list of clearances/permissions required for project construction. This list indicative andthe contractor should ascertain the requirements prior to start of the construction and obtain all necessary clearances/permission prior to start of construction.

Table 7: Clearances and Permissions Required for Construction Activities

Sr. No.	Construction Activity	Statute under which Clearance is Required	Implementation	Supervision
1	Tree Cutting/pruning –7 Nos. of Trees	State forest department	PIU	PIU, PMC and PMU
2	Hot mix plants, Crushers and Batching plants	TSPCB	Contractor	PIU, PMC
3	Storage, handling and Transport of hazardous materials	Hazardous Wastes (Management and Handling) Rules. 2016 Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989 from TSPCB	Contractor	PIU, PMC
4	Sand mining, quarries and borrow areas	Department of Mines and Geology Government of Tripura	Contractor	PIU, PMC
5	New quarries and borrow areas	Environmental clearance under EIA Notification 2006.	Contractor	PIU, PMC
6	Temporary traffic diversion measures	District traffic police	Contractor	PIU, PMC
7	Clearance for establishing Asphalt plant	TSPCB	Contractor	PIU, PMC
8	Installation of Generators	Tripura Electricity Company of respective regions	Contractor	PIU, PMC
9	Clearance for excavation and transporting soil	Department of Mines and Geology/ Local Bodies	Contractor	PIU, PMC
10	License for storing Diesel	Commissioner of Explosivesand TSPCB	Contractor	PIU, PMC
11	Labour Camps	District health Officer	Contractor	PIU, PMC
12	Clearance for crossing any waterway	Irrigation Department, Government of Tripura	Contractor	PIU, PMC
13	If water is to be taken from river/ reservoir	Concerned Water Authority	Contractor	PIU, PMC

97. PMU will be overall responsible for supervision in getting all clearances and provide details to ADB through semi-annual report.

98. ADB SPS Requires that during the design, construction, and operation of the project necessary compliance to all applicable laws and international conventions / treaties along

with pollution prevention and control technologies and practices consistent with international good practice, are ensured.

IV. DESCRIPTION OF THE ENVIRONMENT

A. Physical Resources

1. Location, Area & Connectivity

99. Agartala, the capital of Tripura, is situated along 23° 45' 23° 55' N latitude and 91°15' 91°20' E longitude, in the flood plains of the Haora River. Historically, the city has been an important border-trading town with trading linkages with Bangladesh. Agartala is the second- largest city in northeast India after Guwahati. The city is governed by the Agartala Municipal Corporation. It is located on the banks of the Haora River, near the Bangladesh border, about 90 km (55 mi) east of Bangladesh's capital Dhaka.

100. **Administrative boundaries**: Agartala is the capital of Tripura, the third smallest Indian state considered as the gateway to the North-Eastern India. The AMC was established in 1871 with an area of only 3 km^2. Presently the extended limit of AMC covers an area of 62 km2 comprising of 35 wards. The Greater Agartala Planning Area (GAPA) is spread over an area of 92.0 km^2. It comprises AMC and eight other villages with population of more than 4 lakhs. Considering the natural geographical division created by the Haora River and Katakhal Channel, the GAPA has been demarcated to distinguish the three (3) zones: the north zone, central zone and south zone.

101. **Road, Rail and Air Connectivity**: The National Highway (NH)-44 connects Agartala with Silchar, Guwahati and other towns of Assam. The city has its own airport and direct flights from many other cities of India for the Agartala Airport. The city also has a very prominent and busy railway station, which connects it with all the major cities of the country. The intercity transportation of Agartala is very well organized too. All the places in the city are easily connected by a well laid network of roads such as VIP road, Pragati Road, Akhuara Road and others. There are buses and other transportations that run in the city all day long. Some important localities in the city include Hrishi Colony, Abhoy Nagar, Ram Nagar, Manipuri Basti, Banamalipur and Shib Nagar.

2. Topography, Soils and Geology

102. **Topography**: -The major part of the City (Central Agartala) has a flat terrain. However, the North and South Zones have a rolling terrain with average altitude varying from a high of 25to 30 m to a low of 8 m. Greater Agartala is a combination of plain and undulated areas. The central zone is a flat land bounded by the Haora River in the south and Katakhal Channel in thenorth. An important characteristic of the central part of the city is that it is located at a lower levelthan other areas giving it the appearance of a saucer. Due to its saucer shape, the low-lying areas are vulnerable to inundation during monsoons.

103. **Soils:** - The plains of Haora River are alluvial in nature consisting of sand, silt and clay. The soil in Agartala is in general of poor to medium quality. It is characterized by a top soil underlain by a soft to medium/stiff, silty clay/clayey silt layer, which follows a moderately dense to very dense silty sand layer. Bearing capacity of soil is poor and usually is of the range of 4 – 6 tons per m Central Agartala and most parts of south Agartala.

104. **Geology: -**The geology of Agartala is represented by the repetitive succession of sedimentary rock like sandstone, shale and clay from bottom to top, belonging to Surma group Tipam group and Dupitila group. The valley is dominated by thick sandstones horizons with thin intervening shale/clay horizons. The sedimentary rocks are deformed

and folded. The sandstones are highly porous underlain by impermeable shales or clay and are favorable for ground water retention.

3. Natural Disasters

105. **Cyclone:**[13] The District is completely prone to cyclonic hazard zone and the probability of damage is very high. The seasonality of occurrence of cyclone are during the month of October & November. Sometimes the cyclonic wind flows in the state after passing Bangladesh. In suchevents weakly built houses suffer the damage. Cyclones also disrupt power supply, telecommunication, surface communication and it damages agricultural crops and greenery in the District.

106. **Seismicity:**[14]The District is a part of the most severe seismic zone in the country namely Zone-V of seismic zoning map of India. Several number of moderate to large magnitude earth quake occurred within the District. In 1897 and earth quake took place in the state where the State's only one building that is the king palace which was damaged completely. Several landslide and liquefaction took place in the district.

107. **Floods**: - The District faces flash flood annually during the monsoon season i.e. June toSeptember. Howrah and Katakhal rivers are two major drainage channels draining flood water to Bangladesh. Now a days due to climate change effect there are irregular raining resulting temporary flooding occur in the low-lying area in District. The city is facing frequent floods also due to blockage of drainage system.

4. Climatic Conditions

108. The climate of Tripura exhibits a strong seasonal rhythm. The state is characterized by a warm and humid tropical climate with five distinct seasons, namely, spring, summer, monsoon, autumn and winter. Spring starts from late mid-February & continues till mid-March. Winter returns if there is rain a fresh in mid-February. Summer season starts from middle of March andreaches its peak in April - May. The monsoon generally breaks in the later part of May or first week of June and lasts till September.

109. Winter sets in from November and is severe in the month of January minimum temperature recorded is 4ºc in January 1995. Humidity is generally high throughout the year. Inthe summer season the relative humidity is varied from 50 percent to 74 percent whereas in therainy season it is over 85 percent.

110. Relatively high temperature, occasional thunderstorms and wind velocities characterize the summer season, which extends from March end to mid-May. The average maximum temperature is 34ºC and average minimum temperature is 15ºC.

111. A more sensitive element of climate is the variation in rainfall. It varies not only from place to place or from year to year, but also between seasons. Variation of rainfall between the districts over some years is shown in **Table 8.** Annual rainfall ranges from 1922 mm to 2855 mm. The rainfall generally increases from south-west to north-east. There is a big gap in the rainfall content in southern central part around Amarpur, which is surrounded by 1500 mm. isohytes. The north-eastern part of the state around Dharamnagar gets maximum rainfall Most of the rain comes during the months April-June and July to September. This period is generally referred to as the Kharif season this is the major agricultural season of the whole State. The variation of Kharif rainfall between the districts as also shown in Table.

[13] District Disaster Management Plan 2016-2017
[14] District Disaster Management Plan 2016-2017

Table 8: Average rainfall in different years (in centimeter)

2010	2011	2012	2013	2014	2016	2017	2018	2019	2020
216.1	182.09	188.13	195.18	187.01	220.20	3180.03	2087.8	2111.7	2160.1

Source: Directorate of Economics & Statistics, Govt. of Tripura.

112. On-site monitoring was undertaken for various meteorological variables to generate the site-specific data. Data was collected at site every hour continuously from 20 December 2018 to 7 January 2019.

113. **Methodology**: Site specific data covering micro-meteorological parameters were recorded on hourly basis during the study period and comprises of parameters like wind speed, wind direction (from 0 to 360 degrees), temperature, relative humidity, atmospheric pressure, rainfall and cloud cover. The monitoring was carried out at two locations, Pratapgarh (21-28 December 2018) and Agartala Motor Stand (29 December 2018 - 5 January 2019).

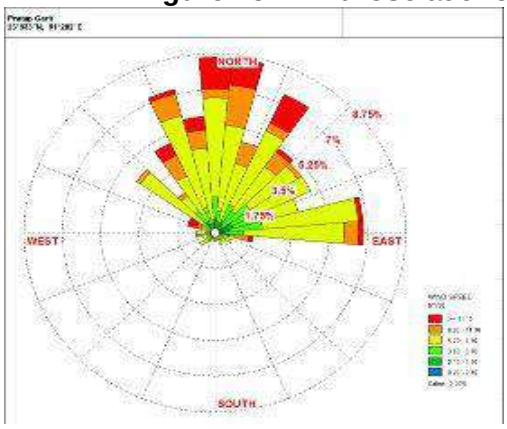
114. **Observations:** The minimum, maximum and average values for all the parameters except wind direction are presented in **Table 9.**

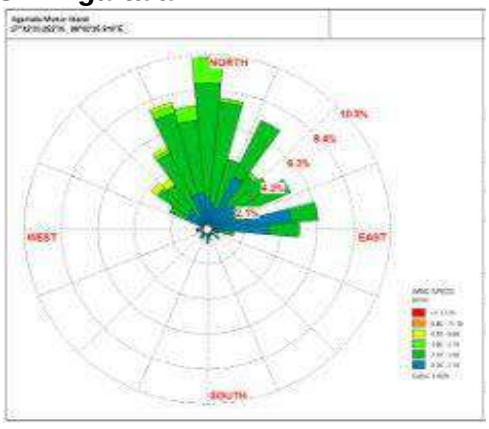
115. Windrose diagram of 2 locations are shown in **Figure 15.**

Table 9: Summarised Meteorological Data

Sr. No.	Parameters	Min. Value	Max. Value	Avg. Value
		Pratapgarh		
1	Wind speed, (kmph)	0.72	18.04	7.18
2	Temperature, °C	11.98	30.89	21.44
3	Humidity (%)	23	79	46.43
		Agartala Motor Stand		
1	Wind speed, (kmph)	1.14	28.01	7.74
2	Temperature, °C	11.01	31.5	22.21
3	Humidity (%)	21	78	45.45

Figure 15: Windrose at two locations in Agartala





Windrose- Pratapgarh **Windrose- Motor Stand**

116. **Secondary Data (Meteorology):** The climate of Agartala is of tropical monsoon type. The average annual rainfall is around 220 centimeters (cm). The average no of rainy days

is 100 days. The temperature varies from 4.2°C to 37.6°C on the average. The winter period is from November to February, summer is from March to May and monsoon is from June to September. It has a moderate temperature and highly humid atmosphere. Winds, which are of moderate velocity, are from the south-to-south – east direction for most of the time. Average velocity of wind varies from 4 km to 9 km per hour.

5. Surface and Ground Water

117. The drainage system of Agartala is dominated by Haora river and Katakhal Channel, which drains the core area of the city. These two waterbodies flow westward into Bangladesh. In terms of catchment area, Haora River is the seventh largest in the Tripura and is the only source of surface water for Greater Agartala. In addition to these two rivers, there are other rivers like Bangeshwar Gang, Debta Gang, Nagichara, Kalapani Charra and its tributaries within Greater Agartala. The Akhaura canal system running along the Akhaura road serves mainly the central area. All rivers are rain-fed and ephemeral in nature and their flow is directly related to rainfall.

118. **Surface water**: 3 surface water sources at and near the MBB College lake were examined for physico-chemical, heavy metals and bacteriological parameters to assess the effect of industrial and other activities on surface and ground water. The samples were analyzed as per the procedures specified in 'Standard Methods for the Examination of Water and Wastewater' published by American Public Health Association (APHA). These samples were taken as grab samples and were analyzed for various parameters to compare with the standards for drinking water as per IS: 10500. The water sampling locations are listed below in **Table 10**. The sampling locations are selected to assess the water quality monitoring pre and post project scenarios at possible intake and out fall sites. The results of the surface water sampling are shown in **Table 11.**

Table 10: Surface Water Monitoring Locations

Sr. No.	Monitoring Locations	Date of Samplings	Location Code
1	MBB memorial College, MBB College lake	27 December 2018	SW1 23°49'36.34"N 91°17'37.51"E
2	Near Bir Bikram University, MBB College lake		SW2 23°49'40.61"N 91°17'34.36"E
3	Haora River near MBB College		SW3

Table 11: Surface Water Monitoring Results

Sr. No.	Parameters	Unit	Standards (IS 2296)	SW-1	SW-2	SW-3
1	Colour	Hazen	300	<1.0	<1.0	<1.0
2	pH value	None	6.5-8.5	6.85 at 25 deg c	6.84 at 25 deg c	7.20 at 25 deg c
3	Turbidity	N.T.U.	-	8.4	10	38
4	Total Dissolved Solids (asTDS)	mg/l	1500	62	88	92
5	Anionic Detergents (as MBAS)	mg/l	1	<0.02	<0.02	<0.02
6	Barium (as Ba)	mg/l	-	<0.05	<0.05	<0.05
7	Calcium (as Ca)	mg/l	-	9.2	17	17
8	Chloride (as Cl)	mg/l	600	17	18	12

Sr. No.	Parameters	Unit	Standards (IS 2296)	SW-1	SW-2	SW-3
9	Copper (as Cu)	mg/l	1.5	<0.02	<0.02	<0.02
10	Fluoride (as F)	mg/l	1.5	<0.1	<0.1	<0.1
11	Iron (as Fe)	mg/l	50	0.84	0.84	4.2
12	Magnesium (as Mg)	mg/l	-	2.9	1.8	4.4
13	Manganese (as Mn)	mg/l	-	0.18	0.27	0.16
14	Nitrate (as NO3)	mg/l	50	0.73	0.79	2.98
15	Phenolic Compounds (asC6H5OH)	mg/l	0.001	<0.001	<0.001	<0.001
16	Selenium (as Se)	mg/l	0.05	<0.005	<0.005	<0.005
17	Sulphate (as SO4)	mg/l	400	17	2.8	<1.0
18	Alkalinity (as CaCO3)	mg/l	200	22	63	54
19	Total Hardness (asCaCO3)	mg/l	-	35	50	61
20	Cadmium (as Cd)	mg/l	0.01	<0.001	<0001	<0.001
21	Lead (as Pb)	mg/l	0.1	<0.005	<0.005	<0.005
22	Mercury (as Hg)	mg/l	-	<0.001	<0.001	<0.001
23	Polychlorinated biphenyls(as PCB)	mg/l	0.0005	<0.0005	<0.0005	<0.0005
24	Arsenic (as As)	mg/l	0.2	<0.005	<0.005	<0.005
25	Total Chromium (as Cr)	mg/l	-	<0.01	<0.01	<0.01
26	Sodium (as Na)	mg/l	-	10	11.3	12
27	Potassium (as K)	mg/l	-	2.7	4.0	2.7
28	Zinc (as Zn)	mg/l	15	<0.02	<0.02	<0.02
29	Hexavalent Chromium (as Cr+6)	mg/l	0.05	<0.01	<0.01	<0.01
30	Total Suspended Solid (asTSS)	mg/l	-	15	21	53
31	Temperature	Deg C	-	26	26	26
32	Conductivity	us/cm	-	105	149	159
33	Biochemical Oxygen Demand (as BOD)	mg/l	3	8	6.2	<2
34	Chemical Oxygen Demand(COD)	mg/l	-	53	39	<4
35	Oil and Grease	mg/l	0.1	<1.4	<1.4	<1.4
36	Silica (as SiO2)	mg/l	-	6.2	9.9	36
37	Salinity*	mg/l	-	0.06	0.09	0.09
38	Phosphate (as PO4)	mg/l	-	<0.15	<0.15	<0.15
39	Phosphorus	mg/l	-	<0.05	<0.05	<0.05
40	DO	mg/l	4	5.6	5.8	6.4
41	Total Nitrogen	mg/l	-	4.3	2.8	1.4
42	Petroleum Hydrocarbon	mg/l	-	<1.0	<1.0	<1.0

Sr. No.	Parameters	Unit	Standards (IS 2296)	SW-1	SW-2	SW-3
43	Faecal coliform	/100ml	zero	Detected	Detected	Detected
44	Total coliform	MPN/100 ml	5000	110	280	110
45	Zooplankton	/1lit	-	Absent	Absent	Absent
46	Phytoplankton	/1lit	-	Absent	Absent	Absent

***** In respect to KCl equivalent salinity 35.

119. **Observations**: The result of water quality monitoring shows that most of the parameters are within the limit as prescribed in standard except higher turbidity in all three samples. The manganese content of the MBB College lake water is above the permissible limit and the iron level of Haora river is above permissible limit, faecal coliform was found in all the water samples. The bathing Ghats, illegal dumping of wastewater and solid waste, illegal usage of lake area for open defecation are possible source of high coliform and other source of pollution.

120. Surface water sample for baseline monitoring at site have been collected on 09.01.2022 to 11.01.2022 by NABL Lab and analysed. Results are depicted in **Table 12** below.

Table 12: Physico-chemical analyses baseline data of Surface water

S. No	Parameters	Location			Standard- IS 2296
		SW1 Bathing Ghat	SW2 MBB Main Entrance Pond	SW3 PWD and NCC College in between Entrance Lake	
1	Temperature(°C)	20.5	20	21	-
2	pH	6.68	6.51	6.91	6.5-8.5
3	Conductivity (µmhos/cm)	1193	348	150	-
4	Turbidity (NTU)	2.21	2.1	2.4	-
5	Total Dissolved Solid(mg/l)	759	221	96	1500
6	Total Suspended Solid(mg/l)	21.8	22.0	15.4	-
7	Total Hardness(mg/l)	249.48	75.24	27.72	-
8	Dissolved Oxygen(mg/l)	6.5	7.0	7.3	4
9	BOD (mg/l)	23.0	9.0	8.0	3
10	COD (mg/l)	136.2	45.4	36.32	-
11	Oil & Grease(mg/l)	<1.0	<1.0	<1.0	0.1
12	Total Kjeldahl	6.38	3.5	3.2	-
13	Chloride(mg/l)	151.16	23.96	22.12	600
14	Sulphate(mg/l)	22.8	12.2	8.0	400
15	Nitrate	9.89	3.63	3.2	50
16	Alkalinity(mg/l)	106.4	64.6	19.0	-
17	Bi-Carbonate(mg/l)	129.81	78.81	23.18	-
18	Phosphate(mg/l)	2.2	0.89	0.75	-
19	Calcium(mg/l)	52.38	15.87	6.35	-
20	Magnesium(mg/l)	28.51	8.55	2.85	-

S. No	Parameters	Location			Standard- IS 2296
		SW1 Bathing Ghat	SW2 MBB Main Entrance Pond	SW3 PWD and NCC College in between Entrance Lake	
21	Sodium(mg/l)	58	21	12.8	-
22	Manganese(mg/l)	<1.0	<1.0	<1.0	-
23	Zinc(mg/l)	0.9	0.8	0.8	15
24	Iron(mg/l)	2.21	1.69	1.12	0.01
25	Cadmium (mg/l)	<0.001	<0.001	<0.001	-
26	Copper (mg/l)	<0.04	<0.04	<0.04	-
27	Nickel (mg/l)	<1.0	<1.0	<1.0	-
28	Lead (mg/l)	<0.05	<0.05	<0.05	0.1
29	Mercury (mg/l)	<0.001	<0.001	<0.001	-
30	Total Chromium(mg/l)	<0.02	<0.02	<0.02	-
31	Arsenic (mg/l)	<0.01	<0.01	<0.01	0.2
32	Silica (mg/l)	9.2	5.54	2.2	-
33	Hexavalent Chromium(mg/l)	<1.0	<1.0	<1.0	0.05
34	Total Coliform(CFU/100ml)	1.9×10^3	1.7×10^3	1.1×10^3	5000
35	Faecal Coliform (CFU/100ml)	1.3×10^3	1.1×10^3	9.0×10^2	-

Source: Project Data, All values in mg/l unless stated otherwise

Physico-chemical analyses baseline data of Surface water

S. No	Parameters	Location		Standard- IS 2296
		SW4 Law College Backside Lake	SW5 Haora River	
1	Temperature(^{0}C)	21.0	20.0	-
2	pH	6.93	7.11	6.5-8.5
3	Conductivity (µmhos/cm)	149	867	-
4	Turbidity(NTU)	2.2	2.13	-
5	Total Dissolved Solid(mg/l)	97.0	549	1500
6	Total Suspended Solid(mg/l)	12.4	24.6	-
7	Total Hardness(mg/l)	23.76	182.16	-
8	Dissolved Oxygen(mg/l)	6.2	6.3	4
9	BOD(mg/l)	4.0	5.0	3
10	COD(mg/l)	18.16	27.24	-
11	Oil & Grease(mg/l)	<1.0	<1.0	0.1
12	Total Kjeldahl Nitrogen(mg/l)	2.21	2.50	-
13	Chloride(mg/l)	20.28	90.33	600

S. No	Parameters	Location		Standard- IS 2296
		SW4 Law College Backside Lake	SW5 Haora River	
14	Sulphate(mg/l)	11	26.6	400
15	Nitrate	2.0	2.49	50
16	Alkalinity(mg/l)	22.8	133	-
17	Bi-Carbonate(mg/l)	27.82	162.26	-
18	Phosphate(mg/l)	0.43	1.15	-
19	Calcium(mg/l)	4.76	36.50	-
20	Magnesium(mg/l)	2.85	21.86	-
21	Sodium(mg/l)	12.41	35.6	-
22	Manganese(mg/l)	<1.0	<1.0	-
23	Zinc(mg/l)	0.11	0.12	15
24	Iron(mg/l)	1.38	1.45	0.01
25	Cadmium (mg/l)	<0.001	<0.001	-
26	Copper (mg/l)	<0.04	<0.04	-
27	Nickel (mg/l)	<1.0	<1.0	-
28	Lead (mg/l)	<0.05	<0.05	0.1
29	Mercury (mg/l)	<0.001	<0.001	-
30	Total Chromium(mg/l)	<0.02	<0.02	-
31	Arsenic (mg/l)	<0.01	<0.01	0.2
32	Silica (mg/l)	1.5	9.2	-
33	Hexavalent Chromium(mg/l)	<1.0	<1.0	0.05
34	Total Coliform(CFU/100ml)	1.1×10^3	1.6×10^3	5000
35	Faecal Coliform (CFU/100ml)	9.3×10^2	9.2×10^2	-

Source: Project Data, All values in mg/l unless stated otherwise

121. **Ground Water Quality**: 3 ground water sources near the MBB College lake were examined for physico-chemical, heavy metals and bacteriological parameters to assess the effect of industrial and other activities on surface and ground water. The samples were analysed as per the procedures specified in 'Standard Methods for the Examination of Water and Wastewater' published by American Public Health Association (APHA). These samples were taken as grab samples and were analyzed for various parameters to compare with the standards for drinking water as per IS: 10500. The water sampling locations are listed below in **Table 13** and the results are shown in **Table 14.**

Table 13: Water Monitoring Locations

Sr. No.	Monitoring Location	Date of Sampling	Location Code
1	Near Bir Bikram University	27th December 2018	GW1 23°49'40.64"N 91°17'37.08"E

Sr. No.	Monitoring Location	Date of Sampling	Location Code
2	Near Dhalwal Water Supply road	27th December 2018	GW2 23°49'39.25"N 91°17'57.39"E
3	Dhaleshwar	28th December 2018	GW3 23°50'0.04"N 91°17'42.62"E

Table 14: Ground Water Monitoring Analysis Results

Sr. No.	Parameters	Unit	Standards	GW-1	GW-2	GW-3
Physical parameters						
1	Colour	Hazen	5	<1.0	<1.0	<1.0
2	pH value	None	6.5-8.5	7.05	7.64	6.51
3	Turbidity	N.T.U.	1	4.1	42	10.
4	Total DissolvedSolids (as TDS)	mg/l	500	88	84	92
General Parameters						
1	Anionic Detergents (as MBAS)	mg/l	0.2	<0.02	<0.02	<0.02
2	Barium (as Ba)	mg/l	0.7	<0.05	<0.05	<0.05
3	Calcium (as Ca)	mg/l	75	6.3	7.8	11
4	Chloride (as Cl)	mg/l	250	5.8	3.8	5.8
5	Copper (as Cu)	mg/l	0.05	<0.02	<0.02	<0.02
6	Fluoride (as F)	mg/l	1	<0.1	0.16	<0.1
7	Iron (as Fe)	mg/l	0.3	0.49	12.3	1.5
8	Magnesium (as Mg)	mg/l	30	4.6	5.6	4.7
9	Manganese (as Mn)	mg/l	0.1	<0.02	<0.02	<0.02
10	Nitrate (as NO3)	mg/l	45	<0.5	<0.5	1.0
11	Phenolic Compounds (as C6H5OH)	mg/l	0.001	<0.001	<0.001	<0.001
12	Selenium (as Se)	mg/l	0.01	<0.005	<0.005	<0.005
13	Sulphate (as SO4)	mg/l	200	<1.0	<1.0	<1.0
14	Total Hardness (as CaCO3)	mg/l	200	35	43	47
15	Cadmium (as Cd)	mg/l	0.003	<0.001	<0.001	<0.001
16	Lead (as Pb)	mg/l	0.01	<0.005	<0.005	<0.005
17	Mercury (as Hg)	mg/l	0.001	<0.001	<0.001	<0.001
18	Polychlorinated biphenyls (as PCB)	mg/l	0.0005	<0.0005	<0.0005	<0.0005
19	Arsenic (as As)	mg/l	0.01	<0.005	<0.005	<0.005
20	Total Chromium (as Cr)	mg/l	0.05	<0.01	<0.01	<0.01
21	Sodium (as Na)	mg/l	60	10	16	20
22	Potassium (as K)	mg/l	-	2.8	2.9	2
23	Zinc (as Zn)	mg/l	5	<0.02	<0.02	<0.02

Sr. No.	Parameters	Unit	Standards	GW-1	GW-2	GW-3
24	Hexavalent Chromium (as Cr+6)	mg/l		<0.01	<0.01	<0.01
25	Total Petroleum Hydrocarbon (as TPH)	mg/l		<1.0	<1.0	<1.0
26	Total Suspended Solid (as TSS)	mg/l		<2.5	22	3.9
27	Temperature	Deg C	-	26	26	26
28	Conductivity	us/cm	-	103	140	162
29	Dissolved Oxygen	mg/l	-	4.8	3.4	3.6
30	Biochemical Oxygen Demand (as BOD)	mg/l	-	<2	2.1	<2
31	Chemical Oxygen Demand (COD)	mg/l	-	<4	11	<4
32	Oil and Grease	mg/l	-	<1.4	<1.4	<1.4
33	Silica (as SiO2)	mg/l	-	20	23	24
34	Salinity*	mg/l	-	0.06	0.08	0.09
35	Total Alkalinity (as CaCO3)	mg/l	200	54	60	76
36	Phosphate	mg/l	-	<0.15	<0.15	<0.15
37	Total Nitrogen	mg/l		<0.3	<0.3	0.4
38	Total Phosphorous	mg/l		<0.05	<0.05	<0.05
Microbial Parameters						
1	Faecal coliform	/100ml	Zero	Not Detected	Not Detected	Not Detected
2	Total coliform	MPN/100ml	zero	2	<2	4

***** In respect to KCl equivalent salinity 35.

122. **Observations**: The result of water quality monitoring shows that most of the parametersare within the limit as prescribed by IS: 10500. Turbidity and Iron were found to be in excess in all the locations. The turbidity is due to water stagnation in the MBB College Lake. Iron content is normally present in the region's ground water and surface water.

123. Ground water sampling for baseline monitoring near project site have been conducted on 07.01.2022 by NABL Lab. Results are depicted in **Table 15** below. It is noted that the concentration level of all the parameters is within the acceptable standards of ground water quality.

Table 15: Physico-chemical, chemical & biological analyses Data of Ground water (MBB College Lake)

S. No	Parameters	Location		Acceptable Limit IS 10500-2012	Permissible Limit IS 10500-2012
		GW-1 Opposite BBMC College Residential house	GW-2 MBB College main entrance opposite road residential area		
Physical Parameters					
1	Odour (TON)	2.0	2.0	Agreeable	Agreeable
2	Colour in hazen Unit	4.0	3.0	5	15
3	Test	Agreeable	Agreeable	Agreeable	Agreeable
4	Turbidity NTU	9.0	11.0	1.0	5.0
5	Total Dissolved Solid (mg/l)	285.0	312.0	500	2000
6	pH	6.74	6.85	6.5-8.5	No Relaxation
Chemical Parameters					
1	Aluminium (mg/l)	<0.02	<0.02	0.03	0.2
2	Ammonia (mg/l)	<0.1	<0.1	0.5	No Relaxation
3	Anionic detergents(mg/l)	<0.05	<0.05	0.2	1.0
4	Barium(mg/l)	<0.1	<0.1	0.7	No Relaxation
5	Boron (mg/l)	0.77	0.89	0.5	1.0
6	Calcium (mg/l)	20.63	26.98	75.0	200.0
7	Chloramines(mg/l)	<0.1	<0.1	0.4	No Relaxation
8	Chloride (mg/l)	47.92	70.05	250.0	1000.0
9	Copper (mg/l)	<0.04	<0.04	0.05	1.5
10	Fluoride (mg/l)	<0.1	<0.1	1.0	1.5
11	Residual Chlorine (mg/l)	<0.1	<0.1	0.2	1.0
12	Iron (mg/l)	1.82	1.6	1.0	No Relaxation
13	Magnesium (mg/l)	6.65	7.60	30.0	100.0
14	Manganese (mg/l)	<0.05	<0.05	0.1	0.3
15	Mineral Oil(mg/l)	<0.01	<0.01	0.5	No Relaxation
16	Nitrate (mg/l)	2.1	2.3	45.0	No Relaxation
17	Phenolic Compound (mg/l)	<0.001	<0.001	0.001	0.002
18	Selenium (mg/l)	<0.01	<0.01	0.1	No Relaxation
19	Silver (mg/l)	<0.001	<0.001	0.1	No Relaxation
20	Sulphate (mg/l)	14.6	18.2	200	400
21	Sulphide (mg/l)	<0.01	<0.01	0.05	No Relaxation
22	Alkalinity (mg/l)	72.2	95.0	200	600
23	Total Hardness (mg/l)	79.4	99.0	200	600
24	Zinc (mg/l)	0.08	0.07	5	15.0
25	Cadmium(mg/l)	<0.002	<0.002	0.003	No Relaxation
26	Cyanide(mg/l)	<0.01	<0.01	0.05	No Relaxation
27	Lead(mg/l)	<0.005	<0.005	0.01	No Relaxation
28	Mercury(mg/l)	<0.01	<0.01	<0.01	No Relaxation

S. No	Parameters	Location		Acceptable Limit IS 10500-2012	Permissible Limit IS 10500-2012
		GW-1 Opposite BBMC College Residential house	GW-2 MBB College main entrance opposite road residential area		
29	Molybdenum(mg/l)	<0.05	<0.05	0.07	No Relaxation
30	Nickel(mg/l)	<0.01	<0.01	0.02	No Relaxation
31	Polychlorinated Biphenyls(mg/l)	<0.0004	<0.0004	0.0005	No Relaxation
32	Polynuclear Aromatic Hydrocarbons(mg/l)	<0.0001	<0.0001	0.0001	No Relaxation
33	Arsenic(mg/l)	<0.01	<0.01	0.01	No Relaxation
34	Total Chromium(mg/l)	<0.02	<0.02	0.05	No Relaxation
Bacteriological Parameters					
1	Total Coliform(CFU/100ml)	<1,<10,<100	<1,<10,<100	<1,<10,<100	Shall not be detectable in any 100 ml. sample
2	Fecal Coliform(CFU/100ml)	<1,<10,<100	<1,<10,<100	<1,<10,<100	Shall not be detectable in any 100 ml. sample

Source: Project Data Baseline Ground water sampling, 07.01.2022

6. Air Quality

124. Ambient air quality monitoring was conducted near the MBB College lake to assess the existing air quality of the area. Ambient air quality monitoring has been carried out during December 2017 to February 2018 representing winter season for 5 locations These monitoring locations are shown in **Table 16**.

Table 16: Details of Ambient Air Quality Monitoring Stations

Sr. No.	Monitoring Location	Location Code	Date of Sampling	Latitude	Longitude
1	Math Chowmuhani	AQ1	20 and 26 Dec 2018	23.9312°N	91.291°E
2	Bidurkata	AQ2	24 and 27 Dec 2018	23.834°N	91.2801°E
3	Mantribai Road	AQ3	01 and 05 Jan 2019	23.8318°N	91.2801°E
4	Banamalipur	AQ4	02 and 06 Jan 2019	23.8398°N	91.2915°E
5	Pratapgarh	AQ5	02 and 06 Jan 2019	23.811°N	91.2888°E

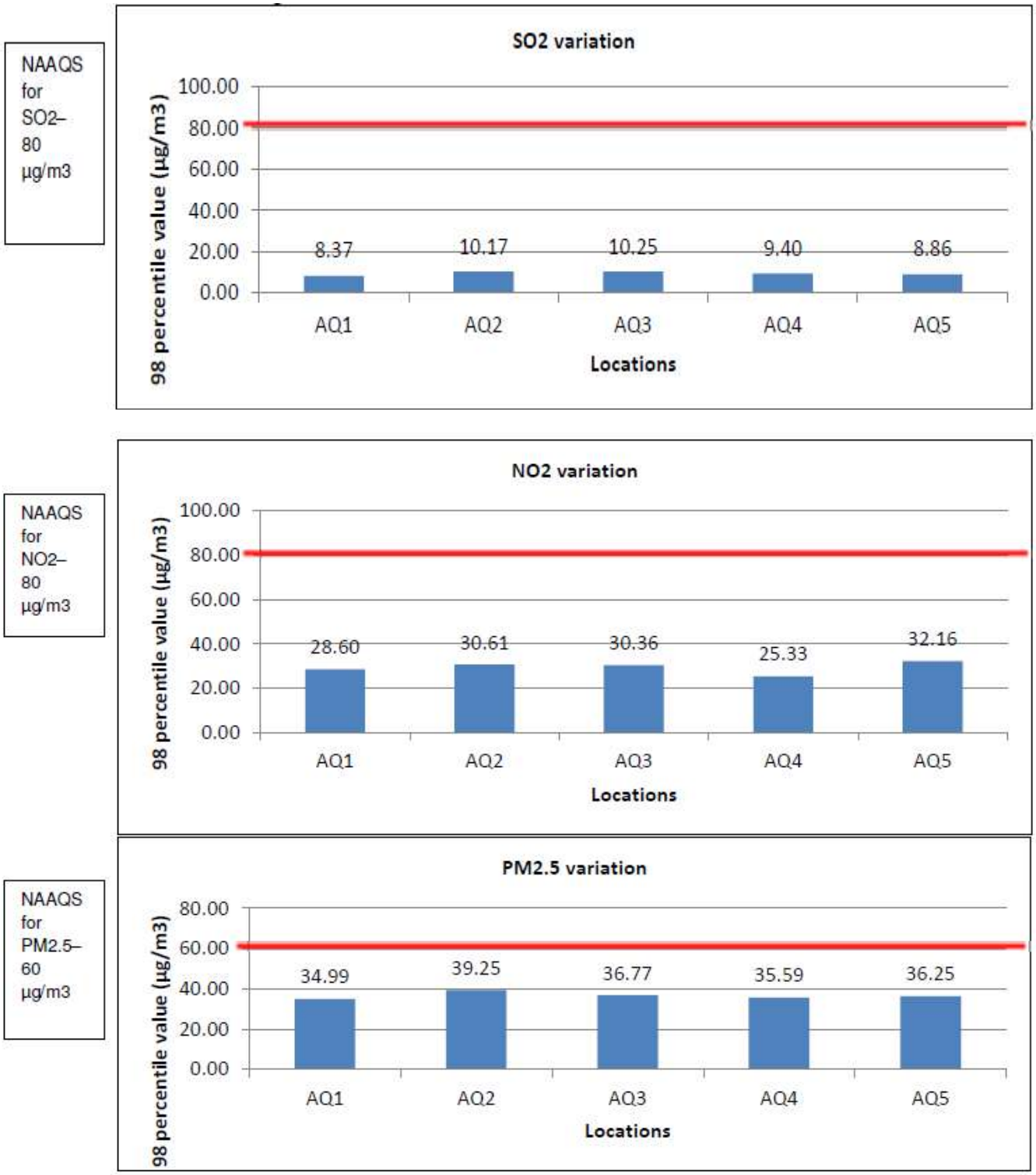
125. **Parameters of Sampling**: - As per Central Pollution Control Board (CPCB) monitoring guidelines Monitoring of Particulate Matter size less than 10 microns (PM_{10}) and Particulate Matter size less than 2.5 microns ($PM_{2.5}$), Sulphur Dioxide (SO2), Nitrogen Dioxide (NO2) were monitored on 24 hourly basis and for CO were monitored on eight hourly basis.

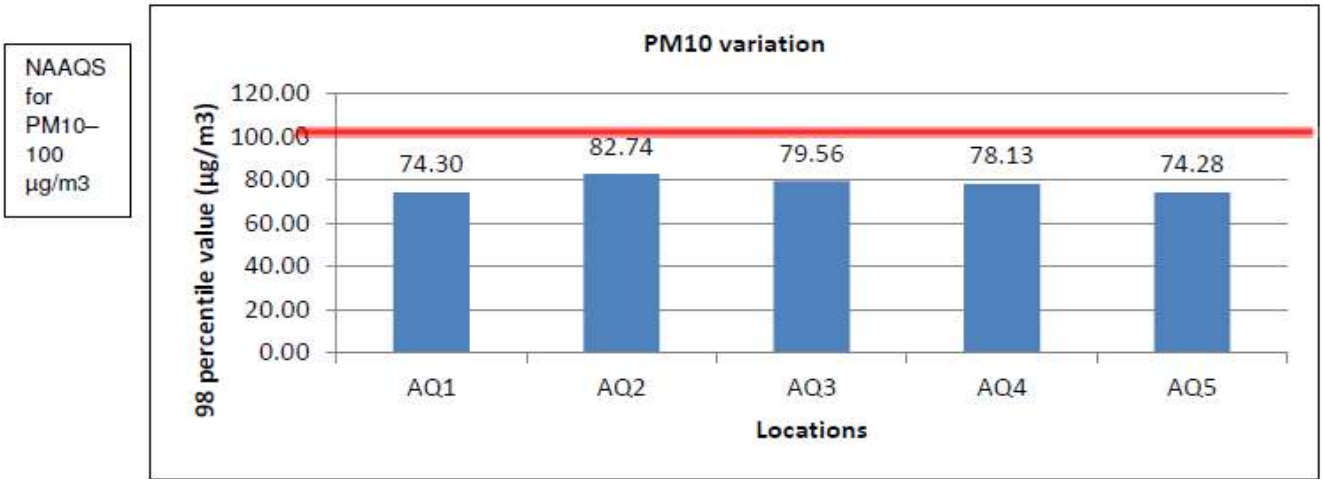
126. **Presentation of Primary Data**: - The graphs in **Figure 16** give the variation of various parameters across all the 5 locations. The 98 percentile values are denoted in the graphs

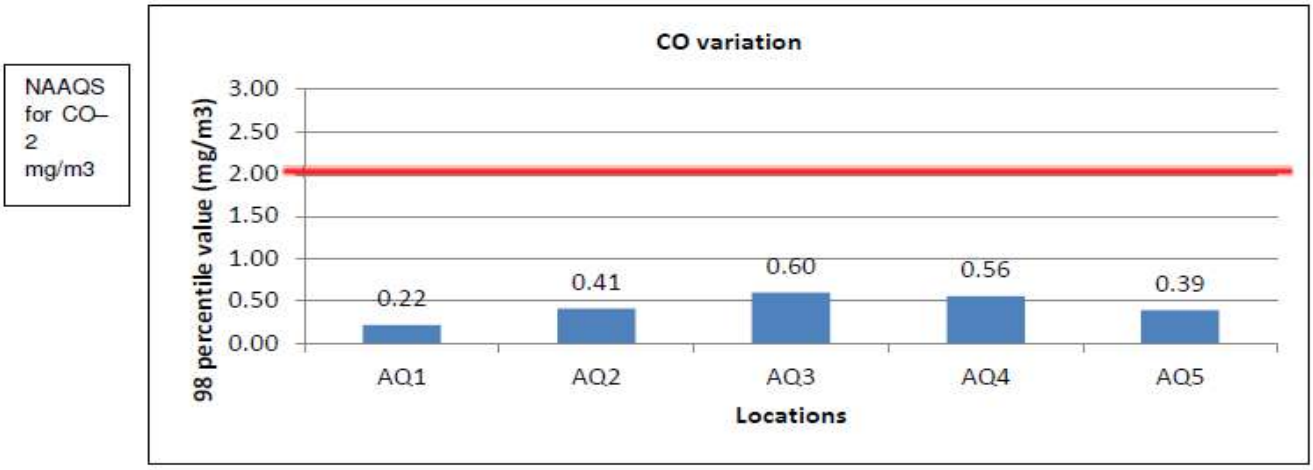
127. **Observation:** All the parameters at all the locations are within the permissible limit (SO_2- 80 µg/m^3, PM_{10}- 100 µg/m^3, $PM_{2.5}$- 60 µg/m^3 and CO-2000 µg/m^3) of the National Ambient Air Quality Standards (NAAQS). For SO_2, the results are within WHO standards;

for NO2 , the results are within NAAQS (absence of WHO standards for 24 hrs.); for $PM_{2.5}$, the results are more than WHO standards; for PM_{10} , the results are more than WHO standards; for CO, the results are within NAAQS (absence of WHO standards). The ambient air quality results show that air pollution is mainly due to vehicular traffic and dust.

Figure 16: Variation of Pollutant Concentration







128.24 Hrs Base line air quality monitoring was carried out also for MBB Lake project during 6th to 11th January 2022 at different sites of the project areas. Results of air quality monitoring are shown in **Table 17** below. Values of all parameters are within the standard, except level of PM10 at one location (IGNOU Regional Center) where concentration exceed the standard.

Table 17: Base line Ambient Air Quality Monitoring data at working sites

Status of Ambient Air Quality						
S. No	**Site name/ Date of Monitoring**	**Air pollutants**				
		PM_{10} µg/m^3	**SO_2 µg/m^3**	**NO_2 µg/m^3**	**CO (8Hrs) mg/m^3**	**Pb µg/m^3**
		CPCB standard 100	**CPCB standard 80**	**CPCB standard 80**	**CPCB standard 2**	**CPCB standard 1**
	MBB College					
AQ1	Staff Quarter/ 06.01.2022-07.01.2022	86.7	6.7	26.5	0.14	<0.01
AQ2	Fisheries Department/ 06.01.2022-07.01.2022	96.6	7.6	24.7	0.18	<0.01

Status of Ambient Air Quality						
S. No	Site name/ Date of Monitoring	Air pollutants				
		PM_{10} µg/m^3	SO_2 µg/m^3	NO_2 µg/m^3	CO (8Hrs) mg/m^3	Pb µg/m^3
		CPCB standard 100	CPCB standard 80	CPCB standard 80	CPCB standard 2	CPCB standard 1
	MBB College					
AQ3	BBMC College/ 08.01.2022 – 09.01.2022	98.5	7.1	28.8	0.15	<0.01
AQ4	Old Science Building/ 08.01.2022 – 09.01.2022	76.2	6.6	26.4	0.14	<0.01
AQ5	IGNOU Regional Center/ 10.01.2022-11.01.2022	106.4	7,8	27.2	0.18	<0.01

(Note: Monitoring done under project)

7. Noise Level

129. To understand the noise levels in the MBB College area, 24 hrs continuous noise level monitoring was done at two locations near MBB College lake**.** The 2 locations are selected on each year- Fisheries Department and another near Main Admin Building of College to assess the impact on noise level during Construction phase. 24-hour monitoring was done at each station. Data was recorded using a Lutron sound level meter. The sound level meter was used to record the SPL reading placed in flat terrain at 1.2 to 1.5m above ground levelin an open area with minimum obstruction, at least 3m away from sound reflecting sources like walls, matted or tall grasses, shrubs, or wooded areas. The details of the locations are given in **Table 18.**

Table 18: Noise Quality Monitoring Locations

Sr. No.	Monitoring Location	Date of Monitoring	Location Code
1	Near College Area-1 (Fisheries Department)	21-12-18	NQ1 23°49'32.70"N 91°17'34.90"E
2	Near College Area –2 (Main Admn. Building)	23-12-18	NQ2 23°49'41.20"N 91°17'56.08"E

130. **Observations**: The statistical analysis is done for measured noise levels at 2 locations during winter season. The parameters are analyzed for Leq day and Leq night. These results are shown in **Table 19** below.

Table 19: Noise Level Monitoring Results

Details	NQ1	NQ2
Date	21.12.2018	23.12.2018
Classification	Residential	Residential
L Day	58.9	57.6
Standard	**55**	**55**

Details	NQ1	NQ2
L Night	48.3	50.4
Standard	**45**	**45**
L Max	61.3	59.7
L Min	40.5	38.1

131. **Results**: The results show that the noise levels higher than the standard limits at both the locations near MBB College lake.

132. Noise level "baseline monitoring" was conducted during 6thJanuary to 10th January 2022 at all working locations by Contractor. The measured noise levels are provided in **Table 20** below. Noise levels are within the standard.

Table 20: Baseline Noise Monitoring Data at Project Location Sites and Surroundings

Sr. No.	Monitoring Locations	Noise Level in dB (A)			
		Day Time 6 AM- 10 PM		Night Time 10 PM—6 AM	
		Leq in dB(A)	Standard (dB(A)	Leq in dB(A)	Standard (dB(A)
N1	MBB Main entrance Opposite Road	60.02	**65**	44.66	**55**
N2	Lake View Cafeteria	61.14	**65**	45.24	**55**
N3	IGNOU back side staff quarter	58.17	**65**	43.16	**55**
N4	MBB College Lake side	65.28	**65**	47.76	**55**
N5	BBMC Admin Block back side	62.46	**65**	44.18	**55**

(project data, Date of sampling:06.01.2022 to 10.01.2022)

133. Following requirements of ADB SPS, 2009, PMU and PIUs shall apply pollution prevention and control technologies for all the applicable environmental parameters and practices consistent with international good practice. When the Government of India regulations differ from these levels and measures, PMU shall achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific subproject circumstances, PMU will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS, 2009.

B. Ecological Resources

Biodiversity Assessment

134. A biodiversity assessment of the MBB College Lake was done in December 2018 to study the various facets of biodiversity of the MBB College lake and the adjoining area. Diversity indices provide important information about rarity and commonness of species in a community. It is important to ascertain these indices as they give a quantitative estimate of how good or badthe baseline biodiversity is. For this subproject a 5 km buffer study area was select around the MBB College lake.

135. On basis of the ecology and biodiversity survey of MBB College lake it was found total

number of flora species observed in study area is 59. Among the faunal species, Red breasted Parakeet which are near threatened species according to IUCN 3.1, were found in the study area. MBB College lake is rich in butterfly diversity total species being 30. According to the studyit was found that the area is fairly rich in biodiversity. The detailed report is attached as **Appendix 8.**

136.**Migratory Birds**: The subproject area is part of the massive avian migratory channel called the Central Asian Flyway (CAF), which spans the entire Indian subcontinent. Thus, the subproject area lies in the path of various winter migratory birds entering the Indian subcontinent from the north and headed farther south. With its diversity of habitats, the area in general is likely to be providing seasonal habitats or staging points to many of these visitors. On the review of available information, no rare or endangered species of flora and fauna prescribed by IUCN or WPC, 1972 are found along the project areas, but some features in surrounding 50 km area are home to some species classified as near threatened (NT), endangered (EN), critically endangered (CR) and Vulnerable (VU). However, none of these are reported in project area as project area mostly comprises urban and habitation areas, and urban agglomeration. Screening of project areas is carried out based on Integrated Biodiversity Assessment Tool (IBAT) and report is attached as **Appendix 7**. The 10 km surrounding area is likely to be containing habitats that are significant to many species of special conservation-value.

137.A primary survey was also conducted on MBB lake and a variety of migratory birds havebeen recorded in the MBB College Campus. A study conducted by Majumder (2018), during theOctober to March period of 2013/2014 and 2014/2015, reported 28 species of migratory (22 species non-resident migratory, 6 species resident migratory) birds. These included Oriental darter, Citrine and White Wagtails, Blue Rock-thrush and Black-naped oriole (partially migratory). A detailed list has been provided in **Appendix 9.** All the Migratory bird species found in MBB College lake falls in the Least Concern status as per Conservation status, except for the speciesof Oriental darter, which is categorized as Near Threatened as per IUCN listing. This is a Winter Migrant Non-Resident species. The breeding period of Oriental Darter is winter in south easternIndia (during the northeast monsoon). They nest in mixed species heronries where they build a stick platform on the tree which is usually surrounded by water. Adults roost communally in treesclose to or over water.

138.**Critically Endangered/ Endangered Species:** The species designated by the IUCN as Critically Endangered or endangered are potentially found within 50km of the subproject area. The subproject area is an urban area with complete modified habitats with no pristine natural habitat or flora and fauna, but the 50 km surrounding area of the subproject includes many pockets of pristine natural habitats and have ranges of many IUCN designated fauna and flora. The 50 km area includes Natural Habitat like moderate to dense forest, rivers with influence of tidal water from Bay of Bengal. The IBAT results shows following IUCN designated species have their range in 50 km surroundings of project area.

139.**Critical Habitats:** As per Proximity report generated by the Integrated Biodiversity Assessment Tool (IBAT), the nearest Protected Areas and Key Biodiversity Areas are 50 km away from the MBB lake. The list of protected area and key biodiversity areas as reported by IBAT proximity checklist are given below in **Table 21 and 22.** The detailed proximity report generated IBAT for 10 km and 50 km from the project area are given in **Appendix 7**.

Table 21: Protected Areas

Sr. No	Area name	Distance
1	Gumti	50 km

Sr. No	Area name	Distance
2	Rema Kalenga	50 km
3	Rudrasagar Lake	50 km
4	Satchari	50 km
5	Sepahijala	50 km
6	Trishna	50 km

Table 22: Key Biodiversity Areas

S. No	Area name	Distance
1	Gumti Wildlife Sanctuary	50 km
2	Rema-Kalenga Wildlife Sanctuary	50 km
3	Rudrasagar Lake	50 km
4	Sepahijala	50 km
5	Trishna Wildlife Sanctuary	50 km

C. Economic Development

140. **Land Use**: The MBB College Lake is surrounded by majorly residential and institutional land use. The existing facilities at the Lake serve as a recreational space (morning walk and laughter club) for these localities. The loop road is used for morning walks, while the existing Ghats provide bathing and washing facilities.

Figure 17: Existing Land-use map of MBB college lake campus

Commerce, Industry and Agricultural:

141. Tripura's gross state domestic product for 2004 is estimated at $2.1 billion in current prices. The economy of Tripura is agrarian. More than 50 per cent of its population depends on agriculture for livelihood and contribution of agriculture and allied activities. Tripura is characterized by low income, overwhelming percentage of population below the poverty line, income leakage, and unemployment. The state is predominantly rural in character (85.29%). Average land holding size is 0.97 hectare. 90% of the cultivators are either small or marginal.

142. **Trade and Commerce**. There are two small industrial estates, with a total number of 36 industrial units and with a total capital investment of INR 56.575 million. Other than the 2 industrial estates, there are 17 other significant industries in Agartala. These industries, as per records, are not in the category of large and medium industries. Wholesale trade in the city is functioning mostly in the Gole Market area and spreads haphazardly mixing with the retail trade.There are 9 markets maintained by AMC within erstwhile Municipal limits, of which, Battala and Maharaj Ganja Bazaar are the main service and distribution centers of Greater Agartala.

143. **Agriculture**. Agriculture and allied activities are the mainstay of the people of Tripura and provides employment to about 64% of the population. There is a preponderance of food crop cultivation over cash crop cultivation in Tripura. At present about 62% of the net sown area is under food crop cultivation. Paddy is the principal crop, followed by oilseed, pulses, potato and sugarcane. Tea and rubber are the important cash crops of the State. Handicraft, particularly hand-woven cotton fabric, wood carvings and bamboo products, are also important. Thesubproject areas are not located in agricultural lands.

144. **Housing and Amenities**: 98% used houses primarily as residences while less than 2%had residence cum other use. 65.5% of the households lived in good condition houses, 29.4% in livable houses and about 3% in dilapidated houses. 1.9% used residence cum other use. Census households by type of structure for 56.3% of households were permanent and for 42.3% were semi-permanent and temporary were less than 1 %. In terms of availability of Latrines, 98%of the households reported having latrines within the premises. 47.7 % households Flush/pour flush latrine connected to septic tank. Only 9.4 % of the households had piped sewer system. 28.2% had pit latrine with slab ventilated improved pit and 7 % had pit latrine without slab in open pit. For assets available at household level, 82.9 % had televisions and 67.9% had mobile phones, 42.6% owned bicycles, 23.6% reported owning motorcycles and 5.9% had car/jeep or van. 7.5% households owned TV, Computer/ Laptop, Telephone/mobile phone and Scooter/ Car.

145. **Health and Educational Facilities** There are good educational facilities in Tripura state,which serve both Agartala urban people and inhabitants of surrounding villages and towns in thehinterland. There are about 21 colleges in Agartala comprising Medical college, Degree college,Nursing college, Polytechnic college and Open university. Percentage of literacy according to 2011 census is 93.88, higher than the national literacy rate. There are also 9 nos. nursing homeand hospital at Agartala. One Government Medical College is also located at Agartala.

146. **Educational Institutions**: Agartala being a well-developed city and capital of the state, it is home to several educational institutions and this can be easily seen in the map given here. Some of the educational institutions in the city include B.Ed. College, Hindi H.Sec School, Ram Nagar School, Bijoy Kumar School, MTB Girls School, Vani Vidypeeth, Government Women's College, Govt. Law College among others.

D. Social and Cultural Resources

147. **Demography.** The total estimated population of AMC limits as per 2011 census is 399,668. Population density of GAPA increased to 41% person per hectare in the year 2001 in compared to 38% in 1991. There are two major racial groups, namely the Indo-Aryans represented by the Bengalis and the Indo-mongoloid represented by communities like the Tripuris, the Reangs, the Noatis, the Kukis, the Halams, the Chakma, the Mogh and the Lushai. The percentage of Scheduled Tribe population to the total city population is estimated to be around 4%. The scheduled tribe populations living in the city is well integrated with the mainstream and is gainfully employed. The literacy rate in Agartala is the highest among the localities of Tripura.

148. **History, culture and Tourism**: One of the earliest kings of Tripura was Patardan B.C. 1900, long before the Manikya Dynasty. According to folklore, Chitrarath, Drikpati, Dharmapha, Loknath Jivandharan were important kings during the time of B.C. in Agartala.

149. In the past, Tripura served as the capital to several Hindu kingdoms. Although a timelineof the rulers has not been found, records reveal that the area has been ruled by as many as 179Hindu rulers, starting from the mythological King Druhya to the last King of Tripura, Kirit Bikram Kishore Manikya. Tripura also came under Mughal rule. The state came under the governance of the British in 1808. Much later the ancient capital of the then Princely State 'Swadhin Tripura'was at Rangamati (Udaipur, South Tripura) by the bank of the river Gomati. In 1760 it was shiftedby the Maharaja Krishna Chandra Manikya Bahadur (r.1829–1849) of Manikya Dynasty to present old Agartala by the bank of the river Haora/Saidra and was named 'Haveli'. Due to frequent invasion of the Kukis and also to keep easy communication with the British Bengali, theMaharaja Krishna Chandra Manikya started the process of shifting the capital from Old Haveli toNew Haveli (present Agartala) in 1849.

150. During the British Raj, Agartala was the capital of the 'Hill Tippera' state, it became a municipality in 1874–1875, and in 1901 had a population of 9,513. The princely state always remained as cake piece to the British and many other invaders. For example, when Arakhan soldiers attacked the old capital of the state the king of Tripura responded by defeating the entiretroop. The Agartala Municipality was established during the reign of Maharaja Bir Chandra Manikya (1862–1896) within an area of 3 square miles (8 km^2) having a population of only 875 by a royal proclamation in the last part of 1871. A.W.S. Power, the first British political agent forTipperah was also appointed as the Chairman of the Agartala Municipality in 1872 who held office from 1872–73. The municipality located at the crossing of latitude N 23° 50' and longitudeE 91°17' covering 3 km^2. Area during that period.

E. Physical Cultural Resource and Sensitive Receptors

151. **Ujjayanta Palace** is a representative example of neoclassical style of early 20th century designed by Sir Alexander Martin for Maharaja Radha Kishore Manikya. The complex of site area 800 acres comprises of the two storied Palace building with central dome, symmetrically landscaped grand entrance promenade in between two ponds, Chhatris, Rear garden, North gate and *Astabal.*

152. The palace has historical association to the Manikya dynasty, the rulers of Tripura beforemerger into India. Ujjayanta palace presently accommodates the State Museum of Tripura from 2011, formerly being used as State Legislative Assembly. The site has provided opportunities for tourist attraction, knowledge source and social cohesion, as it also accommodates the Tourism Department office and a restaurant.

153.It is a Landmark structure in the city of Agartala with significant architectural, aesthetic, cultural value and huge associational value with the inhabitants of the state. It provides contextual value as it is historically and visually linked to its surroundings. Situated 1.52 km fromMBB College Lake.

Other Religious Buildings

154.Agartala has plenty of religious and cultural places. Though Hinduism is the main religionof the place, other religions like Islam, Buddhism and Christianity are also have their place. Thecity has a lot of temples, churches, mosques and monastery, some of which are over 150 to 200years old. Some of the famous religious institutions include Buddha Mandir, Mother Theresa Ashram, Ramkrishan Ashram Vidyamandir among many others. The city has a Universal PrayerHall, where people can come and pray.

155.There are few sensitive receptors like college, community center near the proposed subproject. The significant PCR's and sensitive receptors identified are given in **Table 23.** The impact of the project and the necessary mitigation 1measures are provided in the EMP Section.

Table 23: Details of PCR and Sensitive Receptors

Sr. No.	Sensitive receptor	Approx. Distance from the MBB College lake
1	Maharaja Bir Bikram University 	70m

Sr. No.	Sensitive receptor	Approx. Distance from the MBB College lake
2	Tripura Government Law College 	80m
	Shiv Mandir 	
4	Haora River	580 m
5	STT College, Tripura University	185 m
6	Bir Bikram Memorial College	200 m

F. Environmental Settings of MBB lake

156.The MBB lake is located near MBB college in Agartala town, the surrounding area of MBB lake is already converted into urban use for many years ago. No involuntary land acquisition of private land is anticipated for this project. The proposed components are in existing government-owned lake boundaries. The details about the environmental setting of the project are shown in **Table 24** and **Figure 18** shows the environmental settings of MBB College lake

157.**Hydraulics of Lake**: The MBB College Lake Revitalization Area is spread over an area of 12 hectares, which comprises of Lakes, Garden area, Stadium, Outdoor Sports area,Institutions etc.

(i) The MBB college Lake bed level is at an average of 10 m from MSL.
(ii) Total length of shoreline along full tank level (FTL) of the main lake is 2277 m = 18.1 acres.
(iii) The total area of the main lake falling within the FTL is 73144 m^2.
(iv) Considering 0.5m of free board, the full storage capacity i.e. water holdingcapacity of the lake is 37000 cum.

Table 24: Environmental Settings of Subprojects

Sr. No.	Place Description	Distance from the site (Km)
1.	Elevation above mean sea level	Varying from 19.81 m to 27.4 m
2.	Nearest highway	NH 8 passing within the Agartala city at around 4.53 Km from project site south east direction
3.	Nearest Railway Station	Agartala Railway Station at around 4.1 Km, South direction
4.	Nearest Airport	Agartala Airport at around 8.67 Km North West direction
5.	Nearest City	Proposed project is within the city limits of Agartala
6.	Rivers	Haora river at around 0.58 Km on the Southern side of the project site.
7.	Hills/valleys	None
8.	Archaeologically important places	Ujjayanta Palace, identified as a historical site by Tripura Tourism is 1.74 km
9.	National Parks/ Forest areas	There is no Protected forest area within 10 km of radius. Nearest Wildlife Sanctuary- Sepahijila at 18 km.
10.	Wildlife Sanctuary	None
11.	Core Biosphere reserve	None
12.	Wetland	MBB College lake is identified among the 7 important inland wetlands of Tripura in terms of biodiversity conservation.
13.	International Border	Indo-Bangladesh border around 4.3 Km from the project site at West direction

Figure 18: Environmental Setting of MBB College Lake

V. ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

A. Introduction

158. Potential environmental impacts of the proposed infrastructure components are presented in this section. Mitigation measures to minimize/mitigate negative impacts, if any, arerecommended along with the agency responsible for implementation. Monitoring actions to be conducted during the implementation phase is also recommended to reduce the impact.

159. Screening of potential environmental impacts are categorized into four categories considering subproject phases: location impacts and design impacts (pre-construction phase), construction phase impacts and operations and maintenance phase impacts.

(i) **Location impacts** include impacts associated with site selection and include lossof on-site biophysical array and encroachment either directly or indirectly on adjacent environments. It also includes impacts on people who will lose their livelihood or any other structures by the development of that site.
(ii) **Design impacts** include impacts arising from Investment Program design, including technology used, scale of operation/throughput, waste production, discharge specifications, pollution sources and ancillary services.
(iii) **Construction impacts** include impacts caused by site clearing, earthworks, machinery, vehicles and workers. Construction site impacts include erosion, dust,noise, traffic congestion and waste production.
(iv) **O&M impacts** include impacts arising from the operation and maintenance activities of the infrastructure facility. These include routine management of operational waste streams, and occupational health and safety issues.

160. Screening of environmental impacts has been based on the impact magnitude (negligible/moderate/severe – in the order of increasing degree) and impact duration (temporary/permanent).

161. This section of the IEE reviews possible project-related impacts, in order to identify issues requiring further attention and screen out issues of no relevance. ADB SPS (2009)

require that impacts and risks will be analyzed during pre-construction, construction, and operational stages in the context of the project's area of influence.

162. The ADB Rapid Environmental Assessment Checklist for urban development has been used to screen the project for environmental impacts and to determine the scope of the IEE.

163. The updated IEE study evaluates impacts due to the location, design, construction and operation of the project. The proposed project would create an impact on the environment in three distinct phases:

(i) During Pre-Construction phase
(ii) Design phase
(iii) During the Construction phase, which may be considered as temporary or shortterm;
(iv) During the Operation and Maintenance phase, which would have long term effects

B. Design Impact

164. The various design features that are included in the subproject that will improve the existing condition of the MBB College lake are as follows:

(i) Improved lighting and CCTV surveillance in the area to increase the safety of the users in the night-time.
(ii) The provision of safety railings at strategic locations to reduce the chances ofaccidents due to drowning.
(iii) The improved Solid waste management provisions provided in the design forimprovement in the aesthetics of the area.
(iv) Provision of toilets and diversion of wastewater that was entering the MBB College lake in the design shall improve the water quality of the MBB College lake.
(v) Large amount of landscaping will improve the overall biodiversity of the area

165. **Safety in design**: - The project envisages attracting visitors in large numbers. As a measure to restrict the access of MBB College lake to designated areas and to ensure the safetyof people moving in the pathways and public zones, railings are provided at the following locations:

(i) Around all public Zone B
(ii) Along elevated walk way and Fountain Plaza
(iii) Public Zone A
(iv) Food Court Zone "B"
(v) Cafeteria Zone "A".
(vi) Feature wall near Public zone 2 entry platform
(vii) Railing around Lake view seating
(viii) Railing in Botanical Garden

C. Pre-Construction Phase Impacts

166. **Location Impacts:** It Includes impacts associated with site selection, loss of on-site biophysical properties.

167. **Site Selection of construction work camps, stockpile areas, storage areas and disposal areas:** During the project pre-construction (site clearing) and construction stage,

priority is to locate the construction work camps, stockpiles areas, storage areas and disposal areas near the project locations. However, if it is deemed necessary to locate elsewhere, sites to be considered will not result in destruction of property, vegetation, irrigation, and drinking water supply systems. Residential areas will not be considered for setting up camps to protect the human environment (i.e., to curb accident risks, health risks due to air and water pollution and dust, and noise, and to prevent social conflicts, shortages of amenities, and crime). Extreme care will be taken to avoid disposals near the forest, water bodies, swamps, or in areas which will inconvenience the community. All locations would be included in the design specifications and on plan drawings. Material stockpiles shall be protected by bunds during the monsoon to arrest the silt laden runoff into drains. The subproject is likely to generate soil from excavations, whichneeds to be disposed safely. The mitigation measures for handling of soil, excavated earth material and other construction wastes will be as follows:

168. **Mitigation Measures:**

(i) The excavated soil should be removed from construction area at the earliest for beneficial reuse such as land raising/ filling of excavated areas.
(ii) Soil should be covered with tarpaulin sheets during transportation.
(iii) Soil transportation should not be done during peak hours and should be avoid narrow and heavy traffic routes and important religious or tourist sites etc.
(iv) Earthen bund to be provided around the storage areas for excavated soil andother construction material.
(v) Completed earthworks to be sealed and/or re-vegetated at the earliest with the help of landscape expert.

169. **Site Selection for Source of Materials:** The material used for the construction of subproject components are mainly sand, coarse aggregate fine aggregate and gravel for construction works. Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution. To mitigate the potential environmental impacts, locations of quarry site/s and borrow pit/s (for loose material other than stones) would be included in the design specifications and on plan drawings.

170. The natural raw materials like sand, gravel and soil shall be procured/ sourced from the authorized mines listed by Tripura Government as specified in the website http://trpenvis.nic.in/test/natural_resources.html. For material like gravel and bituminous macadam that are not available in the state, the contractor shall ensure that it shall be procured/sourced from authorized mines listed by the respective state government website. The transportation of raw material from other states may cause trans-boundary pollution leading to air and noise pollution.

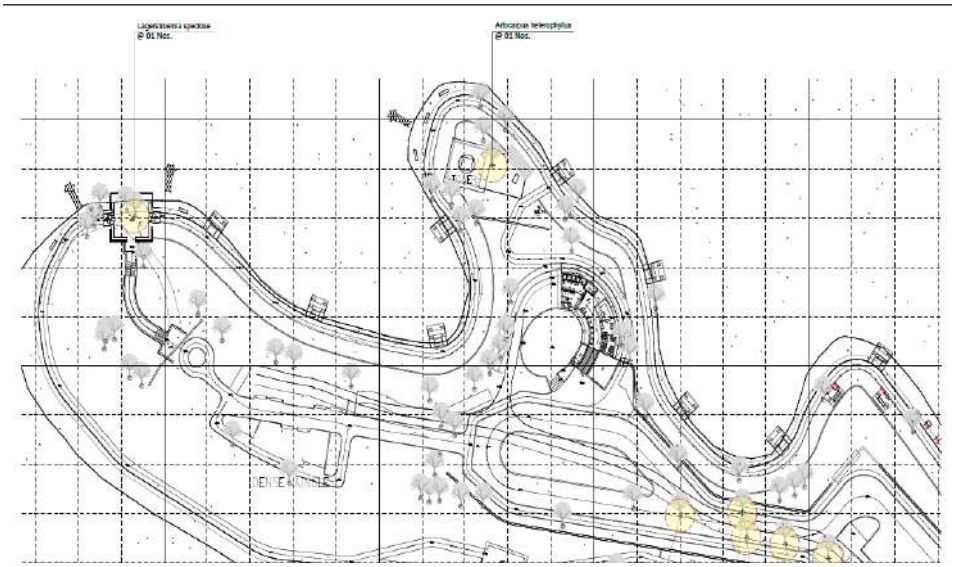
171. **Mitigation Measures:**

(i) Contractor should procure these materials only from the quarries permitted/ licensed by Mines and Geology Department, Government of Tripura;
(ii) Contractor should, to the maximum extent possible, procure material from existing authorized quarries;
(iii) The contractor shall try to procure/ source the material from the nearest possibleauthorized mines.
(iv) It will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of Department of Mines & Geology and local revenue administration; and

(v) Contractor should submit the details of sources and copies of approvals, permissions to AMC, and should start procurement only after the respective source is approved by AMC.
(vi) The transportation of raw material should be done in covered vehicles.
(vii) The vehicles used for the transportation of raw material should have valid PUC certificate and should be well maintained to avoid noise pollution.

172. **Encroachment into forestland and cutting of trees and damage to vegetation.** Construction works in the Agartala city area, MBB College lake to be revitalized and all the development will be restricted within the same boundary. No private land acquisition is requiredfor the subproject. No forest area is involved in the project. Forest Clearance from the Tripura Environment and Forest Department will be not required. Initially 7 number of trees plan to cut down. But now as per construction design all trees shall be saved. (**Figure 19)**

Figure 19: Detailed Layout showing tree cutting at MBB College lake



173. **Landscaping Plan**: The above layout shows the locations of the trees that were proposed to be cut but now there is no requirement of tree cutting as per the change in design. All the trees marked in the layout would be saved. The proposed MBB College Lake Revitalization project involves extensive landscaping with variety of native and exotic plants to add to the natural beauty of theplace, which includes plantation of 365 large trees, 450 palm trees and small, medium and largeshrubs covering an area of 16600 m^2. The tree species are selected based on the recommendations of the local forest office at Battala. This planned landscaping will improve the biodiversity of the area. The lists of trees proposed to be planted are given in **Table 25.**

Table 25: Tree plantation details

Name of Tree	Number	Name of Tree	Number
Alstonia scholaris	15	*Mesua ferra*	10
Bauhinia blakeana	10	*Morus alba*	10
Bombax ceiba	10	*Nyctanthes arbor-tristis*	5
Ceiba pentendra	10	*Peltophorum inerme*	10
Delonix regia	10	*Phyllanthus emblica*	10
Dillenia indica	10	*Plumeria alba*	10
Erythrina stricta	10	*Plumeria rubra*	10

Name of Tree	Number	Name of Tree	Number
Gardenia resinifera	5	*Pterospermum acerifolium*	10
Gmelina arborea	10	*Samanea saman*	10
Holarrhena pubescens	5	*Saraca indica*	20
Lagerstroemia parviflora	10	*Schima wallichii*	15
Lannea coromandelica	10	*Syzygium cumini/ Eugenia jambolana*	10
Litchi chinensis	10	*Tamarindus indica*	10
Madhuca longifolia	20	*Tectona grandis*	10
Magnolia grandiflora	10	*Terminalia arjuna*	5
Mallotus philippensis	5	*Terminalia Chebula*	5
Mangifera indica	10	*Thespesia populnea*	10
Michelia champaca	25	*Phoenix sylvestris Roxb.*	450

174. **Utilities:** Utilities like water supply pipelines (if any), telephone lines, electric poles, and wires within the proposed subproject locations may require to be shifted in few cases. To mitigate the adverse impacts due to relocation of the utilities, the following measures will be followed:

175. **Mitigation Measures:**

(i) Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase;
(ii) Conduct detailed site surveys with the construction drawings and discuss with the respective agencies during the construction phase, before ground clearance;
(iii) Require construction contractors to prepare a contingency plan to include actionsto be done in case of unintentional interruption of services. In case of disruption of water supply, alternative supply, through tankers, shall be provided.

176. Preparation of H&S Plan for Pandemic like COVID-19, With the existing EHS guidelines contracture has to prepare a site specific EHS plan including COVID -19 guidelines based on following principles and it get approved from PMU before staring of construction, the Contractor shall abide by the most stringent procedure available.

(i) Consistently practice social distancing.
(ii) Cover coughs and sneezes.
(iii) Maintain hand hygiene.
(iv) Clean surfaces frequently.

D. Construction Impact

177. Construction phase impacts mainly related to site clearing, earthworks, machinery and vehicles operation and workers. Construction site impacts include soil erosion, dust emission, noise generation, traffic congestion and liquid & solid waste generation. Construction impacts are short term. The various activities in the construction phase and their respective aspects andimpacts on environment are elaborated in **Table 26.** The impacts are further discussed in detail in this section.

Table 26: Activity, Aspects and Impacts during Construction Stage

Sr. No.	Phase	Impact	Remarks
1	CONSTRUCTION - Site Preparation for construction of gazebos, waiting sheds, public toilets, angling and floating decks, open area theatre, jogging track, open gym, children play area, fountain, amphitheatre, aquarium and visitor's centre	• Air pollution • Health Hazard • Soil and possible ground water contamination • Noise Pollution • Water Pollution Damage to Flora and fauna	• During construction, emission of dust and combustion gases from vehicle movement and diesel generator (DG) • Dust generation during levelling and grading • Possible fuel/oil leakage • Generation of Noise • Generation of hazardous wastes including spent lubricants, coolants and sanitary waste • Angling and floating deck construction would be in water which would affect the lake water condition • The existing flora and fauna would have to be removed for construction activity. • Workers involved in construction activity will generate waste both solid and liquid if their accommodation is nearby the site • Sludge removal activity will involve the usage of machineries and vehicles in turn disturbing flora and fauna
2	CONSTRUCTION - Shifting of materials to the site	• Air pollution • Health Hazard • Noise Pollution • Damage to Flora and fauna	• Dust emission from the vehicular movement and loose material movement for site preparation • Dust accumulation on adjacent plants and trees due to vehicle movement • Emission of combustion gases from vehicleand diesel generator (DG) • Generation of noise from vehicles and generator
3	CONSTRUCTION - Actual construction activity	• Air pollution • Damage to Flora and fauna • Impact on migratory birds • Water Pollution	• Excavation work will lead to formation of dust causing damage to nearby flora and fauna and air pollution • The addition of construction material to water body and accidental spillages may hamper aquatic life • The existing flora and fauna would have to be removed for construction activity. • Requirement for aggregate/earth. • Soil Erosion and Slumping possible if the construction material is used from the same site. • The migratory birds may not gather. • Construction waste will be generated • Land use change due to construction.
4	CONSTRUCTION - Site activities and labour camp	• Conflicts with local community; disruption to traffic flow and sensitive receptors	• The transportation of raw materials and wastes will lead to disturbance in traffic, causing comfortless to local people. • The dust and noise generated from the construction activities cause problems to sensitive receptors like MBB College, Shiva temple etc.,
5	Construction works	• Risk to human safety and occurrence of accidents. • Hindrance to accessibility.	• The construction works like excavation, welding, working at height etc., will result in occurrence of accidents due to human errors. • This will impact the workers as well as the general public visiting or residing near the site. • The haphazard disposal of construction and

Sr. No.	Phase	Impact	Remarks
			demolition waste will cause hindrance to access for visitors visiting the lake and joggers and the general public using the adjacent roads. • Handling of hot bitumen will pose risk to workers engaged at site.

178. **Air Quality**: The impact on air quality is expected in the form of dust or transportation impacts which will be minimal and temporary. Emissions from construction vehicles, equipment,and machinery used for excavation and transportation may induce impacts short term and temporary air quality impacts in the construction sites. The impact will be confined within the project boundary and is expected to be negligible outside the plant boundaries.

179. **Mitigation Measures**

(i) Dust cannot be avoided completely due to the nature of the activities during site preparation and construction. However, it can be managed by regularly spraying water at the site (particularly during the dry season), washing down vehicles as they leave the site, and sealing surfaces to the extent possible to minimize the dust.
(ii) Spraying of water on roads and dry stockpile surfaces during dry weather to reduce dust emission
(iii) The use of local construction material will be made to reduce transportation.
(iv) The demolition debris will be partly reused in the construction activity for the saidproject.
(v) The emissions from vehicles will be managed through use of vehicles in good condition.
(vi) The approach roads and vehicles will be kept in good condition to minimizeautomobile exhaust.
(vii) Ensure valid Pollution under Control (PUC) Certificates for all vehicles and equipment used in the construction activity
(viii) Tarpaulin covers shall be used over the beds of trucks which will be used fortransportation of construction material which are prone to fugitive dust emission.
(ix) Idling of delivery trucks/ equipment's will not be permitted.
(x) Provision of dust masks and periodic health check-up for workers.
(xi) Location of all construction establishments such as hot mix plants, Crusher plants,Construction camps and offices etc., shall be located at least 1 km away from thehuman habitations and preferably on the leeward side ensuring all legal requirements and standards.
(xii) Pollution control devices such as cyclone separators /scrubbers shall be installedto control emissions from hot mix plants, crushing units and concrete batching plants. Height of the stacks shall be as per the statutory requirements.

180. **Noise**: All the construction works near the MBB College Lake will be strictly conducted during the day time to avoid any disturbance to the MBB College lake ecosystem, which is rich in biodiversity. Increase in noise level may be caused by excavation, operation of equipment, transportation of equipment, materials, and people. This impact is negative but short-term, and reversible by mitigation measures.

181. **Mitigation Measures**

(i) The construction contractor will be required to plan activities in consultation with Environmental and Social Safeguard officer of PMU and PMC so that

activities with the greatest potential to generate noise are conducted during periods of theday which will result in least disturbance.

(ii) The vehicles and equipment shall be maintained properly to reduce the noise.

(iii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, to minimize sound impact to surrounding sensitive receptor.

(iv) The DG sets used for construction activities shall be with acoustic enclosures andshall meet the latest CPCB standards for noise generation.

(v) Provide prior information to the local public about the work schedule.

(vi) Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at 10 m or more from the vehicles.

182. **Surface water Quality:** The excavation activity will be avoided during the monsoon season, thus minimizing the chances of impact on surface water quality. In unavoidable case of excavation during rains, there may be temporary impacts like flooding of construction sites, mixing of construction waste and material within the runoff, etc. This may lead to silting and blockage of drains and water bodies. These potential impacts are temporary and short-term duration only and to ensure these are mitigated.

183. **Mitigation Measures**

(i) Stockpiles shall be at least 5 m from the MBB College lake water.

(ii) Stockpiles should be provided with earthen bunds.

(iii) Stockpiling shall be covered by tarpaulins or plastic sheets.

(iv) Prioritize re-use of excess spoils and materials in the construction works. If spoilswill be disposed, consult with PIU on designated disposal areas

(v) Provide temporary bunds for stockpiles and materials

(vi) Place storage areas for fuels and lubricants away from any drainage leading to water bodies

(vii) Dispose any wastes generated by construction activities in designated sites

(viii) Install temporary silt traps or sedimentation basins along the drainage leading tothe water bodies;

(ix) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;

(x) All efforts shall be maintained to use the hazardous scarified bituminous materialin the construction of approach roads and should be disposed off in the landfill or dumping into clay lined bitumen disposal pits so that that leachate does not reachthe surface or ground water and pollute.

(xi) Conduct surface quality inspection according to the environmental management plan (EMP).

184. **Groundwater Quality**: Proposed project activities do not interfere with groundwater regime, no groundwater usage/ abstraction is proposed and the activities do not affect groundwater quality.

185. **Solid waste**: 1167 cum of surplus excavated earth, 410 cum of demolished plaster, 60 cum of RCC wastes, 900 cum of existing bitumen and 32 cum of broken brick wastes will be generated due to the proposed construction. The influx of workers from other areas during the construction phase will lead to generation of solid waste from labour camps of about 32 kg/day.

186. **Mitigation Measures**

(i) The contractor will be required to prepare and implement Waste Management Plan – it should present how the surplus waste generated will

temporarily stockedat the site, transported and disposed properly

(ii) Avoid stockpiling of excess excavated soils as far as possible

(iii) Avoid disposal of any debris and waste soils in the forest areas and in or near water bodies/ ponds

(iv) Coordinate with implementing agency and AMC for beneficial uses of excess excavated soils like for in landscaping in public parks and levelling in low lying areas or immediately dispose to designated areas.

(v) The surplus excavated earth and demolition debris shall be disposed in AMC dump site at DC Nagar Lunga.

(vi) The contractor should follow the principal of Waste minimization, recycling and/or reuse

(vii) Proper disposal of non-recyclable waste

(viii) Immediate use of construction spoils and excavation spoils as filling materials Spoil Disposal Management Plan (SDMP) will be prepared and implemented to minimize the potential effects of sediment plumes on aquatic habitats. spoil management plan. Sample spoil Management plan is attached as **Appendix 10.**

187.**Impact on Ecological resource**: The construction activity consists of piling work in water at Public Zone B area. There is change in methodology of piling and now the piling would be done using floating pontoon over the lake instead of construction of Coffer dam as planned earlier. The new methodology of piling and its mitigation measures are described below. This activity will temporarily impact on the fishery of that area. After, the completion of piling work, the pontoon would be removed and the interaction between water and fishes will be back to normal. There is no cutting of trees involved. Rather, there is development Eco park zone and botanical garden will enhance the ecology in the MBB College lake area.

188.**Methodology of piling**

a. On procuring steel, winch, beam etc., fabrication of Pontoon will be done. Planned to fabricate 2 (two) nos. Pontoon fitted with mud tank, to operate 1 no. piling rig operation. Besides, the service boat would be fabricated.
b. Considering the design aspect, Pontoon shall be fabricated near the site. Then the Pontoon should be exactly set on the pile point and anchoring of the Pontoon done properly to hold the floating platform at the exact location. It should not be displaced on reasons
c. Rig to be erected and to be positioned on the Pontoon at proper pile location / point duly checked and temporary reference shall be kept at a safe distance from pile point before starting the work for cross check during boring operation.
d. For Initial Boring Liner is to be installed considering the depth of lake water plus 3 meter is to be driven and consequently 1.5-meter Liner to be added up to the required depth as per the design. The actual diameter of cutting tool/chisel/chopper will be 5 to 7 cm less than the specified pile diameter. The permanent liner will be driven up to the very soft / soft soil deposits i.e. approx up to 10 m to 12 m.
e. The centre line of the Liner shall be checked with respect to the reference points before continuing further boring as mentioned above.
f. The bore-hole is then filled with Eco-Drilling Fluid.
g. Further boring is to be done using Direct Mud Circulation Method. Chisel/ Chopper or with the sludge pump depending upon the soil strata up to the founding strata.
h. Lower of Reinforcement cage: After the founding strata is reached, reinforcement cage in suitable lengths is then to be lowered. Reinforcement bars may be welded properly with the spacer / stiffener rings to provide more rigidity to the cage. The vertical laps are joined by welding. Lowering of

reinforcement cage is done with the help of piling rig itself.

CASTING OF PILE: The method of casting pile with the tremie pipes are indicated below:

- The concreting is to be done by tremie as per clause 6.3.3 of IS-2911 (Part I/Sec 2)-1979, the tremie diameter being minimum 150 mm.
- The concrete mix shall have a slump of about 150mm to 180mm and maximum aggregate size shall not exceed 20/25mm.
- Before pouring the concrete through tremie, the bottom of the tremie funnel / hopper shall be closed with a steel plate called tremie clax.
- After the funnel is filled with concrete, the plate is to be removed and concrete is discharged.
- Thereafter, casting is done in a continuous manner up to the required level. It shall always be ensured that the bottom of the tremie pipe is always inserted at least 1.0m within the concrete to avoid contamination.
- As the concrete progresses the tremie pipes are to be removed gradually. The concrete is to be filled approximately 750mm above the cut-off level, so that good concrete is found at the cut-off level. In case the cut-off level of the pile is the same as the top of the guide casing, then the concrete shall be allowed to overflow till good concrete is visible.
- The Liner is to be kept up to below pile cap level and barge is to be removed after completion of the concreting work. Then barge is to be shifted into the next pile point and same procedure shall be continued for centering the next pile.

189.**Comparison of Methodology of piling**: Table below shows the comparison of pilling methodology as planned earlier and updated thereafter.

Earlier Piling Methodology	Present Piling Methodology
• The piling work was planned to be done in the dry area by construction of Coffer dam to prevent the entry of water into the working area. • The construction area will be dewatered after the preparation of Coffer dam. • The Coffer dam was to be constructed using bamboo and GI/ MS sheets. • Once all the water from the proposed piling area was removed, the piling will be done normally as it would be done on the land.	• The pile rig operation is to be done with the help of floating pontoon on the lake water. • The pontoon would be placed exactly set on the pile point and anchoring of the pontoon will be done. • The pile cage would be driven using a hammering method at the pile location. • Once the casing is lowered, the soil from the bore hole using drilling fluid. • The reinforcement would be lowered and concreting will be done.

190.**Comparison of impact for both the methods**: Table below shows possible impact due to present method of pilling and earlier method planned.

Impact due to Earlier Piling Method	Impact due to Present Piling Method
• This methodology was based on dewatering of the overall Public Zone B. • This would have affected the whole Public Zone B biodiversity of the lake. The flora and fauna of this zone would have damaged. • Also, it was proposed to use bentonite slurry as a drilling fluid which is not eco-friendly and	• This methodology will not require dewatering as the piling would be done using floating pontoon. • This methodology would have negligible impact on aquatic ecology as the lake water is not disturbed during the construction. • The impact on the flora and fauna would be

its disposal is difficult.	temporary only during the construction period of the pile. • Eco drilling fluid would be used as the drilling fluid.

191. The updated methodology will have negligible impact on the biodiversity as the pile rig operation would be done using pontoon. No dewatering of the Public Zone B is required here and hence, the flora and fauna of the zone will not be affected. There would be temporary impact on the biodiversity during the hammering of pile cage. The impact would be temporary and reversible. Once the construction of piles and deck is completed, the interaction of the fishes would be like the earlier condition.

192. **Mitigation Measures:**

(i) The nuisance/ spoil slurry generated during the drilling work should not fall into the water body and lakebed proper precaution should be taken to avoid it.
(ii) The spoil/ slurry produced after drilling work is done, needs to be collected stored properly away from the lake body and if possible, should be reused or disposed at specified location on day to day basis. Long-time storage near water body is not allowed.
(iii) During the concreting work, care must be taken to avoid concrete spilling into water body.
(iv) After the piling work and other construction work is done, the Contractor must ensure that no debris or waste is left back on the lakebed
(v) The piling work should be avoided during the breeding season for the fishes.
(vi) Vehicles/ Machineries should be in good condition so as to avoid spillage/ leakage of fuel, oil and lubricants which can lead to water and soil pollution.
(vii) Illumination by using powerful lights (like flood lights, search lights) should be avoided.
(viii) Environmental Monitoring should be done (Air Quality, Water Quality, Noise levels) according to Environmental Monitoring Plan during construction phase at given location near the piling work.
(ix) Use of eco-friendly materials, construction materials wherever possible.
(x) Zero construction waste discharge into lake. Disposal of any waste materials (includes solid waste, hazardous waste, C & D waste, etc.) in the water bodies shall be strictly prohibited.
(xi) Ensure that ecotone zone shall not be disturbed due to construction activity including piling work.
(xii) Contractor must ensure updated IEE\EMP compliances and other regulatory compliances listed by concerned Government Departments (Forest, Archaeology, DST & Env etc.) Department of Science Technology and Environment Guidelines shall be followed which is attached as **Appendix 14**.

193. **Impact on migratory birds**: Few species of migratory birds are observed in the MBB College lake as mentioned in the baseline chapter. Occurrences of migratory birds in the study area are mainly due to the overall ecological condition which provides them suitable habitats where they feed, rest and breed in the region. Therefore, degradation of air, soil and water quality would lead to degradation of vegetation and the overall quality of their habitats. Increased noise levels and disturbance levels would also result in their displacement from the area. Direct disturbance by presence of people, vehicle, their noise, vibrations, lights etc. can potentially displace most of the species. Therefore, it is recommended that ASCL and contractor shall take utmost care during construction period to minimize disturbance levels due to vehicle movement,controlling noise levels, avoiding construction during night hours.

194. **Mitigation Measures**

(i) To avoid disturbance to the breeding area of migratory birds, the northeast monsoon season should be avoided for heavy construction activities.
(ii) The area around MBB College lake shall not be disturbed or damaged during transportation of vehicle and materials, storage or parking, workers camps, trespassing etc. activities during construction and operational phases.
(iii) Strict control on dust pollution using various methods and technologies shall be carried out. During construction, operation, phases water sprinkling on haul roads,overburden and soil dumps shall be carried out regularly to control dust pollution.
(iv) Vehicle movements during construction and operation phases shall be restrictedto bare minimum to avoid any direct disturbance to the surrounding area.
(v) Ambient noise pollution and vibrations during construction and operation phases shall be within limits of the standards mentioned.
(vi) Ensure zero discharge of solid waste from the project site into the MBB College lake and its surrounding area.
(vii) Ensure safe passage of runoff through drainages located nearby the project area.
(viii) Batching plant shall be kept away from MBB College lake.
(ix) Construction workers and other staff during construction or operational phase shall not be involved in poaching and hunting activities of birds, reptiles or mammals around the project site.
(x) No resources (i.e. fuel wood, stones, sand, soil etc.) from areas surrounding MBB College lake shall be collected by staff or workers. This shall be instructed to theworkers and staff in advance.

195. **Construction and Demolition waste**: Construction debris/ waste is generated due to demolition of some existing structures like watch tower and pathways. The watch tower is a steel structure and is not more than 20-year-old structure, approximately 2.5 MT of scrap steel will be generated after its demolition. Careless disposal of debris can obstruct waterways causing siltation of reservoirs and reduce capacity. Unleaded demolition wastes will cause traffic blockage and dust causing inconvenience and health risks. **Figure 20** shows existing watch water which will be demolished.

Figure 20: Existing Watch Tower to be demolished

196. **Mitigation measures:**

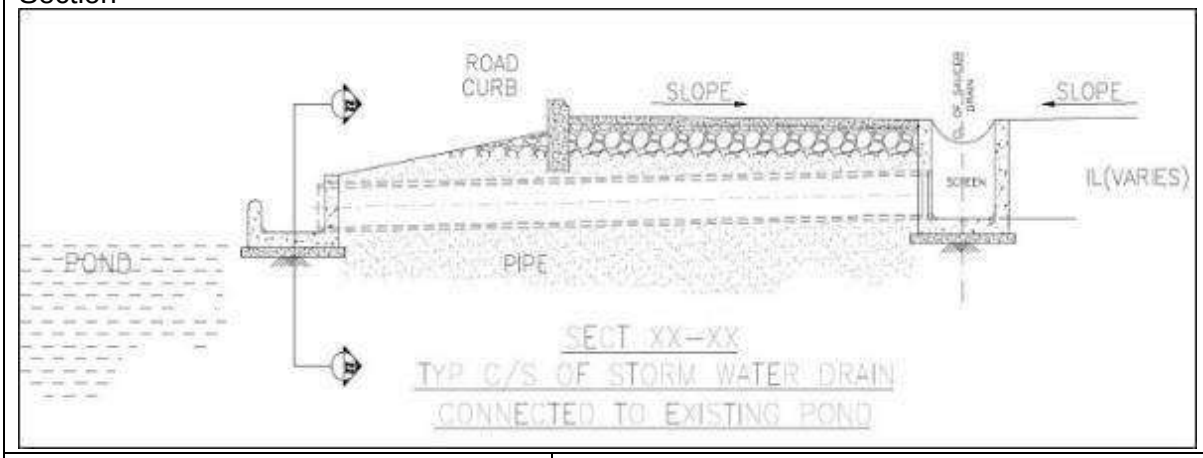
(i) The maximum amount of the construction and demolition waste generated from the subproject will be utilized in construction works and the balance amount will be send to the DC Nagar Lunga Site C&D waste management site owned by AMC, for its re-used for future construction activities.

(ii) Out of the total excavated earth of 7872 cum, of which 6696 cum h will be reused in construction works and the rest will be stored as the DC Nagar Lunga site for future use.

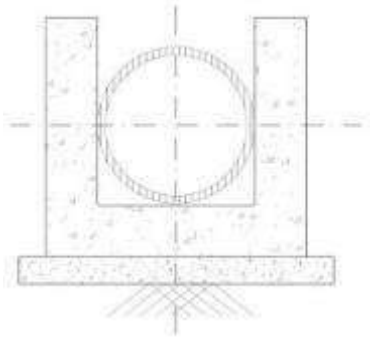
197. **Impact on Hydrology and Drainage during Construction Phase**: Construction activities and embankments may act as a barrier to the flow of runoff water. To ensure the properflow of storm water and to discourage pounding within the site, appropriate grading of the existingtopography shall be done. The proposal puts forward the use of saucer drains on the side of theupward slope along the pathway. It serves the dual functions of reducing the edge erosion as well as to direct the water into catch basins equipped with a screen to prevent the egress of solid waste into the lake, which behaves as a natural reservoir for the watershed. The catch basins shall be having a removable cover to enable cleaning as the part of the regular maintenance schedule. The **Figure 21** show the typical sections of the proposed storm water saucer drain.

Figure 21: Typical Section of storm water saucer drains at MBB College Lake

Section



Section (Z-Z)



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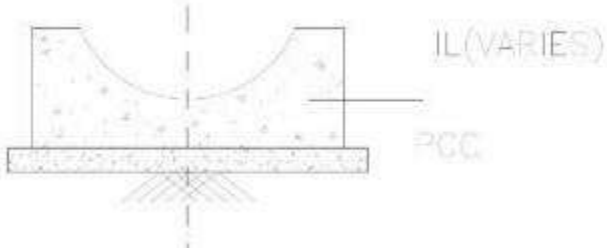

198. **Accessibility**. Hauling of construction materials and operation of equipment on-site cancause traffic problems. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

199. **Mitigation Measures:**

(i) Plan transportation routes so that heavy vehicles do not use narrow local roads,except in the immediate vicinity of delivery sites;
(ii) Schedule transport and hauling activities during non-peak hours;
(iii) Locate entry and exit points in areas where there is low potential for trafficcongestion;
(iv) Keep the site free from all unnecessary obstructions;
(v) Drive vehicles in a considerate manner;
(vi) Coordinate with Traffic Department for temporary partial closure of MBB college road (near public zone B) diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; and
(vii) Notify affected sensitive receptors by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.
(viii) Sample Traffic Management Plan is attached as **Appendix 11**.

200. **Socio-Economic – Income**. The subproject components will be in Government land. Construction works will impede the access of residents to specific site in limited cases. The potential impacts are negative and moderate but short-term and temporary.

201. **Mitigation Measures:**

(i) Leave spaces for access between mounds of soil;
(ii) Provide walkways and metal sheets where required to maintain access across forpeople and vehicles;
(iii) Consult businesses and MBB College regarding operating hours and factoringthis in work schedules; and
(iv) Provide sign boards for pedestrians to inform nature and duration of constructionworks and contact numbers for concerns/complaints.

202. **Socio-Economic – Employment**. Approximately 80 workers will be required during the 18-months construction stage. This can also result to generation of contractual employment and increase in local revenue. Thus, potential impact is positive and long-term.

203. **Mitigation Measures:**

(i) Employ at least 50% of the labour force, or to the maximum extent, local persons within the 2 km immediate area if manpower is available; and
(ii) Secure construction materials from local market.

204. **Occupational Health and Safety**. Workers need to be mindful of the occupational hazards which can arise from working in height, working within water and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures.

205. **Mitigation Measures:**
(i) Comply with all national, state and local labor laws**;**
(ii) Following best practice health and safety guidelines: IFC's General EHS Guidelines,[15] ADB's Interim Guidelines (**Appendix 22)** for COVID WHO Interim Guidance (and its updates) on Water, Sanitation, Hygiene and Waste management for the COVID19 virus (**Appendix 21**) and Sector Specific (Water and Sanitation) Guidelines;[16]

[15] https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES
[16] https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-

(iii) Develop and implement site-specific Health and Safety (H&S) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use Personal Protective Equipment; (c) H&S Training[17] for all site personnel; (d) documented procedures to be followed for allsite activities; and documentation of work-related accidents;
(iv) Strict compliance of H&S plan and requirements of wearing personal protectiveequipment (PPE) during work hours;
(v) Provide specific guidance for suitable PPE for every on-site work assignment.
(vi) Ensure that qualified first-aid is provided at all times. Equipped first-aid stationsshall be easily accessible throughout the site;
(vii) Provide medical insurance coverage for workers;
(viii) Secure all installations from unauthorized intrusion and accident risks;
(ix) Provide supplies of potable drinking water;
(x) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
(xi) Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection,and preventing injuring to fellow workers;
(xii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s donot enter hazard areas unescorted;
(xiii) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
(xiv) Ensure moving equipment is outfitted with audible back-up alarms;
(xv) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the generalpublic as appropriate; and
(xvi) Disallow worker exposure to noise level greater than 85 dBA for duration of morethan 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.
(xvii) Life jackets shall be available and use by the workers during work within the lake.

206. ASCL Health and safety plan in response to COVID-19 will be an integral part of the environmental management plan (EMP).

(i) The H&S plan may be updated as and when new guidelines are issued by the governments, and international organizations such as WHO and ADB.
(ii) Contractor will be advised to prepare site-specific plan compliant with government circulars, guidelines and public health advisories, elaborating the arrangements and measures for implementation of the H&S plan.
(iii) These site-specific plans should be shared with ADB after ACPL approval.

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[17] Some of the key areas that may be covered during training as they relate to the primary causes of accidents include slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence, butit does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective, and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

In accordance with the government guidelines, the respective agreed measures arein place before start of activity at project sites and congregation of workers at the project site and camps. The implementation of the contractor's approved site- specific plans is properly monitored by the project consultants and the PMU/PIUs.

207. **Maintaining Core Labour Standard**. The Contractor and ASCL are responsible for ensuring that international CLS[18] –as reflected in national labor laws and regulations are adhered to. ASCL is ultimately responsible for monitoring compliance with national labor laws and regulations, provided that these national laws are consistent with CLS. ADB will carry out due diligence – during loan review missions – to ensure that executing and implementing agencies and contractors comply with applicable (national) core labor standards and labor laws. ASCL will ensure that bidding and contract documents include specific provisions requiring contractors to comply with all: (i) applicable labor laws and core labor standards on: (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity or caste; and (c) elimination of forced labor; and (ii) the requirement to disseminate information on sexually transmitted diseases including HIV/AIDS to employees and local communities surrounding the project sites. These will be monitored as part of the project's safeguards reporting requirements.

208. **Community Health and Safety.** Hazards posed to the public, specifically in high footfall density areas may include traffic accidents and vehicle collision with pedestrians. In most of the cases location of project sites are along the road ways, hence safety risk to community is to be considered with special emphasis to children, women and elderly.:

209. **Mitigation Measures:**

(i) Provide barricades in all construction sites, especially near excavations to avoid entry of people specially children.
(ii) Ensure that the traffic diversion plans are developed considering high footfall ofwomen, children and elderly like schools, temples and hospitals etc.
(iii) Ensure that no working equipment's should be kept unattended.
(iv) Plan material and waste routes to avoid times of peak-pedestrian activities specially time of school in residential areas.
(v) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure
(vi) Provide road signs and flag persons to warn of dangerous conditions for all the work sites along the roads.

210. **Work Camps**. Operation of work camps can cause temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants. Potential impacts are negative but short-term and reversible by mitigation measures.

211. **Mitigation Measures:**

(i) Total around 80 workers are expected for construction work. Contractor shall setup toilets with septic tank and soak pit at labour camp. There will be

[18] Core Labor Standards (CLSs) are a set of four internationally recognized basic rights and principles at work: (i) freedom of association and the right to collective bargaining; (ii) elimination of all forms of forced or compulsory labour; (iii) effective abolition of child labor; and (iv) elimination of discrimination in respect of employment and occupation.

generation of around 32 kg per day of solid waste and 8.64 KLD of sewage from the labour camps.

(ii) Contractor shall arrange potable drinking water for workers in camp.

(iii) Shall provide adequate number of separate toilets for male and female workers.

(iv) Contractor shall provide bins for storage of solid waste and hand over the collected solid waste to AMC collection vehicles for processing.

(v) Fuel provision shall be made available in camp like LPG so that no tree cutting isinvolved for fuelwood.

(vi) Take extreme care in selecting sites to avoid direct disposal to water body whichwill inconvenience the community.

(vii) For excess spoil disposal, ensure (a) site shall be selected preferably from barren,infertile lands. In case agricultural land needs to be selected, written consent fromlandowners (not lessees) will be obtained; (b) debris disposal site shall be at least 200 m away from surface water bodies; (c) no residential areas shall be located within 50 m downwind side of the site; and (d) site is minimum 250 m away from sensitive locations like settlements, ponds/ lakes or other water bodies.

(viii) Consult with ASCL/ PIU before locating project offices, sheds, and construction plants.

212. **Social and Cultural Resources.** For this project, excavation will occur at locations known not to have archaeological values, so it could be that there is a low risk of such impacts. Nevertheless, the construction contractor will be required to:

213. **Mitigation Measures:**

(i) Follow the protocol for chance finds (**Appendix 20**) in any excavation work;

(ii) Create awareness among the workers, supervisors and engineers about the chance finds during excavation work;

(iii) Stop work immediately to allow further investigation if any finds are suspected;

(iv) Inform local Archaeological Department / Museum office if a find is suspected; take any action they require ensuring its removal or protection in situ.

214. **Sensitive Receptors**: Since the work is being conducted in an urban sensitive area where there are colleges (MBB College, Law College) and religious centre (Shiva Temple), the excavation works along the MBB College lake will create nuisance and health hazard. The measures suggested under various heads in this section will minimize the impact in general in all areas; however, special attention is necessary at these locations. Following measures shall be implemented in 250 m around the sensitive locations (Colleges and religious centres)

215. **Mitigation Measures:**

(i) No material should be stocked in this area; material shall be brought to the site as and when required

(ii) Conduct work manually with small group of workers and less noise; minimize useof equipment and vehicles

(iii) No work should be conducted near the religious places during religious congregations

(iv) Material transport to the site should be arranged considering school timings; material should be in place before school starts;

(v) Notify concerned colleges 2 weeks prior to the work; conduct a 30-minute

awareness program on nature of work, likely disturbances and risks and construction work, mitigation measures in place, entry restrictions and dos and don'ts

(vi) Implement all measures suggested elsewhere in this report – dust and noise control, public safety, traffic management, strictly at the sites.

216. **Night time Work Safety:** During construction at Night time following mitigation should be taken:

- Limit construction activities at night. When necessary, ensure that night work is carefully scheduled, and the community is properly informed so they can take necessary measures. Consult community regarding appropriate timing of noisy activities and avoid noisy activities at night. Use noise-control methods (barriers/ shelter/ muffling devices) and maintain a buffer zone if possible. Minimise project transportation, particularly heavy vehicles, through residential areas. Use of high noise generating equipment shall be stopped during night time
- Safety gear can greatly affect worker visibility. The decision and manoeuvre distance – how long it takes a driver to notice the worker and make any path or speed changes – is over 5 times greater with reflective clothing than with regular, dark-coloured – or even orange-coloured – clothes. With this increased decision and manoeuvre distance, workers, motorists, and equipment are much less likely to have a collision – chances of damage, injury, or death are reduced.
- Reflective clothing isn't the only available technique to increase visibility at night. Flashing lights on a worker's body or clothing, reflective tape on equipment, and especially proper work area lighting are all good ways to increase visibility.
- Proper lighting at night includes several different levels and designations of lighting. In order to understand appropriate lighting levels for night work, we first need to talk about how it is measured. Lighting is typically measured by what are called "foot-candles". One foot-candle is the luminance cast on a 1 square foot surface by a single candle's light.
- Visibility & Training: There are two main ways to ensure that motorists and workers experience the safest possible night-time work zone. First is proper safety training, and second is improving visibility throughout the work zone and especially at critical areas like traffic control workers' stations and on any people or equipment.
- Through proper training and lighting, night time construction can happen as safely as construction in the daytime. This allows contractors and agencies to take advantage of working with fewer delays for the travelling public and for construction workers to work more safely in lower volume traffic.

E. Guidelines for COVID -19

217. Construction sites operating during the Covid-19 pandemic need to ensure they are protecting their WORKFORCE and minimizing the risk of spread of infection by strictly followingthe pre-approved EHS plan including COVID – 19 guidelines. The COVID -19 guidelines must updated strategies and recommendations for employers responding to COVID-19 including:

(i) Conducting daily health checks
(ii) Conducting a hazard assessment of the workplace
(iii) Encouraging employees to wear cloth face coverings in the workplace, if appropriate
(iv) Implementing policies and practices for social distancing in the workplace
(v) Updated cleaning and disinfection guidance
(vi) Updated strategies and recommendations that can be implemented now to

respond to COVID-19

(vii) A table outlining the engineering controls, administrative controls, and personal protective equipment (PPE) that employers may use to help prevent the spread of COVID-19 in the workplace

(viii) Persons/Labourers showing COVID-19 symptoms or not providing self-attestationshall be directed to leave the work site and report to the fever clinic/quarantine centre immediately. Labour not to return to the work site until cleared by fever clinic/quarantine centre.

F. Workers Camp

218. Masks (homemade[19] can be thought of) to be provided to all the persons/labourers for use at the camp site as well as at the worksite. Increase cleaning/disinfection visits to at least 2times a day. Cleaning person(s) to be provided with disposable gloves, gown and face mask foreach cycle of cleaning.

G. Updates on COVID-19

219. The Contractor shall be in touch with the Department of Health & Family Welfare and Labour Department to identify any potential worksite exposures relating to COVID-19, including:

(i) Strictly follow the guidelines issues by Ministry of health and OSHA

(ii) Other workers, vendors, inspectors, or visitors to the worksite with close contactto the individual

(iii) Labour Camps / Work areas such as designated workstations or rooms /sheds

(iv) Work tools and equipment

(v) Common areas such as break rooms, tables and sanitary facilities

(vi) PMU to ensure all government staff, Consultant and Contractor personal have Aarogya Setu app, developed and recommended by GOI for tracking COVID-19 patients.

H. Training

a. PMU to ensure all workers get training on above requirements before start of anyconstruction activity.

b. During construction period frequent visual and verbal reminders to workers can improve compliance with hand hygiene practices and thus reduce rates of infection. Handwashing posters should also be displayed at work site and labourcamps.

I. Emergency contact

a. Provide emergency contact number at work site and labour camp for reportingCOVID-19 symptoms.

J. Operation and Maintenance Impact

220. The operational impacts of the proposed project are beneficial and have positive impacton the people in general, society, economy and health and sanitation of the project are, resultingin overall improvement. The conservation of nature in an urban environment has direct impact on people and has many health benefits.

[19] Advisory on use of Homemade Protective Cover for Face & Mouth by GOI.

221.There are some negative impacts during the operation stage of the MBB College Lake due to the influx of visitors' population which is estimated to be around 1000 people per day., the impacts and mitigation measures are listed in **Table 27.**

Table 27: Mitigation Measures – Operation phase

Sr. No.	Activity	Impact	Mitigation measures
1	Influx of visitors due to increased recreational amenities	Fall hazard and other unsafe acts and conditions	• As a measure to restrict the access of MBB College lake to designated areas and to ensure the safety of people moving in the pathways and public zones, railings shall be provided at o Public Zone A o Public Zone B o Along elevated walkway and fountain plaza o Along lake view seating o In Botanical Garden • Rescue divers and lifejackets shall be available at all the times in MBB College lake area
		Probability of Snake bite	• Regular maintenance and monitoring • Provision of anti-venom kit and training for the same to the working staff and security.
		Water Pollution due to 12 KLD sewage generation	• The existing toilet block near cafeteria shall be refurbished and be provided with Septic Tank and soak pit. • Sewage generated from proposed E toilet block in Eco-Park Zone shall be treated using biodigester. • The contractor shall ensure the proper functioning of the toilet blocks and the sewage treatment facilities. • In no circumstances the sewage generated from the toilets shall flow to the MBB College lake. • Water quality of the MBB College lake to be monitored as per monitoring plan • Sludge generated from bio digestors and septic tank will be cleaned by AMC.
		Disturbance to Migratory Birds	• The commercial surface water activities like swimming, boating, etc. shall be confined to the commercial zone of site plan to maintain the ecological integrity of the site. • No night-time activity shall be permitted at the site. • Water quality of the MBB College lake shall be maintained by avoiding any time of wastewater entering to the water body, and regular monitoring of the water quality. • Adequate solid waste management at the site shall be ensured for improved water quality.
		Disturbance to aquatic ecosystem	• The commercial surface water activities like swimming, boating, etc. shall be confined to the • Commercial zone as shown of site plan to maintain the ecological integrity of the site.
		Generation of 50 kg of Solid waste due to tourist's footfall. Environmental pollution - Potential impact on soil, groundwater, and surface water nearby	• Roadside bins shall be provided in the lake area for visitors to dump the waste. • Dedicated Bins shall be provided for the waste collection from cafeteria and eateries • A total of 70 twin litter bins (80 liters) are recommended to be placed along road side. • For sweeping purpose, 4 full time sweepers should be employed to ensure the cleanliness of the

Sr. No.	Activity	Impact	Mitigation measures
		the disposal site	surrounding area. Sweepers to be equipped with broom, dust pan, safety jacket, safety mask, gloves, shoes and a 120-liter two wheeled HDPE bin. • Four bins of 1100 liter capacity shall be placed to collect all the waste generated in MBB College lake premises and eventually transfer it to waste collection vehicle of AMC. • The place should be declared as 'No Plastic Zone'
		Air pollution from vehicle movement increased due to increase in number of visitors and traffic congestion.	• Traffic shall be diverted properly to avoid congestion • Parking facility shall be available with appropriate entry and exit space • Air quality around MBB College lake to be monitored as per monitoring plan

VI. PUBLIC CONSULTATION, PARTICIPATION AND INFORMATION DISCLOSURE

A. Overview

222.The active participation of stakeholders including local community, NGOs/CBOs, and themedia in all stages of project preparation and implementation is essential for successful implementation as well as operation of the project. It will ensure that the subprojects are designed, constructed, and operated with utmost consideration to local needs, ensures community acceptance, and will bring maximum benefits to the people. Public consultation and information disclosure are a must as per the ADB SPS 2009.

223.**A three-tier consultation process has been adopted**: focus group discussions, primary household sample surveys and a town-level public consultation workshop. Most of the main stakeholders have already been identified and consulted during preparation of this IEE, and any others that are identified during project implementation will be brought into the process in the future. Primary stakeholders of the subproject are: residents, shopkeepers and businesspeople who live and work alongside the roads in which network improvements will be provided, and government and utility agencies responsible for provision of services, Agartala municipal corporation, Public Health Engineering Department and Tripura State Pollution Control Board. Secondary Stakeholder are: NGOs and CBOs working in the area, community representatives, beneficiary community in general, government agencies, the executing and implementing agencies, Government of India and the ADB.

B. Public Consultation

224.The public consultation and disclosure are a continuous process throughout the project implementation, including project planning, design and construction. During IEE preparation stage, public consultations were conducted near MBB lake and other part of town to access theawareness of general public, present use of lake, safety and security problems at lake area, lackof public utilities, migratory and local plants and bird's species, other suggestions. Local residents, business persons (vendors, hawkers, shopkeepers etc.), college staff and students Government officials, women residents were consulted during public consultations in April 2018 and October 2018. Further, the public consultation due to (a) night works at some sections under the Project; and (b) change of construction methodology (now, the piling work would be done using floating pontoon over the lake) under the Project has also been done in the month of November 2022.The proposed facilities will cover the entire MBB lake area and the people consulted were all residents or

workers of nearby area of MBB lake and are direct beneficiaries. Details of public consultations done are given in **Appendix 12.**

225. **Public Participation during the Preparation of the IEE** Public consultation and participation is an integral part of IEE study. The process involves identifying interested and affected people (stakeholders); informing and providing the stakeholders with sufficient background and technical information regarding the proposed development; creating opportunities and mechanisms whereby they can participate and raise their viewpoints (issues, comments and concerns) with regard to the proposed development; giving the stakeholders feedback on process findings and recommendations; and ensuring compliance to process requirements with regards to the environmental and related legislation.

226. Stakeholders are representatives of the society who have direct (primary stakeholders) or indirect (secondary stakeholders) impacts from the project and are involved in one or other way.

227. Primary stakeholders are:

(i) Residents, workers, shopkeepers and businesspeople near the work sites
(ii) Public representatives of the town.
(iii) Agartala Municipal Corporation.
(iv) Agartala Smart City Limited.

228. Secondary Stakeholders are:

(i) Other concerned government institutions (Pollution Control Board).
(ii) MBB College and Higher Education Department.
(iii) Forest Department.
(iv) NGOs working in the affected communities
(v) Other community representatives (prominent citizens, religious leaders, elders,women's groups)
(vi) The beneficiary community in general
(vii) Members of the Angling society
(viii) ADB as the funding agency.

229. The following methodologies are used for carrying out public consultation:

(i) Local communities, Individuals affected to be given priority while conducting public consultation;
(ii) Walk-through informal group consultations along the proposed project area;
(iii) The local communities to be informed through public consultation with briefing onproject interventions including its benefits; and
(iv) The environmental concerns and suggestions made by the participants to be listed out, discussed and suggestions to be noted for consideration during implementation.

230. **Stakeholder meetings**: Most of the stakeholders have already been consulted during the preparation of this IEE and any others that are identified during the project implementation will be brought into the process in the future. Photographs, attendance sheets and Minutes of the recent stakeholder consultation meeting held on 26th November, 2018 and 5th November 2022 is attached as **Appendix 12.**

C. Consultation and Disclosure

231.A series of public consultation meetings were conducted during the site visits in November and December 2018. Various forms of public consultations (consultation through adhoc discussions on site) have been used to discuss the project and involve the community inplanning the project and mitigation measures. Public consultations were done on 16-11-2018 in MBB College lake area, MBB college involving students, locals and members of Lake Angling and Aquatic Conservation Society of Tripura. There were around 35 male members and 16 female members were consulted and appraised about the project. The objectives were to appraise the stakeholders about the program's environmental impacts and present safeguards to mitigate any potential significant impacts. Another consultation was done with group likely to be affected, that of the users of the Ghat which consists of flight of steps constructed near the entrance of the MBB College and is used for bathing and washing clothes. The members have expressed their happiness and approval for the proposed project informing the project will help in attracting more tourists and improve the overall scenic beauty of the MBB College lake area. They insisted that all the precautionary measures shall be taken to avoid the noise generation from the construction project and siltation of the lake shall be avoided as the lake is used for fishing and bathing. Records of public consultations and group meeting are attached as **Appendix 12.**

232.The stakeholders have appreciated the proposal of government and they have ensured that they will cooperate with the EA during project implementation. They want the project to be started immediately. The major issues raised during the public consultations are summarized asfollows:

(i) Proposed project should improve the existing condition of the MBB College lake.
(ii) There should be no disturbance to the nearby residents due to the noise generated during construction activities.
(iii) The traffic should be planned properly during construction to ensure minimumdisturbance to residents and nearby institutions.
(iv) The waste generated during the construction activity should be managed appropriately.
(v) The Anglers society informed that the construction of new fishing deck is wellaccepted, and the construction should start.
(vi) Efforts should be made by the government to maintain the lake in long term.
(vii) The students of MBB college informed that the MBB College lake should be improvised in recreational aspects.
(viii) The female students of MBB college informed that the security aspects of MBBCollege lake should be improvised for easy movement of people of all genders.
(ix) Local people should be employed by the contractor during construction work;
(x) Adequate safety measures should be taken during construction work;
(xi) People expressed their cooperation as the proposed activities are supposed toenhance the living standard of the public.
(xii) People asked for notice before construction and proper warning signs along the construction area to avoid accidents and inconvenience
(xiii) The residents using bathing area confirmed that it is for recreation during summer season and they would like to continue the same after the development.
(xiv) The people washing clothes in the bathing area were explained the harmful impact of detergents on the aquatic ecosystem.

233.The outcomes of the public consultation held at all the locations were integrated into

the design of the MBB College lake like special arrangement of CCTV surveillance, night time lighting of the pathways etc. to ensure safety aspects, fishing decks for Anglers. Provision of recreational facilities as per the request of MBB college students and nearby residents.

234. PMC representatives had a meeting with Associate Professor, Department of Zoology, MBB College on 24-04-2018. The college officials were informed about the proposed MBB College Lake Revitalization project, and its benefits. The college authority was requested to share the list of existing flora and fauna in and around MBB college to understand the biodiversity of the lake precinct. A list of existing plant species was shared by HOD (Department of Botany, MBB College). The list is attached as **Appendix 18**. While planning the Botanical Zone of MBB College the existing plant species as per the above provided list were taken into consideration.

235. As per Tripura Forest Department, Government of Tripura website, the MBB College lake is identified as wetland important from the point of view of Bio-diversity conservation and centers of socio-economic values and potential sources of eco-tourism in the state. The lake is ranked 3 and categorized as medium use. However, the lake is not identified as wetland under Wetland Conservation and Management Rules 2017. The Sub-Divisional Forest Officer (S-DFO), Mr. C K Bardhan Sadar, Forest Sub Division was requested vide letter dated 28-06-2019 (letter attached as **Appendix 13**) to share the present wetland status of MBB College lake. S-DFO appraised that currently the lake is not a listed wetland as per the Wetland Conservation and Management Rules 2017, so no NOC is required for the proposed subproject. Further Sub divisional Forest Officer Sadar send letter (on 17.06.2022) to West district DFO to provide necessary guidance to ASCL for conservation of wetland during execution of the project (**Appendix 13**). Clarification provided by Forest Dept. and Tripura State pollution control board and instructed to follow DST guideline for protection and preservation of lake during implementation of the project (**Appendix 13**). PMC should ensure that the construction should follow the draft guidelines of Department of Science,Technology and Environment for protection and preservation of lakes and water bodies vide letter No F.11 (35)/ DSTE/CC/Pt-1/ 3813-24 dated 24-05-2017 (attached as **Appendix 14**). These design guidelines are duly adhered in the subproject design.

236. PMC representatives met Mr. Harshkumar C, IFS, DCF HQ and Sooryanarayan B, IFS, DCF (IT & Stat) FHQ on 23-07-2019 regarding the forest land status of MBB College Lake area,the status was checked in IT cell of forest department GIS Map and it was confirmed that the proposed MBB College Lake Revitalization area is not falling under any forest category.

237. The Hon'ble Tripura High Court in its order dated 16-08-2016 has asked Government of Tripura to set up a committee and come up with the guidelines to preserve the water bodies of Tripura state. Accordingly, Government of Tripura vide its notification dated 24-05-2017 stipulated, "Statutory Guidelines for protection and preservation of Lakes, Ponds and water bodies in Tripura". The proposed project shall adhere to these guidelines, these guidelines states that permanent structures like RCC wall, Concrete wall and Brick wall should be avoided at the pond banks and free movement of water and aquatic life to be provided. Subsequent to this judgment and notification, for monitoring water bodies, a Sub Division wise Committee consisting of representatives of the concerned department (owner of the water bodies), Forest Department, Fishery Department, Tripura State Pollution Control Board (TSPCB) and exert from Fishery College is formed vide MO dated 11-04-2018 which states that the committee shall periodically check the water quality with the help of TSPCB and take necessary action for maintaining the ecosystem of the water body. Based on this MO, PMC representatives met Mr. Animesh Das, Director, Department of Science and Technology, on 25th July 2019, he informed that No Clearance is required from the Department of Science and Technology in this regard as the guideline for protection of

water bodies and lakes in Tripura State is in draft stage and once the guideline is released in public domain it shall be followed for all such activities.

238. It was observed that people are willing to extend their cooperation as the proposed activities are supposed to enhance the infrastructure service levels and the living standard of the public. The proposed project is a need of the town. Locals are very much in favor of the project and they want that this should be completed as early as possible. People are ready to extend alltypes of support to during execution of the project. Few people expressed their concern regarding the nuisance and disturbance (dust, road closure and traffic management activities) during the construction stage which can have impact on their day to day activities. Public demanded for advance notice before construction and proper warning signs along the construction area to avoid accidents and inconvenience.

D. Future Consultation and Disclosure

239. The public consultation and disclosure program will remain a continuous process throughout the subproject implementation and shall include the following:

1. Consultation during Construction

240. Prior to start of construction, AMC and PIU with the assistance of PMC will conduct information dissemination sessions at major intersections and solicit the help of the local community leaders/prominent citizens to encourage the participation of the people to discuss various environmental issues. At each ward/ neighbourhood level, focus group meetings will be conducted to discuss and plan construction work with local communities to reduce disturbance and other impacts, and provide a mechanism through which stakeholders can participate in project monitoring and evaluation.

241. A constant communication will be established with the affected communities to redress the environmental issues likely to surface during construction and operational phases and also regarding the grievance redress mechanism. AMC/PIU with the help of PMC will organize public meetings and will appraise the communities about the progress on the implementation of EMP. Meeting will also be organized at the potential hotspots/sensitive locations before and during the construction.

242. Public meetings with affected communities (if any) to discuss and plan work programs and allow issues to be raised and addressed once construction has started.

243. Smaller-scale meetings to discuss and plan construction work with local communities to reduce disturbance and other impacts and provide a mechanism through which stakeholders can participate in subproject monitoring and evaluation.

244. During construction, increased traffic, excess generation of dust and noise due to construction activities may cause some inconveniences to the local population. Mitigation measures are already considered in the IEE to keep this at a minimum. Community consultationshave already been carried out. During construction, multiple consultations at various levels will be carried out ensuring clear communication to the affected persons about the likely transient impact during construction and continued impact, if any, during the operation stage.

2. Information Disclosure

245. Executive summary of the updated IEE will be translated in the local language and made available at the offices of AMC, PMU and PIU. Copies of summary will be provided to participants of city level workshop to be organized in Agartala. Hard copies of the updated

IEE will be accessible to citizensas a means to disclose the document and at the same time creating wider public awareness. Electronic version of the updated IEE in English and Executive Summary in Bengali will be placed in the official website of the AMC after approval of the updated IEE by Government and ADB. Stakeholders will also be made aware of grievance register and redress mechanism.

246. Public information campaigns (via newspaper, TV and radio) to explain the project to the wider city population and prepare them for disruption they may experience once the construction program is underway; Formal disclosure of completed project reports by making copies available at convenient locations in the city informing the public of their availability, and providing a mechanism through which comments can be made.

247. Local communities will be continuously consulted regarding location of construction camps, access and hauling routes and other likely disturbances during construction. The road closure together with the proposed detours will be communicated via advertising, pamphlets, radio broadcasts, road signage, etc.

248. Project related information shall be disclosed through public consultation and making relevant documents available in public locations. PMU and PIUs shall provide relevant safeguards information in a timely manner, in an accessible place and in a form and languages understandable to affected person and other stakeholders. For illiterate people, other suitable communication methods will be used.

249. The following documents shall be made available at the offices of project agencies - PMU,PIU and ULB offices for public reference and shall also be uploaded on respective websites.

(i) Summary of project and draft IEE (in Hindi and English)
(ii) Draft IEE Report (in English)
(iii) Final IEE Report (in English)
(iv) Updated/amended IEE (in English)
(v) Corrective action plan prepared during project implementation (English)
(vi) Semi-annual Environmental Monitoring Reports (English)

250. A concise summary of project and updated IEE report (in Bengali), providing all necessary details of proposals, implementation arrangements, subproject locations, likely issues and mitigation and monitoring measures and grievance redress mechanism, shall be made availableto the stakeholders at consultation meetings. This should also provide contact information of project agency. This summary shall also be displayed at the notice boards of PMU, PIU and other public places. During project implementation, relevant information about any major changes to project scope will be shared with beneficiaries, affected persons, vulnerable groups,and other stakeholders. The following documents will be submitted to ADB for disclosure on ADB website. PMU will send written endorsement to ADB for disclosing these documents: Documents will also be available on the website of Agartala Smart City website.

(i) Final IEE;
(ii) a new or updated IEE and corrective action plan prepared during projectimplementation, if any; and
(iii) environmental monitoring reports

VII. GRIEVANCE REDRESS MECHANISM

A. Common Grievance Redress Mechanism (GRM)

251. A common grievance redress mechanism (GRM) has been put in place (**Appendix 15**) to receive, evaluate,and facilitate the resolution of social, environmental or any other project related grievances. The GRM aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project. The GRM described below has been developed in consultation with stakeholders. Public awareness campaign will be conducted to ensure that awareness on the project and its grievance redress procedures is generated. The campaign will ensure that the poor, vulnerable and others are made aware of.

252. The GRM provides an accessible, inclusive, gender-sensitive and culturally appropriate platform for receiving and facilitating resolution of affected persons' grievances related to the project. The multi-tier GRM for the project is outlined below, each tier having time-bound schedules and with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required. ULB-wide public awareness campaigns will ensure that awareness on grievance redress procedures is generated through the campaign. The Environmental and Social Safeguard Officer of PMU have the overall responsibility for timely grievance redress on environmental and social safeguards issues.

253. **Who can complain:** A complaint may be registered by stakeholders who may be, "directly, indirectly, materially, and adversely" affected by the project. Any other representative can register a complaint on behalf of the affected person/s or any stakeholder by, provided that he or she identifies the affected person/s and includes evidence of the authority to act on their behalf.

254. **What the Grievance/Complain should contain:** Any concerns pertaining to safeguard compliance - environment, involuntary resettlement, and indigenous people, design related issues, compensation, service delivery or any other issues or concerns related to the project. The complaint must contain name, date, address/contact details of the complainant, location of the problem area, along with the problem. Sample grievance registration form is attached in **Appendix15.**

255. **Where & How to file a Complaint:** The contractor's site office will be the primary point for receiving and lodging any complaint. Apart from that, Grievances/ suggestions from affected persons can be dropped into suggestion boxes or conveyed through phone or e-mails. AffectedPersons or any complainant will also be able to register grievances on social, environmental or other related issues, personally to the Central Complaint Cell located at ASCL office. Sample grievance redressal form is attached in **Appendix 15**. The Grievance Officer and designated official will be able to correctly interpret/record verbal grievances of non-literate persons and those received over telephone. The concerned Executive Engineers/ Asst. Engineer/ contractor's site engineer, Environment Health & Safety (HSE) Officer of Contractor has monitor these books and if possible take necessary actions to redress minor complaints with intimation to the complainant as well as to the Central Compliant Cell established at PIU level. The time period to resolve any grievances at different level of GRC has been discussed below.

256. PMU has maintained a Central Complaint Cell at ASCL office located in Agartala MunicipalCorporation headed by a designated Grievance Officer/Administrative/ Executive Officer under CEO, ASCL. The Complaint Cell also serve as Public Information Centre, where, apart from grievance registration, information on the Project, subprojects, social and

environmental safeguards, etc. can be provided.

257. **Documentation:** Documentation of the complaints is important and must contain name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area, and how the problem was resolved. PMU with the support of PIU have the overall responsibility for timely grievance redress, and for registration of grievances, related disclosure, and communication with the aggrieved party. All the documents made available to the public at the community level (at ward offices) and will include information on thecontact number, address and contact person for registering grievances, and disseminated throughout the project area by the PIU.

258. **Grievance/ Problem Redress through Participatory Process:** Efforts must be made by the PIU with the support of safeguard officers to resolve problems and conflicts amicably through participatory process with the community and the ULBs. In case of grievances that are immediate and urgent in the perception of the complainant, the Contractor and supervision personnel from the PIU provide the most easily accessible or first level of contact for the quick resolution of grievances. Contact phone numbers and names of the concerned staff and contractors has posted at all construction sites at visible locations.

259. **Grievance Redressal Committee:** In pursuance of Asian Development Bank (ADB) Guideline, an independent Grievance Redressal Committee (GRC) has established under Agartala Smart City Limited (ASCL) on 16.04.2021 and again committee rearranged on 21.05.2022 to address the grievance of persons affected due to implementation of sub-projects under ADB assisted projects. The composition of the GRC is provided in **Table 28** below:

Table 28: Composition of Grievance Redressal cell

Level 1: Site level GRC	Level 2: Central GRC	Level 3: Apex GRC
• Executive Engineer • Site Engineer, ASCL • EHS Officer of Contractor • Contractor's site engineer • Representative of affected people (AP)	• CEO, ASCL • E&S Nodal Officer • PEPO • Executive Engineer • Asst. Engineer • Team Leader, PMC • E&S Officer, PMC	• Members of Executive committee of ASCL

260. **Process and Timeframe:**

(i) **1st level grievance**: In case of grievances that are immediate and urgent in the perception of the complainant, concerned officer of PIU will direct the contractor to and ensure that it is resolved. If the grievance is not under the contractor scope,but under the project, PMC (field office) will resolve this issue. All the grievances should be resolved within 7 days of receipt of a complaint/ grievance.

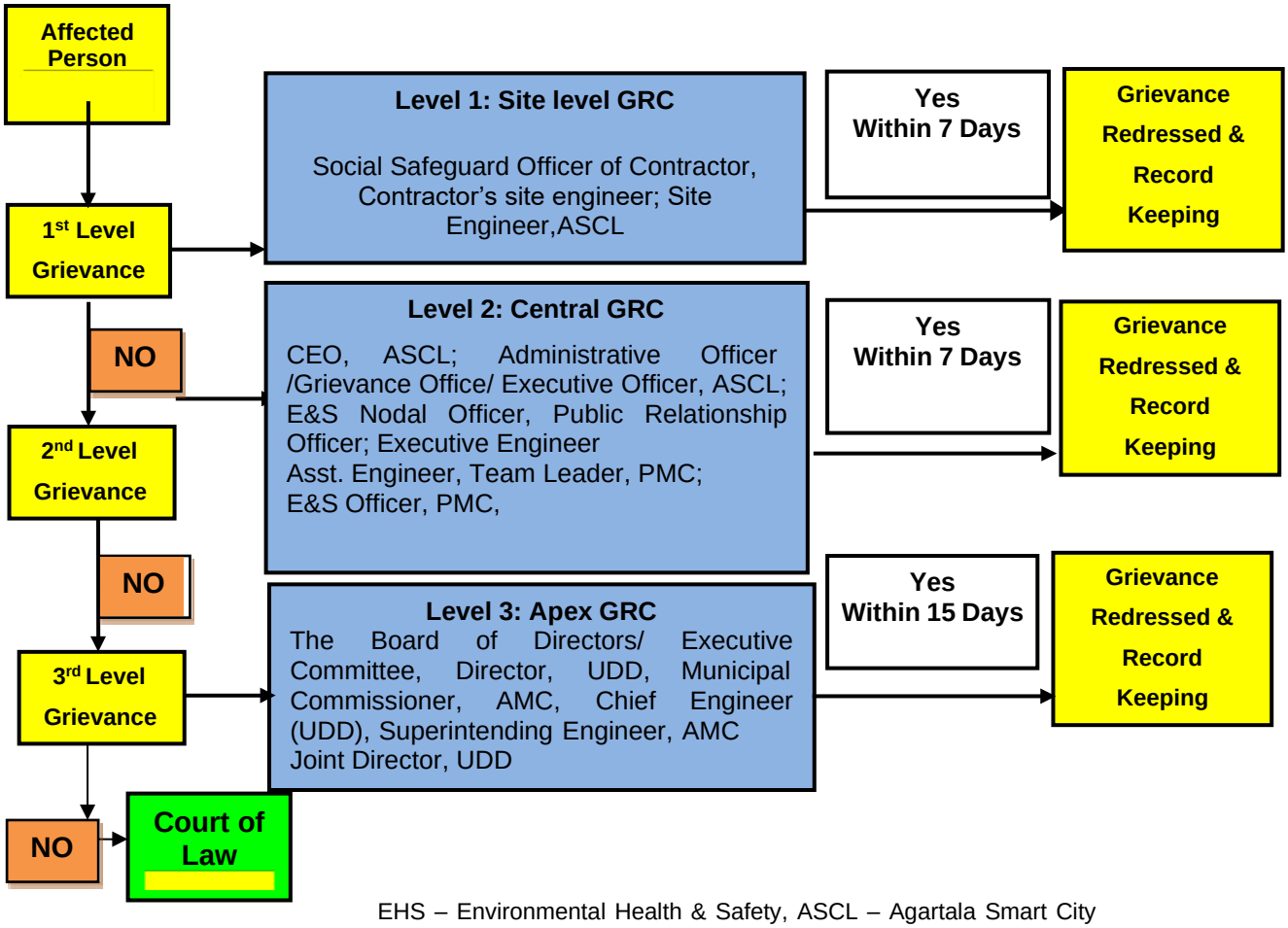
(ii) **2nd level grievance**: All grievances that cannot be redressed at first level within7 days will be brought to the notice of E&S nodal officer of ASCL to place the issue to CEO ASCL. The Grievance Officer may consult/seek the assistance of the Environment & Social officer and Public Engagement Officer of the PMU and E&S Officer of PMC to resolve the complicated issues. The Central GRC will review the grievance and act appropriately to resolve it within 7 days of receipt atthis level.

(iii) **3rd level grievance:** All the grievances that are not addressed at 2nd level by PIU within in 15 days of receipt will be brought to the notice of the Apex Grievance Redressal Committee (GRC). The Apex GRC will meet twice a month and determine the merit of each grievance brought to the committee. The GRC will resolve the grievance within 15 days of receiving the complaint.

The Social Safeguard Officer will communicate all decisions taken by the GRC to thecomplainant

261. The process of the grievance redressal mechanism (GRM) is given in Figure below.

Figure 22: Grievance Redressal Mechanism



EHS – Environmental Health & Safety, ASCL – Agartala Smart City Corporation Limited, CEO – Chief Executive Officer, E&S – Environment & Social, UDD – UrbanDevelopment Department

262. In case of any inter-departmental or inter-jurisdictional coordination required for resolution of specific grievances, the PIU will refer the matter directly to the CEO ASCL for state- level or inter-departmental coordination and resolution. 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 outcome of the GRM.

263. Periodic community meetings with affected communities to understand their concerns and help them through the process of grievance redress (including translation from local dialect/language, recording and registering grievances of non-literate affected persons and explaining the process of grievance redress) will be conducted if required. The above Grievance Redress Process will be discussed with the different stakeholders during stakeholder consultation meetings. These meetings will be held with affected persons and community members (beneficiaries) and the concerned Municipal Ward Councillors where civil works are proposed. The process and timelines for grievance redress and contact details of the persons responsible for grievance redress will be shared in the stakeholder meetings. Action taken in respect of all complaints will be communicated to the complainant by letter, over phone or e-mailor WhatsApp as the case may be.

264. **Consultation Arrangements for GRM:** This will include group meetings and discussions with affected persons, to be announced in advance and conducted at the time

of day agreed on with affected persons and conducted to address general/common grievances; and if required with the Environment/Social Specialist of PMU/ PMC for one-to-one consultations. Non-literate affected persons/ vulnerable affected persons will be assisted to understand the grievance redress process, At the site office the Social Safeguard Officer of contractor and at PIU level, the Grievance officer or any other official appointed at receiving section will assist the non-literate APs to register complaints and with follow-up actions at different stages in the process.

265. **Record keeping:** Records of all grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed actions and measures, the date these were affected, and final outcome will be kept by PIU. The number of grievances recorded and resolved, and the outcomes will be displayed/disclosed in the PIU office, ULB office and on the web, as well as reported in the semi-annual social and environmental monitoring reports to be submitted to ADB.

266. **Information dissemination methods of the GRM:** Grievances received, and responses provided will be documented and reported back to the affected persons. The number of grievances recorded and resolved and the outcomes has displayed/disclosed in the Central Complaint Cell at ASCL and web. The phone number where grievances are to be recorded will be prominently displayed at the construction sites.

267. **Periodic review and documentation of lessons learned:** The PMU, and PIUs, supported by the PMC specialist will periodically review the functioning of the GRM and record information on the effectiveness of the mechanism, especially on the PIU's ability to prevent andaddress grievances.

268. **Costs:** All costs involved in resolving the complaints (meetings, consultations, communication and reporting/information dissemination) will be borne by the PMU.

269. **ADB Accountability Mechanism:** If the established GRM is not in a position to resolvethe issue, the affected person also can use the ADB Accountability Mechanism through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters or the ADB India Resident Mission (INRM). Before submitting a complaint to the Accountability Mechanism,it is recommended that affected people make a good faith effort to resolve their problems by working with the concerned ADB operations department (in this case, the resident mission). Only after doing that, and if they are still dissatisfied, they could approach the Accountability Mechanism. The ADB Accountability Mechanism information will be included in the project- relevant information to be distributed to the affected communities, as part of the project GRM.

VIII. ENVIRONMENTAL MANAGEMENT PLAN

A. Environmental Management Plan

270. The purpose of the environmental management plan (EMP) is to ensure that the activities are undertaken in a responsible, non-detrimental manner with the objectives of: (i) providing a proactive, feasible, and practical working tool to enable the measurement and monitoring of environmental performance on-site; (ii) guiding and controlling the implementation of findings and recommendations of the environmental assessment conducted for the project;(iii) detailing specific actions deemed necessary to assist in mitigating the environmental impact of the project; and (iv) ensuring that safety recommendations are complied with.

271. A copy of the EMP and H & S Plan must always be kept at work sites. The EMP will be made binding on all contractors operating on the site and will be included in the

contractual clauses. Non- compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

272. For civil works, the contractor will be required to (i) establish an operational system for managing environmental impacts (ii) carry out all of the monitoring and mitigation measures setforth in the EMP; and (iii) implement any corrective or preventative actions set out in safeguardsmonitoring reports that the employer will prepare from time to time to monitor implementation of this updated IEE and EMP. The contractor shall allocate budget for compliance with these EMP measures, requirements and actions.

Table 29: Design Stage Environmental Management Plan

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation/ Monitoring	Cost and Source of Funds
Location impacts of proposed component s	Nearby community may be affected due to increased pollution during construction and operation	Sites should be selected so that nearby community may have no or minimum impact due to proposed works	Consultants	Project costs
Design of component s	Design as per national and international norms	Adhered to National lake conservation program and DST guidelines attached as **Appendix 14**	PMU/ PIU	Project costs
Requirement of tree cutting	Tree cutting may result loss of aesthetics and increase in air pollution	(i) sites should be selected so that minimum tree cutting is required (ii) project documents should include the minimum tree cutting provisions (iii) Obtain prior permission fortree cutting, if required (iv) Compensatory plantation will be done as per forest department letter no. F.11-13/WFD/Deptt.0prnt/2018-19/11595-597 dated 27-01-2020. The compensatory plantation cost will be included together with Smart Roads compensatory plantation budget.(**Appendix 19)**	PIU	Project costs
All worksites	Physical cultural resources and chance finds	(i) Ensure that worksites arenot located in archeologicallysensitive areas; liaise and reconfirm with local Archaeological Department during detailed design phase; detailed (ii) Create awarenessamong the workers, supervisors and engineers about the chance finds during excavation work; (iii) Stop work immediately to allow further investigation if any finds are suspected; (iv) Inform local Archaeological Department / Museum office if a find is suspected and take any action, they require to ensure its removalor protection in situ.	PMC/ PIU	Project costs

273. Site Specific Environmental Management Plan is prepared for pre-construction and construction phase for the MBB Lake revitalization project to ensure compliance with the ADB's environmental safeguard requirements and all applicable laws, regulations and standards for environmental protection in India. The EMP ensures that the proposed project activities are undertaken in a responsible, non-detrimental manner with the objectives of:

(i) providing a proactive, feasible, and practical working tool to enable the measurement and monitoring of environmental performance on-site;
(ii) guiding and controlling the implementation of findings and recommendations of the environmental assessment conducted for the project;
(iii) detailing specific actions deemed necessary to assist in mitigating the environmental impact of the project; and
(iv) ensuring that safety recommendations are complied with.

274. These site specific EMPs has included in the tender and contract documents. The provisions set out in the EMPs will be implemented by the Contractor and monitored by the Engineer under supervision of PIU Environment Officer. Monitoring shall be implemented through the monitoring site visits of environmental specialists of all Project levels. The site visitsshall be carried out in accordance with the formal monitoring schedule: Contractor-daily, Engineer -weekly and PIU - monthly. The costs foreseen for the implementation of all the measures prescribed in the EMP are included in the Bill of Quantities.

275. **EMP Boundary**: This EMP is application for the construction work site of the MBB lake revitalization project. This is also applicable to the construction workers camp that will be established by the contractor during the construction stage after necessary site assessment.

276. The EMP boundary for construction works is shown in **Figure 23** below.

Figure 23: EMP zones for construction works

277. **Sensitive Receptors**: As defined in Chapter 2 of this report, there are sensitive receptorslike residential areas, Institutional areas (MBB College and Law College), Shiva

Temple, densevegetation along the stretch of the MBB lake, MBB lake itself as an important water body of Agartala and the adjoining water bodies like other ponds and the Haora River. The sensitive receptors identified are shown in the **Figure 24**.

Figure 24: Sensitive Receptors along the MBB Lake

278. **Construction activities:** The construction activities that are required for the MBB lake revitalization subproject are listed below:

(i) Pruning of Jungle and unorganized vegetation.
(ii) Grading of site as per the design requirements.
(iii) Shoring of sides of the lakes as per design.
(iv) Construction of entry spaces/zones with ticket counters.
(v) Construction of utility and amenity structures required for the functioning of electrical, pumping, irrigation and any other system.
(vi) Construction of visually perforated boundary walls for entire campus
(vii) Renovation and conservation of selected existing built-structures such as Eco-park gate house, Gazebos etc.
(viii) Augmentation of existing vegetation with landscaping
(ix) Providing safety railings and signage where ever applicable
(x) Installation of water ATMs and Smart toilet blocks.
(xi) Installation of Irrigation system with pumps, plumbing and water outlets
(xii) Installation of façade lighting on the identified existing structures as well as inthe surrounding landscapes.

279. It is recommended that the environmental specialist of PIU, PMC and the contractor shall conduct a Joint field verification to ascertain any possibilities of saving trees, environmental and community resources, and these activities are to be taken up by the construction contractor. To ensure environmental safeguard, the following activities and plans are to be implemented at the preconstruction stage to ascertain that all measures are taken to minimize environmental damage:

(i) **Utility Survey**- A detailed utility survey for all the elements along the MBB road adjoining the lake, and pathways like LT, HT lines, water pipeline, storm

drains orany other utility should be done prior to the start of work for planning the construction and minimizing the disruption in services in the adjoining areas. Include locations and operators of these utilities in the detailed design documentsto prevent unnecessary disruption of services during construction phase.

(ii) **Traffic Management Plan**- Traffic management plan framed for construction and operation phase. The plan should take into consideration the type and proportion of vehicles and transport assessed for the MBB College road. Traffic management plan also suggested measures for parking for various types of vehicles engaged in the construction activity.

(iii) **Spoil Management**- A detailed spoil management plan developed to avoid land or water contamination due to un-scientific dumping of spoil generated during the construction phase of the project.

280. **Environmental Risk Assessment**: The environmental aspects and impacts are identified with the aim to control/prevent pollution to the environmental and to ensure ADB environmental safeguard requirements and all other legal requirements are being complied with. The assessment shall consider normal, abnormal and foreseeable emergency situations and consider where applicable, the aspects associated with the various project.

281. **Risk Assessment methodology**: The methodology adopted for assessment of environmental impacts and aspects during the preconstruction, construction and operation stageof the proposed MBB Lake revitalization project is presented below:

Table 30: Risk Matrix

Likelihood		
Likelihood	**Definition**	**Score**
Certain	Will occur more than once a week	5
Likely	Likely to occur more than once or twice during the construction phase	3
Unlikely	May occur once or twice during the construction phase	2
Rare	Unlikely to occur during the construction phase	1
Consequence		
Consequence	**Definition**	**Score**
Catastrophic	unprecedented damage or impacts involving the natural environment or surrounding communities	5
Major	major damage to natural environment or surrounding communities	3
Moderate	limited adverse impacts on natural environment or surrounding communities	2
Minor	no or minimal adverse environmental or social impacts	1

Likelihood and value	Consequence and value			
	Catastrophic (5)	Major (3)	Moderate (2)	Minor (1)
Certain (5)	High		Medium	Low
Likely (3)	High	Medium		
Unlikely (2)	Medium		Low	
Rare (1)	Low		Low	

282. The environmental risk matrix along with the proposed mitigation measure during the construction phase and operation and management phase is shown in **Table 31** below. The **Figure 25-27** gives the various site plans for implementation of the environmental Management Plan.

Table 31: Environmental Management Plan for Anticipated Impacts – Pre construction, Construction and Operation phase

Activity	Impact	Likelihood (Score)	Consequence (Score)	Risk Score (consequence x likelihood)	Environmental Management Measures	Approximate Location	Responsible for Implementation	Responsible for Supervision
Pre-Construction Phase								
Submission Of updated environmental management plan (EMP)/ site environmental plan (SEP); EMP implementation and reporting	Unsatisfactory compliance to EMP	1	5	5	• The contractor shall designate a full-time environment, health and safety (EHS) staff. The EHS staff shall supervise, monitor and report on day-to-day compliance to requirements related to workers health and safety as specified in applicable laws, rules and regulations and EMP. • The ESH staff shall possess a recognized degree or advanced diploma inindustrial/construction safety. • The ESH staff shall have practical experience in industrial/construction projectsfor a period of not less than 5 years. • Submission of updated EMP/ site-specific environmental management plan (SEMP); including work methodology and spoil management plan • Timely submission of periodical monitoring reports including documentary evidence on EMP implementation such as photographs.	For all locations	Contractor	PMU and PMC's environmental specialist
EMP Implementation Training	Irreversible impact tothe environment, workers, and community	1	5	5	• Project manager and all key workers will berequired to undergo training on EMP implementation including spoils/waste management, Standard operating procedures (SOP) for construction works; occupational health and safety (OH&S), core labour laws, applicable environmental laws, etc.	For all locations	Contractor	PMU and PMC's environmental specialist

Activity	Impact	Likelihood (Score)	Consequence (Score)	Risk Score (consequence x likelihood)	Environmental Management Measures	Approximate Location	Responsible for Implementation	Responsible for Supervision
Environmental monitoring of baseline conditions of air, noise, water and soil	To establish base line environmental conditions	1	5	5	• Environmental monitoring through NABL approved laboratory	For all locations	Contractor	PMU and PMC's environmental specialist
Utilities	Telephone lines, electric poles and wires within proposed project area	2	3	6	• Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and • Require construction contractors to prepare a contingency plan to include actions to be taken in case of unintentional interruption of services.	For all locations	Contractor	PMU and PMC's environmental specialist
Consents, permits, clearances, NOCs, etc.	Failure to obtain necessary consents, permits, NOCs, etc. can result to design revisions and/or stoppage of works	3	5	15	• Obtain all necessary consents, permits, clearance, NOCs, etc. prior to award of civil works. • Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction • Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc.	For all locations	Contractor	PMU and PMC's environmental specialist
Site Clearance activities	Loss of greenery due to haphazard clearing and changes in micro climatic condition	3	2	6	• Clearing of vegetation should be strictly as per layout and only ground cover/ shrubs that impinge directly on the permanent works or necessary temporary works shall be removed with prior approval from the Environmental Expert of PMC.	Entire MBB lake construction site	Construction Contractor	Environmental Specialist of PIU

Activity	Impact	Likelihood (Score)	Consequence (Score)	Risk Score (consequence x likelihood)	Environmental Management Measures	Approximate Location	Responsible for Implementation	Responsible for Supervision
					• Clearance area should be marked with highly visible marking. • Initially Only 7 trees identified under the project shallbe cut after receiving clearance from the Forest Dept. Now as per construction design all tree shall be saved at site. • Plantation of 815 trees is a part of MBB lake revitalizations project, all possible care should be taken to ensure retention of these trees.			
	Soil Erosion	3	2	6	• The topsoil removed from around 13905 m^2 area shall be stored in areas as shown in Site Plan • Site grading and excavation to be undertaken during dry season and top soil to be preserved and relocated after construction activities. • Earthen bund to be provided around the storage areas for excavated soil and other construction material. • Completed earthworks to be sealed and/or re-vegetated at the earliest with the help of landscape expert.	Entire MBB lake construction site	Construction Contractor	Environmental Specialist of PIU
	Damage to existing habitat	3	3	9	• Monitor area for fauna prior to clearing operation, with catcher to remove fauna for release elsewhere; when the clearing is complete, fauna spotter/catcher should remain on call.	Entire MBB lake construction site	Construction Contractor	Environmental Specialist of PIU
	Dust Generation from stockpiles	5	2	10	• Water sprinkling on surface of soil stockpiles.	Stockpile area	Construction Contractor	Environmental Specialist of PIU

Activity	Impact	Likelihood (Score)	Consequence (Score)	Risk Score (consequence x likelihood)	Environmental Management Measures	Approximate Location	Responsible for Implementation	Responsible for Supervision
					• Use tarpaulins to cover sand and other loose material when transported by vehicles;			
	Runoff from stockpiles contaminating water	5	3	15	• Stockpiles shall be at least 5 m from the MBB lake water. • Stockpiles should be provided with earthen bunds.	Stockpile area	Construction Contractor	Environmental Specialist of PIU
	Disruption to other visitors/ users of MBB lake	3	2	6	• While working at the MBB lake, contractor shall not obstruct/ prevent the flow of water between Haora River, and MBB lake through the existing culvert. • As the construction work is expected to disrupt users of MBB lake, notice shall be served well in advance to the affected community like nearby residents, Angling society, MBB College authorities etc.,	Entire MBB lake construction site	Construction Contractor	Environmental Specialist of PIU
	Disturbance/ damage to existing utilities on the sites (Telephone lines, Electric poles and wires, water lines within proposed subproject)	2	2	4	• Prepare a contingency plan to include actions to be done in case of unintentional interruption of services. • In case of disruption of water supply, alternative supply through tankers, shall be provided; water may be made available.	Entire MBB lake construction site	Construction Contractor	PMC and PIU
Demolition of existing watch tower, refurbishment of structures like	Air pollution due to dust emission	3	2	6	• Regular Water spraying on surfaces and demolition stockpile. • Vehicles carrying demolition debris fromsite shall be covered with tarpaulins while entering and leaving the site will always be Covered	Entire MBB lake construction site	Construction Contractor	Environmental Specialist of PIU
	Noise generation	5	3	15	• Restrict the demolition work only during day time between 8 am to 6 pm	Entire MBB lake	Construction	Environmental Specialist of PIU

Activity	Impact	Likelihood (Score)	Consequence (Score)	Risk Score (consequence x likelihood)	Environmental Management Measures	Approximate Location	Responsible for Implementation	Responsible for Supervision
cafeteria, gazebos etc.						construction site	Contractor	
	Soil and water contamination	3	3	9	• 269.5 cum of demolition debris will be generated in the form of broken tiles and paver blocks, scarified bitumen, broken plaster etc. The Contractor shall suitably dispose of the unutilized debris materials at the centralized facility of DC Nagar Lunga site of AMC after necessary permission • Contractor should ensure to reuse the scarified bituminous wastes (27cum) within the site for road surface, the disposal of surplus waste shall be carried out over a 30 mm thick layer of rammed clay to eliminate the possibility of scarified percolation of leachate into the ground water.	Lake area and demolition sites	Construction Contractor	Environmental Specialist of PIU
	Hinderance to access of visitors to the lake area	3	2	6	• The debris shall not be disposed in walkways or pathways.	Entire MBB lake construction site	Construction Contractor	Environmental Specialist of PIU
	Blocking of water in MBB lake	2	3	6	• The contractor shall ensure that the demolition debris shall not be disposed/ stored in a manner to block the flow from or to MBB lake.	Entire MBB lake construction site	Construction Contractor	Environmental Specialist of PIU
Relocation of existing Transformer near fisheries department	Soil and water contamination by leakage	3	5	15	• The relocation of transformer should be done in the presence of TSECL officials. • The removed transformed should be immediately transported to the storage site if TSECL until further installation/ reuse.	Fisheries Department	Construction Contractor	Environmental Specialist of PIU
Labour Camp Set up	Water and land Pollution due to discharge of sewage	3	3	6	• Contractor shall set up toilets with septic tank and soak pit at labour camp.	Labour Camp area	Construction	Environmental Specialist of PIU

Activity	Impact	Likelihood (Score)	Consequence (Score)	Risk Score (consequence x likelihood)	Environmental Management Measures	Approximate Location	Responsible for Implementation	Responsible for Supervision
							Contractor	
	Air Pollution due to burning of solid waste	2	2	4	• Contractor shall provide bins for storage of solid waste and hand over the collected solid waste to AMC collection vehicles for processing.	Labour Camp area	Construction Contractor	Environmental Specialist of PIU
	Loss of trees for fuel wood	2	2	4	• Fuel provision shall be made available in camp like LPG so that no tree cutting is involved for fuel wood.	Labour Camp area	Construction Contractor	Environmental Specialist of PIU
	Ill-health and unhygienic conditions	3	3	9	• Contractor shall arrange potable drinking water for workers in camp. • Shall provide adequate number of separate toilets for male and female workers.	Labour Camp area	Construction Contractor	Environmental Specialist of PIU
Consumption of construction materials	Disruption in land topography, vegetation, soil erosion, water logging and water pollution	3	3	9	• Contractor should obtain material from existing mines approved/ licensed by Mines and Geology Department/ Revenue Department. • Verify suitability of all material sources and obtain approval of implementing agency • Submit a monthly statement of construction material procured indicating material type, source and quantity. • For new quarry if Environmental Clearance is applicable to be obtained. • Adequate safety precautions shall be ensured during transportation of quarry material from quarries to the construction site. Vehicles transporting the material shall be covered to prevent spillage	Mines listed by Tripura Government as specified in the website: http://trpenvis.nic.in/test/natural_resources.html	Construction Contractor	ASCL

Activity	Impact	Likelihood (Score)	Consequence (Score)	Risk Score (consequence x likelihood)	Environmental Management Measures	Approximate Location	Responsible for Implementation	Responsible for Supervision
Construction Phase								
Excavation of soil and Stockpile	Dust Generation from stockpiles	5	3	15	• Water sprinkling on surface of stockpiles	Stock pile area	Construction Contractor	Environmental Specialist of PIU
	Runoff from stockpiles contaminating water	2	3	6	• Stockpiles shall be at least 5 m from the MBB lake water	Stock pile area	Construction Contractor	Environmental Specialist of PIU
	Noise generation from excavation	5	2	10	• During night time permissible noise limit activity allowed.	Stock pile area	Construction Contractor	Environmental Specialist of PIU
	Siltation of MBB lake	3	3	9	• Excavated earth shall be stored in designated areas as shown in image. • Excavated earth stockpile shall be covered so that sediment laden water does not drain into nearby watercourse. • Prioritize re-use of excess soils and debris in the construction works.	Stock pile area	Construction Contractor	Environmental Specialist of PIU
	Danger due to deep excavation and chances of accident	3	5	15	• Consult with AMC in identifying deep excavation areas on construction maps • Provide hard barricades and sign boards to warn of dangerous conditions	Stock pile area	Construction Contractor	Environmental Specialist of PIU
Usage of Construction vehicles and equipment	Dust generation from vehicle movement	5	2	10	• Water sprinkling on Kaccha/ mud roads. • Limit of vehicle speed to 20 kmph within site. • Periodical air quality monitoring shall be done during construction and operation • phase.	Entire MBBlake construction site	Construction Contractor	Environmental Specialist of PIU

Activity	Impact	Likelihood (Score)	Consequence (Score)	Risk Score (consequence x likelihood)	Environmental Management Measures	Approximate Location	Responsible for Implementation	Responsible for Supervision
	Emissions from vehicles and equipment	3	2	6	• The vehicles shall be maintained regularly. • Vehicles and machineries working in premises shall have PUC certificate.	Entire MBB lake construction site	Construction Contractor	Environmental Specialist of PIU
	Noise generationdue to operation of vehicles n equipment	5	3	15	• The vehicles and equipment shall be maintained properly to reduce the noise. • Enclosures and silencers shall be provided for high noise generating equipment.	Entire MBB lake construction site	Construction Contractor	Environmental Specialist of PIU
	Soil and Water Pollution due to Spillage / leakage of fuel, oil and lubricants	2	5	10	• Fuel, oil, lubricants and other chemicals shall be stored on concrete platforms. • The storage area shall in the designated area as per the site plan. • DG sets, oil/ fuel consuming equipment shall be placed in concrete platforms.	Entire MBB lake construction site	Construction Contractor	Environmental Specialist of PIU
Storage of Oil, fuel, lubricants and other hazardous materials	Water Pollution due to spillage/ leakage	3	5	15	• Hazardous materials like paints, solvents, fuel and oils shall be stored only when it is necessary • The storage locations in premises shall be in the designated area with the storage area as per the site plan. • Periodic Water quality monitoring shall be done to check the impact of leakage/ spillage on water body.	Entire MBB lake construction site	Construction Contractor	Environmental Specialist of PIU
Construction works	Dust Generation	5	3	15	• Water sprinkling shall be done to control dust emission twice a day in dry areas like stock piles, roads etc., • Stockpiles of raw/ waste material, demolition debris, excavated earth etc., shall be covered with tarpaulin during the entire construction activity. • DG sets if used for construction activityshall meet the required emission standards.	Entire MBB lake construction site	Construction Contractor	Environmental Specialist of PIU

Activity	Impact	Likelihood (Score)	Consequence (Score)	Risk Score (consequence x likelihood)	Environmental Management Measures	Approximate Location	Responsible for Implementation	Responsible for Supervision
					• Periodic Air quality monitoring shall be done at selected locations to check the impact of developmental activity			
	Siltation of MBB lake and degradation of water quality	3	3	9	• The Contractor shall not excavate bed of the MBB lake at any location for borrowing earth for embankment construction. • Contractor shall construct silt fencing at the base of the embankment construction for the entire perimeter of MBB lake and around the stockpiles at the construction sites. The fencing shall be provided prior to commencement of earthwork and continue till the stabilization of the embankment slopes. • Contractor shall ensure that construction materials containing fine particles are stored in an enclosure such that sediment laden water does not drain into MBB Lake	MBB lake and construction locations	Construction Contractor	Environmental Specialist of PIU
	Impact on water flow to MBB Lake	2	2	4	• Contractor shall ensure that no construction materials like earth, stone, waste disposed off in a manner that block the flow of water to and from the MBB lake. • Contractor shall take all necessary measures to prevent any blockage to the water flow. • In addition to the design requirements, the Contractor shall take all required measures as directed by the Environmental Specialist of PIU to prevent temporary or permanent flooding of the site or any adjacent area.	MBB lake	Construction Contractor	Environmental Specialist of PIU

Activity	Impact	Likelihood (Score)	Consequence (Score)	Risk Score (consequence x likelihood)	Environmental Management Measures	Approximate Location	Responsible for Implementation	Responsible for Supervision
Construction works	Noise impact on sensitive receptors	5	3	15	• All Construction plants and equipment used in construction shall strictly conform to the MoEFCC/ CPCB noise standards. • During night time activity within in permissible noise level with safety measures are allowed. • Provide prior information to the identified sensitive receptors about the work schedule; • Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers the sound impacts to surrounding sensitive receptor; and use hydraulic or vibro impact hammers in place of diesel hammers for piling work; • Maintain maximum sound levels not exceeding 80 decibels (dbA) when measured at 10 m or more from the vehicles & equipment. • Provision of ear-plugs to contractors exposed to high noise levels. • Periodic Noise monitoring shall be done at selected locations to check the impact of developmental activity on water body.	Entire MBB lake construction site and sensitive receptor locations	Construction Contractor	Environmental Specialist of PIU
Construction works	Impacts on landscape and aesthetics due to construction activity	5	2	10	• Stockpiling of raw material, waste, demolition debris, excavated earth etc. to be done only in the designated areas. • Avoid disposal of any debris and waste soils in and around the MBB lake premise or other forest and nearby water bodies.	Entire MBB lake construction site	Construction Contractor	Environmental Specialist of PIU

Activity	Impact	Likelihood (Score)	Consequence (Score)	Risk Score (consequence x likelihood)	Environmental Management Measures	Approximate Location	Responsible for Implementation	Responsible for Supervision
					• Coordinate with PIU for beneficial uses of excess excavated soils or immediately dispose to DC Nagar site.			
	Hindrance to traffic movement on MBB College Road	5	2	10	• Do not close the road completely, ensure that work is conducted onto edge of the road; allow traffic to move on one line; • In unavoidable circumstances of road closure, provide alternative routes, and ensure that public is informed about such traffic diversions; • At all work sites public information/ caution boards in English and local language (Bengali) shall be provided - information shall inter-alia include: project name, cost and schedule; executing agency and contractor details; nature and schedule of work at that road/ locality; traffic diversion details, if any; entry restriction information; competent official's name and contact for public complaints. • Prepare a Traffic Management Plan	Approach road of MBB College road	Construction Contractor	Environmental Specialist of PIU
	Nuisance/ disturbance to sensitive areas	3	2	6	• No material should be stocked in sensitive area; material shall be brought to the site as and when required • Conduct work manually with small group of workers and less noise; minimize use of equipment and vehicles • No work should be conducted near the Shiv Mandir during religious congregations. • Material transport to the site should be arranged considering MBB College and Tripura Government College timings.	Sensitive areas	Construction Contractor	Environmental Specialist of PIU

Activity	Impact	Likelihood (Score)	Consequence (Score)	Risk Score (consequence x likelihood)	Environmental Management Measures	Approximate Location	Responsible for Implementation	Responsible for Supervision
					• Notify MBB College and Tripura Government College 2 weeks prior to the work; conduct a 30 minutes awareness program at on nature of work, likely disturbances and risks and construction work, mitigation measures in place, entry restrictions and dos and don'ts • Implement all measures suggested elsewhere in this report - dust and noise control, public safety, traffic management, strictly at these sites.			
	Disturbance to migratory birds	5	2	10	• Training of all workers regarding anti-poaching of migratory bird species • Noise levels should be kept minimum • Habitat conservation for feeding and breeding of migratory birds shall be done. • Prevention of pollution of lake either by wastewater or solid waste • Raising awareness within local people through lectures, workshops, informative boards, posters and engaging them in clean up drives.	Entire MBB lake construction site	Construction Contractor	Environmental Specialist of PIU
Storage, handling and disposal of surplus excavated earth, Demolition Debris, construction wastes	Air Pollution due to loading and transportation of wastes	5	2	10	• 1167 cum of surplus excavated earth, 269.5 cum of demolition debris, 60 cum of RCC wastes and 32 cum of broken brick wastes shall be disposed of in DC Nagar Lunga AMC dump site. • Before loading the wastes into vehicles, the stockpiles shall be water sprinkled toreduce the dust emission. • Transportation vehicles carrying waste materials shall be covered with tarpaulin to avoid emission of finer particles and dust.	Entire MBB lake construction site	Construction Contractor	Environmental Specialist of PIU

Activity	Impact	Likelihood (Score)	Consequence (Score)	Risk Score (consequence x likelihood)	Environmental Management Measures	Approximate Location	Responsible for Implementation	Responsible for Supervision
					• The vehicles carrying wastes shall be checked for their PUC certificate and its fitness.			
	Land contamination and water pollution	3	3	9	• The surplus excavated earth and other construction wastes shall not be dumped on any agricultural land, grass land or water bodies which contaminate the soil and water bodies of Agartala.	Disposal Site	Construction Contractor	Environmental Specialist of PIU
	Degradation of Aesthetics	5	2	10	• The wastes shall not be disposed on road sides of city or anywhere which degrades the aesthetics of the place. • Contractor shall be penalized for disposal of wastes in private/ unauthorized lands or water bodies.	Disposal Site	Construction Contractor	Environmental Specialist of PIU
Operation Phase								

Influx of visitors due to increased recreational amenities	Fall hazard andother Unsafe acts and conditions	3	5	15	• As a measure to restrict the access of MBB lake to designated areas and to ensure the safety of people moving in the pathways and public zones, railings shall be provided at
					  • Public Zone A
					  • Public Zone B
					  • Along elevated walkway and fountain plaza
					  • Along lake view seating
					  • In Botanical Garden
					• Rescue divers and lifejackets shall be available at all the times in MBB lake area
						Commercial lake development zones	O&M Contractor	PIU/ ASCL

	Probability of Snake bite	3	3	9	• Regular maintenance and monitoring • Provision of anti-venom kit and training for the same to the working staff and security.	Garden area	O&M Contractor	PIU/ ASCL

Activity	Impact	Likelihood (Score)	Consequence (Score)	Risk Score (consequence x likelihood)	Environmental Management Measures	Approximate Location	Responsible for Implementation	Responsible for Supervision
	Water Pollution due to 12 KLD sewage generation	5	3	15	• The existing toilet block near cafeteria shall be refurbished and be provided with Septic Tank and soak pit. • Sewage generated from proposed E toilet block in Eco-park Zone shall be treated using biodigester. • The contractor shall ensure the proper functioning of the toilet blocks and the sewage treatment facilities. • In no circumstances the sewage generated from the toilets shall flow to the MBB lake. • Water quality of the MBB lake to be monitored as per monitoring plan • Sludge generated from bio digestors and septic tank will be cleaned by AMC.	Entire MBB lake development area	O&M Contractor	PIU/ ASCL
	Disturbance to aquatic ecosystem	2	3	6	• The commercial surface water activities like swimming, boating, etc. shall be confined to the commercial zone as shown in site plan to maintain the ecological integrity of the site.	Commercial zone of MBB lake	O&M Contractor	PIU/ ASCL
	Generation of 50 kg of Solid waste due to tourist's footfall. Environmental pollution - Potential impact on soil, groundwater, and surface water nearby the disposal site	5	3	15	• Roadside bins shall be provided in the lake area for visitors to dump the waste. • Dedicated Bins shall be provided for the waste collection from cafeteria and eateries • A total of 70 twin litter bins (80 litres) are recommended to be placed along road side. • For sweeping purpose, 4 full time sweepers should be employed to ensure the cleanliness of the surrounding area. Sweepers to be equipped with broom, dust pan, safety jacket, safety mask, gloves, shoes and a 120-liter two wheeled HDPE bin.	Entire MBB lake development area	O&M Contractor	PIU/ ASCL

Activity	Impact	Likelihood (Score)	Consequence (Score)	Risk Score (consequence x likelihood)	Environmental Management Measures	Approximate Location	Responsible for Implementation	Responsible for Supervision
					• Four bins of 1100 litres capacity shall be placed to collect all the waste generated in MBB lake premises and eventually transfer it to waste collection vehicle of AMC. • The place should be declared as 'No Plastic Zone'			
	Air pollution from vehicle movement increased due to increase in number of visitors and traffic congestion.	3	3	9	• Traffic shall be diverted properly to avoid congestion • Parking facility shall be available with appropriate entry and exit space • Air quality around MBB lake to be monitored as per monitoring plan	Entire MBB lake development area	O&M Contractor	PIU/ ASCL

Figure 25: Proposed Silt Fencing around MBB College Lake

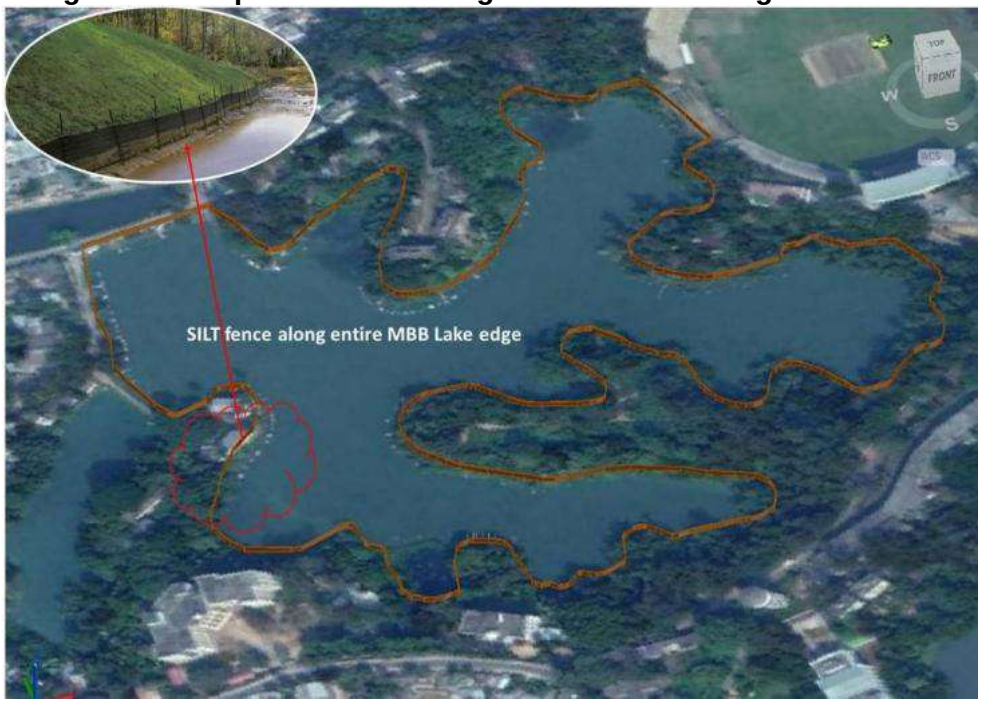


Figure 26: Site Environment Management Plan for Storage Area at Public Zone A

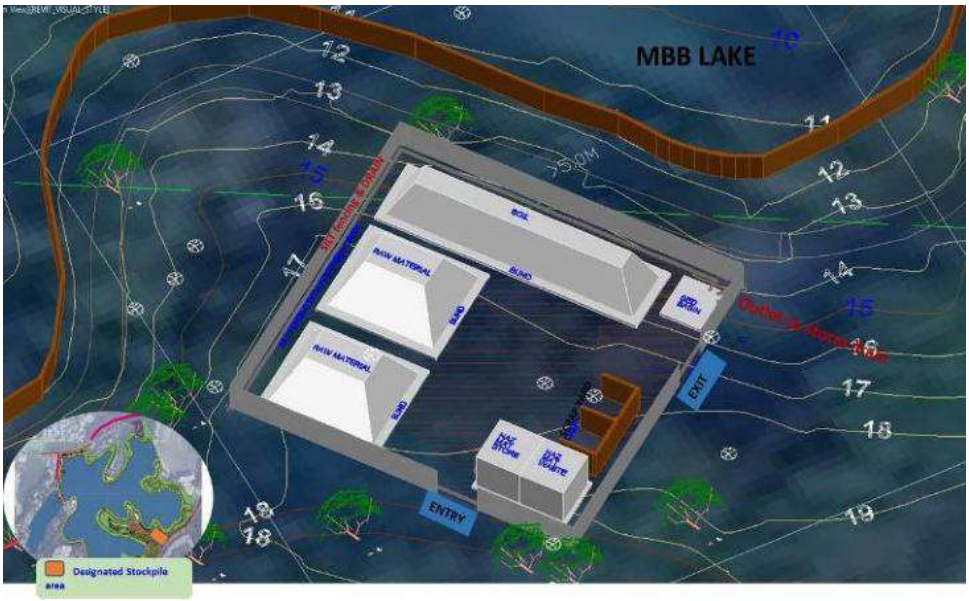


Figure 27: Designated Surface Water Activity Zone

B. Institutional Arrangement

283. Agartala Smart City Limited (ASCL) is the executing agency (EA) and implementing agency (IA) for the Project, responsible for management, coordination and execution of all activities funded under the loan. The PMU[20] is responsible for implementing the Project, while the PIUs[21] at project level support the PMU. The social and environmental safeguards specialists (consultants) have been recruited and function as Project Management Consultants who support PMU / PIUs in safeguard compliance. The Board of Directors of ASCL provide policy related directions and project oversight to PMU.

284. The PMU is headed by a Project Director and is responsible for: 1) approval of detailed project reports; 2) technical sanction on tender/bid evaluation; 3) overall monitoring, supervision & project implementation, and 4) any other matter related to implementation of Socialand Environment Safeguard as per ADB SPS requirements from time to time. The Board of Directors of ASCL may assign any other requirements related to ADB assisted project to PMU from time to time. The PMU has a Safeguard and Gender Cell (SGC) to oversee all safeguards and gender related activities. The SGC at PMU is headed by a Safeguard Specialist, who is the Environment and Social Nodal Officer of ASCL,); to be provided with training on ADB SPS 2009. The Safeguard Specialist (E & S Nodal Officer – ASCL) is reporting directly to Project Director. The SGC is having a gender expert for the entire project period who reports on the project's gender related results to the Project Director.

285. The PIUs are headed by Deputy Project Director (DPD) who is having overall responsibility for safeguards management. An Environmental and Social Safeguards Unit (ESSU) has been established for safeguards management which staffed with one Assistant Engineer each for environmental and social safeguards. Social and Environmental safeguard consultants of PMC assist PMU and two PIUs for project implementation support. This includes two safeguard consultants, an Environmental Safeguard Specialist

[20] A Project Management Unit (PMU) will be set up comprising of senior management from ASCL.

[21] Two Project Implementation Units (PIUs) will be set up as follows: (i) PIU for Maharajah Bir Bikram (MBB) College Lake Revitalization; Revival and Restoration of Ujjayanta Palace Complex and Chandmari water supply project (ii) PIU for Upgradation of Major Roads in Agartala City.

and a Social Safeguard Specialist and a Social Safeguard Specialist. The Social Safeguard Consultant support gender dimensions of the project. The PMC Safeguards Specialist enlist the support of the Construction Manager and the 3 deputy construction managers to take care of safeguards related tasks at field level.

286. During implementation, contractor team include an Environmental, Health & Safety (EHS) Officer and a Social Supervisor.

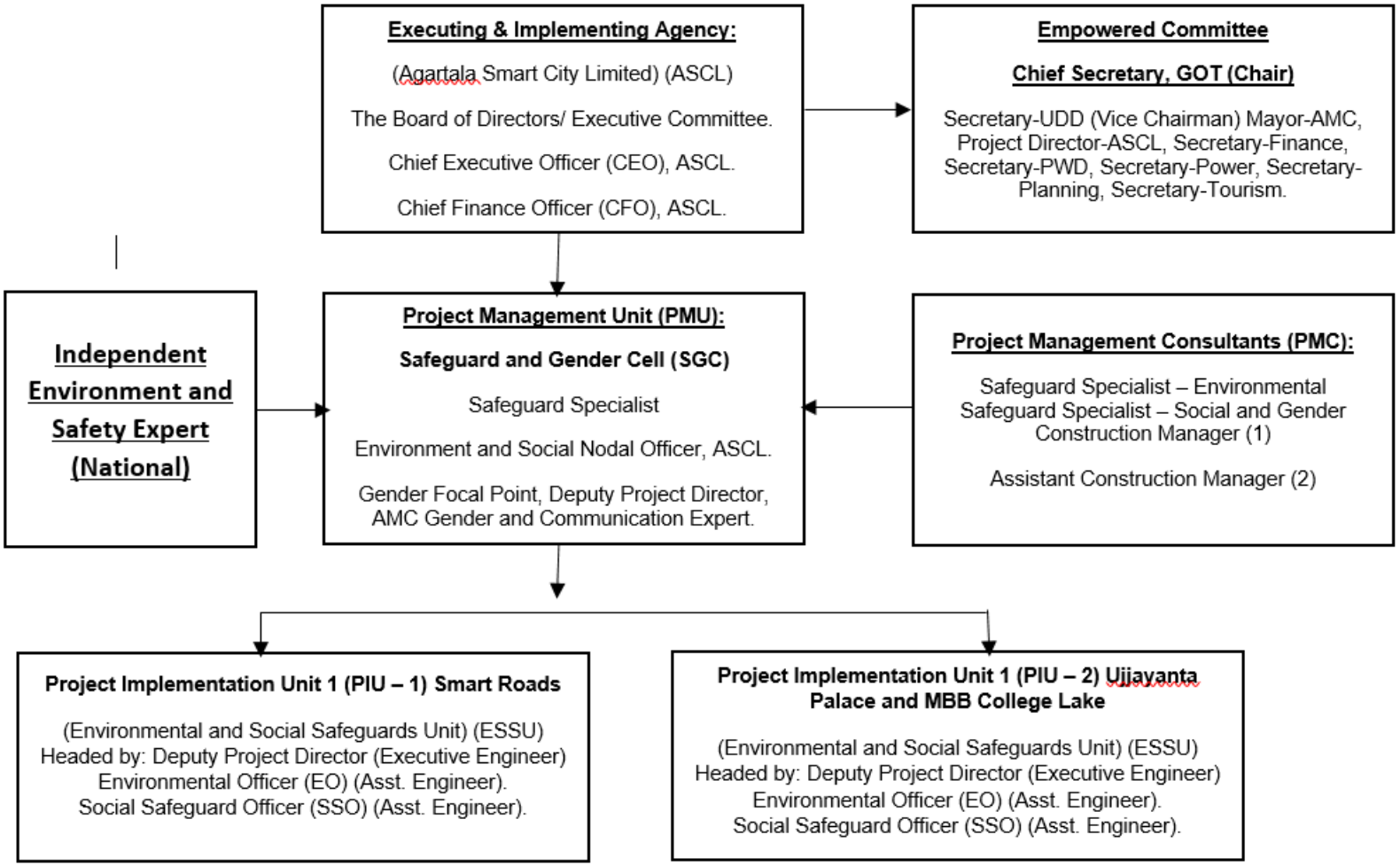
287. The institutional roles and responsibilities for environmental safeguards implementation at PMU, PIUs and Contractors level is described below:

C. Safeguards Implementation Arrangement:

1. Project Management Unit:

288. SGC at PMU level has overall responsibility of implementation of project in compliance with ADB SPS 2009, country legislations, and project-specific policies relating to Grievance Redress Mechanism as agreed between ASCL and ADB. The SGC is headed by Nodal Officer (Environmental and Social) is supported by an environmental specialist of PMC team. ASCL has recruited individual consultant (Environment & safety expert) to provide project implementation support and ensure compliances with ADB requirements. The Nodal Officer have overall responsibility in implementation of the environmental safeguard requirements including appropriate monitoring and reporting responsibilities. Key tasks and responsibilities of the Nodal Officer are as follows:

Figure 28: Safeguards Implementation Arrangement: Safeguards and Gender



2. Nodal Officer (Environmental and Social) at PMU: Environmental Safeguards Responsibilities

(i) Review and finalize subproject environmental category;
(ii) Oversee preparation of IEEs; confirm existing IEEs/EMPs are updated based on detailed designs.
(iii) Ensure that EMPs are included in bidding documents and civil works contracts;
(iv) provide oversight on environmental management aspects of subprojects and ensure EMPs are implemented by PIUs and contractors;
(v) Facilitate and ensure compliance with all government rules and regulations regarding site and environmental clearances, as well as any other environmental requirements (e.g., location clearance certificates, environmental clearance certificates, etc.), as relevant;
(vi) Supervise and provide guidance to the PIUs to properly carry out the environmental monitoring as per the IEE/EMP;
(vii) Review, monitor, and evaluate the effectiveness with which the EMPs are implemented, and recommend corrective actions to be taken as necessary;
(viii) Consolidate monthly environmental monitoring reports from PIUs and submit semi-annual monitoring reports to ADB (see the format in **Appendix 16 and 17 respectively**);
(ix) Ensure timely disclosure of final IEEs/EMPs in locations and form accessible to the public; and
(x) Address any grievances brought about through the grievance redress mechanism in a timely manner.

289. **Project Implementation Units**. PIU is headed by a Deputy Project Director and supported by PMC. Two PIUs established for (i) Roads sub-project and (ii) MBB Lake and Ujjayanta Palace subprojects. An Environmental and Social Safeguards Unit (ESSU) established for safeguards management at the PIUs level which staffed with one Assistant Engineer – Environment (AEE). AEE will oversee the safeguards implementation at PIU level andreport to Safeguards Officer at PMU. Key tasks and responsibilities of AEE are as below:

3. Assistant Engineer Environment (AEE) at PIU

(i) Coordinate public consultation and information disclosure
(ii) Liaise with local offices of regulatory agencies in obtaining clearances /approvals
(iii) Oversee day-to-day implementation of EMPs by contractors, including compliance with all government rules and regulations, take necessary action for obtaining rights of way
(iv) Ensure continuous public consultation and awareness
(v) Coordinate grievance redress process and ensure timely actions by all parties
(vi) Review and forward Monthly EMP Monitoring Reports of Contractor to PMU

290. PMC has appointed an environmental specialist for the project. EHS supervisor of Contractor will provide all necessary assistance to environment specialist of PMC in updating IEEs and will supervise day-to-day EMP implementation. Following are the key tasks of environmental specialist of PMC.

(i) Assist in prepare / update REA checklist
(ii) Assist in identification of sites/components in compliance with exclusion criteriaand project environmental selection guidelines
(iii) Assist in update / prepare IEE report
(iv) Provide guidance and oversee work of EHS supervisor
(v) Assist in conduct public consultation & information disclosure
(vi) Monitor the implementation of EMP by contractor; report effectiveness and identifythe need for corrective actions; work closely with Environmental Specialist
(vii) Assist in review monthly EMP implementation reports submitted by contractors
(viii) Oversee and provide guidance to contractors on environmental monitoring (air, noise, etc.) as per the EMP
(ix) Assist in preparing semi-annual Environmental Monitoring Reports
(x) Assist in grievance redress, and ensure redress
(xi) Provide regular on-site training programs to contractors site staff and supervisors

291. Environmental Safeguards Tasks of PMC: PMC will assist SGC PMU to achieve compliance with the environmental management and monitoring requirements in accordance with ADB Safeguard Policy Statement 2009 and government policies and ensuring that the contractorsand their sub-contractors design, construct and operate the project facilities in compliance with the same. Detailed tasks of the PMC include, but are not limited to, the following:

(i) Establish a system to monitor environmental safeguards of the Project; including the functioning of the GRM, and prepare indicators for monitoring important parameters of environmental safeguards;
(ii) Support PMU to prepare semi-annual environmental safeguard monitoring reports that will be appraised during project implementation;
(iii) Support the PMU in ensuring that the environmental safeguard activities are carried out in accordance with the agreed plans and frameworks;
(iv) Ensure that the relevant measures specified in the resettlement plans, and genderaction plan will be incorporated in bidding documents and approved by ADB priorto issuance of invitation for bidding and monitor their compliance on behalf of PMU;and
(v) Ensure monitoring of social safeguards plans and gender action plan and addressunanticipated impacts, if any; and
(vi) Provide training programs to PMU/PIU staff and contractors involved in the project implementation for strengthening their capacity in managing and monitoring socialsafeguards and gender.

292. PMC engage services of the following specialists as and when required to addresssite-specific environmental requirements as below:

(i) Environment Specialist Consultant. Responsibilities include the review and refinement of the IEEs and the EMPs and ensure inclusion in the bid documents and during construction, monitor the implementation of the EMPs and support in the reporting and documentation requirements;
(ii) Heritage Management Specialist. Provides guidance on the ADB SPS requirementon Physical Cultural Resources in the ASCL project including the conduct of

Heritage Impact Assessment, provides support on the statutory clearances to be obtained and the documentation and reporting on the implementation of mitigationmeasures; and

(iii) Biodiversity Expert. Provides guidance on the ADB SPS requirement on Biodiversity Conservation and Critical Habitat Assessment including the conduct preliminary screening (e.g. IBAT assessment reports), on-site verifications and consultations, recommend specific measures and provide supervisor support during the planning and construction periods;

293. Civil works contracts and contractors. EMPs are included in bidding and contract documents and verified by the PIUs and PMU. The contractor has required to designate an Environment, Health and Safety (EHS) supervisor to ensure implementation of EMP during civil works. Contractors are to carry out all environmental mitigation and monitoring measures outlinedin their contract. The contractor has submitted to PMU, for review and approval, a site environmental management plan (SEMP) including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program as per SEMP; and (iv) budget for SEMP implementation. No works are allowed to commence prior to approval of SEMP.

294. A copy of the EMP/approved SEMP will be kept on site during the construction period at all times. The EMP included in the bid and contract documents. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

Table 32: Institutional Roles and Responsibilities for Environmental SafeguardsImplementation

Responsible Agency	Responsibility		
	Pre-Construction Stage	**Construction Stage**	**Post-Construction**
PMU Safeguard Officer [E & S Nodal Officer ASCL].	(i) Review REA checklists and assign categorization based on ADB SPS 2009 (ii) Review and approve EIA/IEE (iii) Submit EIA/IEE to ADB for approval and disclosure in ADB website (iv) Ensure approved IEEs are disclosed in PMU websites and summary posted in public areas accessible and understandable by local people. (v) Ensure environmental management plans (EMPs) are included in the bid documents and contracts (vi) Organize an orientation workshop for PMU, PIU, ULB and all staff involved in the project implementation on (a) ADB SPS, (b) Government of India national, state, and local environmental laws and regulations, (c) core labour standards, (d) OH&S, (e) EMP implementation especially spoil management, working in	• Over-all environmental safeguards compliance of the project • Monitor and ensure compliance of EMPs as well as any other environmental provisions and conditions. Review monthly monitoring report. • Prepare and submit to ADB semi-annual monitoring reports. • If necessary, prepare Corrective Action Plan and ensure implementation of corrective actions to ensure no environmental impacts; Review and submit Corrective Action Plans to ADB. • Organize capacity	Compliance monitoring to review the environmental performance of project component, if required and as specified in EMP

Responsible Agency	Responsibility		
	Pre-Construction Stage	**Construction Stage**	**Post-Construction**
	congested areas, public relations and ongoing consultations, grievance redress, etc. (vii) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs. (viii) Organize an induction course for the training of contractors preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures; and taking immediate actions to remedy unexpected adverse impacts or ineffective mitigation measures found during the course of implementation. (ix) Ensure compliance with all government rules and regulations regarding site and environmental clearances as well as any other environmental requirements. (x) Assist PMU, PIUs, and contractor to document and develop good practice construction guidelines to assist the contractors in implementing the provisions of IEE. (xi) Assist in the review of the contractors' implementation plans to ensure compliance with the IEE.	building programs on environmental safeguards. • Coordinate with national and state level government agencies • Assist in addressing any grievances broughtabout through the Grievance Redress Mechanism in a timelymanner as per the IEEs • Coordinate PIUs, consultants and contractors on mitigation measures involving the community and affected persons and ensure that environmental concerns and suggestions are incorporated and implemented.	
PIU, Assistant Engineer Environment	(i) Ensure IEE is included in bid documents and contract agreements. Ensure cost of EMP implementation is provided. (ii) Disclose of approved EIAs/ IEEs. (iii) Obtain all necessary clearances, permits, consents, NOCs, etc. Ensure compliance to the provisions and conditions. (iv) EMP implementation regarding sites for disposal of wastes, camps, storage areas, quarry sites, etc. (v) Organize an induction course for the training of contractors, preparing them on EMP implementation, environmental monitoring requirements relatedto mitigation measures, and on taking immediate action to remedy unexpected adverse impacts or	• Oversee day-to-day implementation of EMPs by contractors, including compliance with all government rules and regulations. • Take necessary action for obtaining rights of way; • Oversee implementation of EMPs, including environmental monitoring by contractors; • Take corrective actions when necessary to ensure no environmental impacts; • Submit monthly environmental monitoring reports	Conducting environmental monitoring, as specified in the EMP. Issuance of clearance for contractor's post-construction activities as specified in the EMP.

Responsible Agency	Responsibility		
	Pre-Construction Stage	**Construction Stage**	**Post-Construction**
	ineffective mitigation measures found during the course of implementation.	to PMU, • Conduct continuous public consultation and awareness; • Address any grievances brought about through the grievance redress mechanism in a timely manner as per the IEEs	
Consultant – PMC-Environmental Specialist	(i) Review IEE/EMP submitted byPIU and revise report to submit toPMU. (ii) Assist PMU and PIU in obtaining all necessary clearances, permits, consents, NOCs, etc. Ensure provisions and conditions are incorporated in the IEE and detailed design documents. (iii) Update initial environmental assessment for proposed project using REA checklists and submit to PIU (iv) Assist in ensuring IEE is included in bid documents and contract agreements. (v) Assist in determining adequacy of cost for EMP implementation. (vi) Assist in summarizing IEE and translating to language understood by local people. (vii) Assist in addressing any concern related to IEE and EMP. (viii) Conduct specific assessment requirements	• Monitor EMP implementation. • Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs. • Monitoring of Implementation of EMP at site by contractor • Recommend corrective action measures for non-compliance by contractors • Assist in the review of monitoring reports submitted by contractors • Assist in the preparation of monthly monitoring reports conduct continuous • Public consultation and awareness;	(i) Assist in the inspection and verification of contractor's post - construction activities.
Consultant – PMC - Construction Manager/ Deputy Construction Manager	(i) Ensure site-specific EMP and Occupational Health and safety measures are prepared by the contractor prior to mobilization / start of construction. (ii) Assist in addressing any concern related to IEE and EMP. (iii) Conduct specific assessment requirements	(i) Monitor EMP implementation at site by the contractor. (ii) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs.	(i) Facilitate and assist environment specialist in the inspection and verification of contractor's post-construction activities.
Contractors (EHS Engineer)	(i) Review the IEE and provide information about changes needed as per revised design and scope of works to E&S Nodal Officer of PMU for final revision of IEE (ii) Prepare EHS plan and take approval from PIU and Ensure	(i) Implement EMP. (ii) Implement corrective actions if necessary. (iii) Prepare and submit monitoring reports including pictures to PIU	(i) Ensure EMP post- construction requirements are satisfactorily complied. (ii) Request Certification from PIU.

Responsible Agency	Responsibility		
	Pre-Construction Stage	**Construction Stage**	**Post-Construction**
	EMP implementation cost is included in the methodology. (iii) Undergo EMP implementation orientation by E&S Nodal Officer of PMU prior to start of works (iv) Provide EMP implementation orientation to all workers prior to deployment to worksites (v) Seek approval for camp sites and sources of materials. (vi) Ensure copy of IEE is available at worksites. Summary of IEE is translated to language understood by workers and posted at visible places at all times.	(iv) Comply with all applicable legislation, is conversant with the requirements of the EMP; (v) Brief his staff, employees, and labourer about the requirements of the EMP and provide environmental awareness training to staff, employees, and labourers; (vi) Ensure any sub-contractors/ suppliers who are utilized within the context of the contract comply with all requirements of the EMP. The Contractor will be held responsible for non-compliance on their behalf; (vii) Bear the costs of any damages/ compensation resulting from non- adherence to the EMP or written site instructions; (viii) Ensure that PIU are timely informed of any foreseeable activities related to EMP implementation.	

D. Training Needs

295. Executing and implementing agencies need to have a sustained capacity to manage and monitor environmental safeguards. Although specialist consultants support will be available to PMU and PIUs, it is necessary to mainstream safeguards in day-to-day working. Therefore, PMU and PIUs require capacity building measures for (i) a better understanding of the project-related environmental issues; and (ii) to strengthen their role in preparation of IEE, implementation of mitigation measures, and subsequent monitoring. Trainings and awareness workshops are included in the project with the primary focus of enabling the PMU and PIU staff to understand impact assessments and carry out environmental monitoring and implement EMPs. After participating in such activities, the participants will be able to review environmental assessments, conduct monitoring of EMPs, understand government and ADB requirements for environmental assessment, management, and monitoring (short and long-term), and incorporate environmental features into future project designs, specifications, and tender documents and carry out necessary checks and balances during project implementation.

296. Typical modules would be as follows: (i) sensitization; (ii) introduction to environment and environmental considerations in projects; (iii) review of IEEs and integration into the project detailed design; (iv) improved coordination within nodal departments; and (v)

monitoring and reporting system. Specific modules customized for the available skill set will be devised after assessing the capabilities of the target participants and the requirements of the project. The contractors will be required to conduct environmental awareness and orientationof workers prior to deployment to work sites.

297.The following **Table 33** presents the outline of capacity building program to ensure EMP implementation. The estimated cost is Rs. 3,35,000 (excluding trainings of contractors which willbe 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 skillset after assessing the capabilities of the target participants and the requirements of the project.

Table 33: Outline of Capacity Building Program on EMP Implementation

Description	Target Participants	Estimate (INR) - (Lump sum)	Cost and Source of Funds
1. Introduction and sensitization to environment issues (1 day) • ADB Safeguards Policy Statement • Government of India and Agartala applicable safeguard laws, regulations and policies including but not limited to core labor standards, OH&S, etc • Incorporation of EMP into the project design and contracts • Monitoring, reporting and corrective action planning	All staff and consultants involved in the project.	Rs.50,000.00	PMU cost
2. EMP implementation (3 days) • Roles and responsibilities • OH&S planning and implementation • Wastes management (water, hazardous, solid, excess construction materials, spoils, etc.) • Working in congested areas, • Public relations • Consultations • Grievance redress • Monitoring and corrective action planning • Reporting and disclosure • Post-construction planning	All staff and consultants involved in the project All contractors prior to award of contract	Rs. 1,00,000.00	PMU cost
3. Plans and Protocols (3 days) • Construction site standard operating procedures (SOP) • Site-specific EMP • Traffic management plan • Spoils management plan • Waste management plan • Chance find protocol • O&M plans Post-construction plan	All staff and consultants involved in the project All contractors prior to award of contract or during mobilizationstage.	Rs. 50,000.00 Rs. 75,000.00	PMU cost
4. Experiences and best practices sharing • Experiences on EMP	All staff and consultants involved in the	Rs. 30,000.00	PMU Cost

Description	Target Participants	Estimate (INR) - (Lump sum)	Cost and Source of Funds
implementation. • Issues and challenges Best practices followed.	project All contractorsAll NGOs		
5. Contractors Orientation to Workers on EMP implementation (OH&S, core labour laws, spoils management, etc)	All workers (including manual laborers) of the contractor prior to dispatch to worksite	Rs. 30,000.00	Contractors cost as compliance to contract provisions on EMP implementation (refer to EMP tables) Activities related to COVID-19 are covered in the bidding documents and respective BOQ.

E. Monitoring and Reporting

298. Prior to commencement of the work, the contractor will submit a compliance report to ASCL ensuring that all identified pre-construction environmental impact mitigation measures as detailed in the EMP will be undertaken. ASCL with the assistance of the Environmental Specialist PMU and consultant environment specialist will review the report and thereafter ASCL will allow commencement of works. During construction, results from internal monitoring by the contractor will be reflected in their weekly EMP implementation reports to the Construction Supervision Specialist. These weekly reports will be retained in Construction Supervision office for reference. Construction Supervision Specialist will review and advise contractors for corrective actions if necessary. Semi-annual monitoring report (**Appendix 17**) summarizing compliance and corrective measures taken will be prepared by Construction Supervision Specialist to be reviewed and endorsed by Municipal Corporation to Agartala Smart City Ltd. SEMR will also include monitoring details relating to the implementation of site specific OHS plan and compliance with the COVID19 plan. Based on monthly reports and measurements, PMU will draft, review, and submit to ADB, 6-monthly (twice a year) EMP implementation progress report **(Appendix 17**). Once concurrence from the ADB is received the report will be disclosed in the Project website. ADB will review project performance against the Agartala Smart City Ltd commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities will be commensurate with the project's risks and impacts. Monitoring and supervising of social and environmental safeguards will be integrated into the project performance management system. The details of tentative environmental monitoring locations during the construction phase are given in **Figure 29.**

299. Monitoring Methods: All environmental monitoring and relevant operational data will be stored in a relational database and linked MIS system. This will enable efficient retrieval and storage and interpretation of the data. Regular data extracts and interpretive reports will be sent to the regulator.

300. Air Quality Monitoring: The ambient concentrations of PM_{10}, $PM_{2.5}$, SO_2, NOx, CO in the ambient air will be monitored at regular intervals. Any abnormal rise will be investigated to identifythe causes, and appropriate action will be initiated. Green belt shall be developed for minimizingdust propagation. The ambient air quality data should be transferred and processed in acentralized computer facility equipped with required software. Trend and statistical analysis should be done.

301. Noise Levels: Ambient noise levels near habitations shall also be monitored once in six months. Audiometric tests should be conducted periodically for the employees working

close to the high noise sources.

302. Monitoring of Surface Water: Methods prescribed in "Standard Methods for Examination of water and Wastewater" prepared and published jointly by American Public Health Association (APHA), American Water Works Association (AWWA) and Water Pollution Control Federation (WPCF); Manual on water and wastewater Analysis published by NEERI, Nagpur are recommended.

303. Monitoring of Groundwater: The groundwater samples shall be taken from representative locations periodically and analyzed for necessary corrective actions, if any.

304. Data Analysis: The monitored data will be analyzed and compared with the baseline and the regulatory standards specified by different government agencies. The standards against which the different environment components will be compared are as per **Table 34.** Environment monitoring plan is shown in **Table 35.**

Figure 29: Monitoring location during construction stage

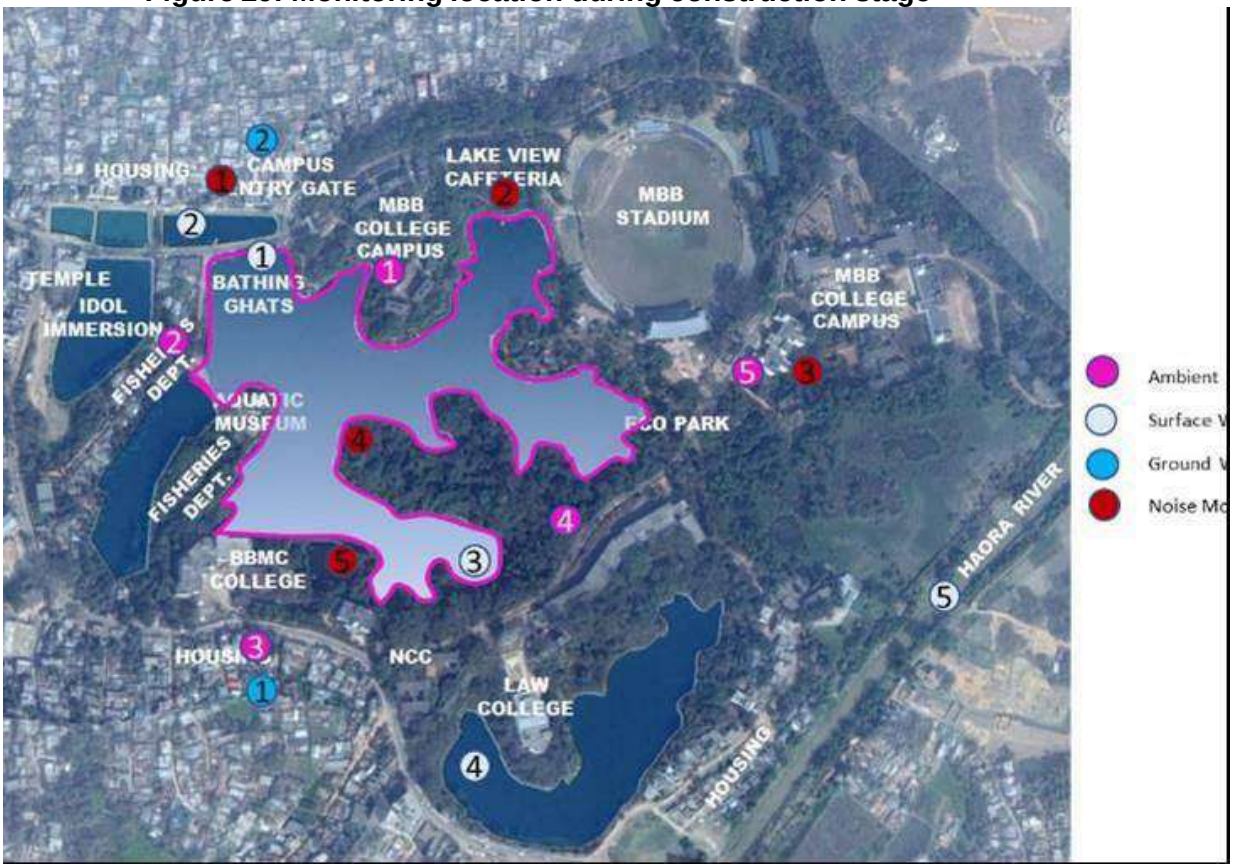


Table 34: Applicable Standards for Different Environmental Components

Sr. No.	Component	Applicable Standards
1	Ambient Air Quality	National Ambient Air Quality standards, CPCB
2	Noise Quality	Ambient Air Quality Standards with Respect to Noise, CPCB
3	Surface water Quality	IS:2296: Class 'C' "D" Water, CPCB
4	Ground water Quality	IS: 10500 Standards, BIS

Table 35: Environmental Monitoring Plan

Sr. No.	Type	Locations	Parameters	Period and Frequency	Institutional Responsibility	
					Implementation	Supervision
Pre- Construction Phase						
1	Ambient Air Quality	5 locations	PM10, $PM_{2.5}$, Sulphur dioxide (SO_2), Oxides of nitrogen (NO_2), Carbon monoxide (CO), Hydrocarbon (HC), Volatile Organic Compounds (VOC's)	24-hr (8hr for CO) average samples once	Contractor through MoEFCC approved agency	PIU
2	Surface Water	5 locations	pH, TSS, TDS, DO, BOD, Salinity, Total Hardness, Fluoride, Chloride and MPN (No. of coli forms / 100ml), Heavy Metals	once	Contractor through MoEFCC approved agency	PIU
3	Ground Water	2 locations	pH, TSS, TDS, DO, BOD, Salinity, Total Hardness, Fluoride, Chloride and MPN (No. of coli forms / 100ml), Heavy Metals	once	Contractor through NABL approved agency	PIU
4	Noise	4 locations	24 hrly Day and Night time Leq levels	once	Contractor through NABL approved agency	PIU
Construction Phase						
1	Ambient Air Quality	4 locations	PM10, $PM_{2.5}$, Sulphur dioxide (SO_2), Oxides of nitrogen (NO_2), Carbon monoxide (CO), Hydrocarbon (HC), Volatile Organic Compounds (VOC's)	24-hr. (hr. for CO) average samples once in a quarter, except monsoon	Contractor through NABL approved agency	PIU

Sr. No.	Type	Locations	Parameters	Period and Frequency	Institutional Responsibility	
					Implementation	Supervision
2	Surface Water	2 locations	pH, TSS, TDS, DO, BOD, Salinity, Total Hardness, Fluoride, Chloride and MPN (No. of coli forms / 100 ml), Heavy Metals	once in a quarter	Contractor through NABL approved agency	PIU
3	Ground Water	2 locations	pH, TSS, TDS, DO, BOD, Salinity, Total Hardness, Fluoride, Chloride and MPN (No. of coli forms / 100 ml), Heavy Metals	once in a quarter	Contractor through NABL approved agency	PIU
4	Noise	4 locations	24 hourly Day and Night time Leq levels	once in a Quarter except monsoon	Contractor through NABL approved agency	PIU
Operation Phase						
1	Ambient Air Quality	4 locations	PM10, PM2.5, Sulphur dioxide (SO_2), Oxides of nitrogen (NO_2) Carbon monoxide (CO) Hydrocarbon (HC) (VOC's).	24-hr (8hr for CO) average samples once in a quarter	O&M Contractor through NABL approved agency	PMU
2	Ground Water	2 locations	pH, TSS, TDS, DO, BOD, Salinity, Total Hardness, Fluoride, Chloride and MPN (No. of coli forms / 100 ml), Heavy Metals.	once in a quarter	O&M Contractor through NABL approved agency	PMU
3	Surface Water	2 locations	pH, TSS, TDS, DO, BOD, Salinity, Total Hardness, Fluoride, Chloride and MPN (No. of coliforms / 100ml), Heavy Metals.	once in a quarter	O&M Contractor through NABL approved agency	PMU

Sr. No.	Type	Locations	Parameters	Period and Frequency	Institutional Responsibility	
					Implementation	Supervision
4	Noise	4 locations	24hrly Day and Night time Leq levels	once in a quarter	O&M Contractor through NABL approved agency	PMU
5	Implementation of COVID guidelines	All Construction site, worker camp and contractor's offices	As mentioned, In latest government guidelines	Daily and weekly reporting to PMU	Contractor through authorized Agency to handle COVID-19	PIU and PMU

F. EMP Implementation Cost

305. Most of the mitigation measures require the contractors to adopt good site practice, whichshould be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. Regardless of this, any costs of mitigation by the construction contractors or consultants are included in the budgets for the civil works and do not need to be estimated separately here. Mitigation that is the responsibility of ULBs will be provided as part oftheir management of the project, so this also does not need to be duplicated here. Cost for the capacity building program is included as part of the project. The EMP cost includes the cost for providing water supply and sanitation facilities for the workers. In addition to this, hard barricades need to be provided at the work sites to prevent any entry of the public or animals into the worksiteand to prevent any possible accidents.

Table 36: Estimated amount for implementation of EMP during pre-construction, construction & operation phase

Sr. No.	Description	Stage	Unit	Quantity	Rate (Rs)	Amount (Rs)	Cost Covered by
A	**Implementation staff**						
1	EHS Officer	Construction	Per month	18	50,000	900,000	Civil Works Contract
B	**Monitoring measures**						
	Pre-Construction Phase						
1	Periodic air quality monitoring during pre-construction stage at locations specified. The parameters to be monitored are PM_{10}, $PM_{2.5}$, SO_2, NOx, CO. Each monitoring schedule shall be over a duration of 24 hours (in8-hour shifts), once.	Pre-Construction	Nos.	5	8,000	40,000	Civil Works Contract
2	Surface Water quality monitoring during pre-construction phase at locations given. The sampling shall be carried out once and cover all parameters as per IS10500 including heavy metals	Pre-Construction	Nos.	5	10,000	50,000	Civil Works Contract

Sr. No.	Description	Stage	Unit	Quantity	Rate (Rs)	Amount (Rs)	Cost Covered by
3	Ground Water quality monitoring during pre-construction phase at locations given. The sampling shall be carried out once and cover all parameters as per IS10500 including heavy metals	Pre-Construction	Nos.	2	10,000	20,000	Civil Works Contract
4	Noise level monitoring at specified areas. Each monitoring schedule shall be over a duration of 12 hours (6AM to 6PM), once. The monitoring shall be carried out in accordance with CPCB norms	Pre-Construction	Nos.	5	2000	10,000	Civil Works Contract
Construction Phase							
1	Periodic air quality monitoring during construction stage at locations specified. The parameters to be monitored are PM_{10}, $PM_{2.5}$, SO_2, NOx, CO. Eachmonitoring schedule shall be over a duration of 24 hours (in8-hour shifts), once in quarter except for monsoon for 5 quarters for 18 months.	Construction	Nos.	25	8,000	2,00,000	Civil Works Contract
2	Surface Water quality monitoring during construction phase at locations given. The sampling shall be carried out once in quarter except for monsoon for 5 quarters for 18 months and cover all parameters as per IS 2296 including heavy metals	Construction	Nos.	25	10,000	2,50,000	Civil Works Contract
3	Ground Water quality monitoring during construction phase at locations given. The sampling shall be carried out once in quarter except for monsoon for 5 quarters for 18 months and cover all parameters as per IS10500 including heavy metals	Construction	Nos.	10	10,000	1,00,000	Civil Works Contract
4	Noise level monitoring at specified locations. Each monitoring schedule shall be over duration of 12 hours(6AM to 6PM), once in quarter except for monsoon for 5 quarters for 18 months. The monitoring shall be carried out in accordance with CPCB norms.	Construction	Nos.	25	2000	50,000	Civil Works Contract
Operation Phase							

Sr. No.	Description	Stage	Unit	Quantity	Rate (Rs)	Amount (Rs)	Cost Covered by
1	Periodic air quality monitoring during operation phase at major settlement areas along project road. The parameters to be monitored are PM_{10}, $PM_{2.5}$, SO_2, NOx, CO. Each monitoring schedule shall be over a duration of 24 hours (in 8-hour shifts), once quarter except for monsoon for 6 quarters for 2 Years.	Operation Phase	Nos.	30	8,000	240,000	PIU
2	Surface Water quality monitoring during operation phase at locations given. The sampling shall be carried out once in quarter except for monsoon for 6 quarters for 2 years and cover all parameters as per IS 2296 including heavy metals.	Operation Phase	Nos.	30	10,000	300,000	PIU
3	Ground Water quality monitoring during operation phase at locations given. The sampling shall be carried out once in quarter except for monsoon for 6 quarters for 2 years and cover all parameters as per IS10500 including heavy metals.	Operation Phase	Nos.	12	10,000	120,000	PIU
4	Noise level monitoring at specified locations. Each monitoring schedule shall be over duration of 12 hours(6AM to 6PM), once in quarter except for monsoon for 6 quarters for 2 Years). The monitoring shall be carried out in accordance with CPCB norms.	Operation Phase	Nos.	30	2000	60,000	PIU
	Subtotal (B)					**1,440,000**	
C	**Capacity Building**						
1	Introduction and sensitization to environment issues.	Pre-Construction	Lumpsum			50,000	PMU
2	EMP implementation.	Construction	Lump sum			100,000	PMU
3	Plans and Protocols	Construction	Lump sum			50,000	PMU
			Lumpsum			75000	Civil works contract

Sr. No.	Description	Stage	Unit	Quantity	Rate (Rs)	Amount (Rs)	Cost Covered by
4	Experiences and best practices sharing.	Construction/ Post-Construction	Lump sum			30,000	PMU
5	Contractors Orientation to Workers on EMP implementation (OHS, core labor laws, spoils management, etc.) Activities related to COVID-19 are covered in the bidding documents, respective BOQ and safeguards documents	Prior to dispatch to worksite	Lumpsum			30,000	Civil works contract
	Subtotal (C)					**335,000**	
D	**Civil Works**						
1	Regular water sprinkling (at least 2 times, 3hrs per day) per day at all construction sites for suppression of visible dust levels. Hire charges for water tanker. Note: This item is to be operated after the completion of earthwork to suppress the visible dust levels. Cost of watering during compaction of earthwork is deemed to be already covered under civil works. (Code No. 0130, Building Works PWD SoR 2017 PWD Basic Rate:Page-1)	Construction	hours	1350	310	418,500	Civil works contract
2	Construction of shelters for workers.	Construction	lumpsum			300,000	Civil works contract
3	Providing Water SupplyFacility for the workers.	Construction	Lump sum			200,000	Civil works contract
4	Provision of Portable Toilets for construction workers at workers' camp (Market Rate).	Construction	Nos.	6	40000	240,000	Civil works contract
5	Providing Personal Protective Equipment to the labours during the construction phase of the project.	Construction	cost/ person / annum	80	1,000	80,000	Civil works contract
6	Waste bins for segregation of waste at Workers' camp (Market Rate)	Construction	Nos.	4	3123	12,492	Civil works contract
7	Waste bins for segregation of waste at Construction site (Market Rate)	Construction	Nos.	4	3123	12,492	Civil works contract

Sr. No.	Description	Stage	Unit	Quantity	Rate (Rs)	Amount (Rs)	Cost Covered by
8	First Aid Boxes for the construction site (Market Rate)	Construction	Nos.	3	1964	5,892	Civil works contract
9	First Aid Boxes for the workers camp (Market Rate)	Construction	Nos.	2	1964	3,928	Civil works contract
10	Installation of a steel portable barricade with horizontal rail 300 mm wide, 2.5 m in length fitted on a 'A' frame made with 45 x 45 x 5 angle iron section, 1.5 m in height, horizontal rail painted (2 coats) with yellow and white stripes, 150 mm width with an angle of 450, 'A' frame painted with 2 coats of yellow paint, complete as per IRC: SP:55-2001 (Sr. No. as per SDB 8.37 new, SOR 2017 for Roads & Bridge Works, Tripura, PWD R&B)Page 56 of 240)	Construction	Nos	20	2,493.9	49,878	Civil works contract
11	Providing and fixing of retro-reflectorized cautionary, mandatory and informatory sign as per IRC:67 made of high intensity grade sheeting vide MoRT&H technical specification Clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M 15 grade cement concrete 450 mm x 450 mm x 600 mm, 600 mm below ground level as per drawings and MoRT&H Technical Specification Clause 801. 800 mm x 600 mm rectangular Unit Each Taking output = one traffic sign(Sr. No. 8.4 Ref. to MoRTH Spec. 801, MoRT&H Analysis, Tripura PWD Page 152 of 388).	Construction	Perunit	5	2,417.60	12,088	Civil works contract
14	Disposal of surplus earth demolished old plaster, RCC waste, brick waste and other wastes/ rubbles into the Landfill site of Agartala Municipal Corporation (15 km from proposed MBB College project site) (Sl. No. 1.1.1 SOR 2017:PWD (Buildings),	Construction	cum	1456.6	258	375,802.8	Civil works contract

Sr. No.	Description	Stage	Unit	Quantity	Rate (Rs)	Amount (Rs)	Cost Covered by
	Tripura/ Mechanical Carriage. SH:01- Page:2)						
12	Providing Silt fencing along lake edge for protection of MBB College lake water body from siltation (Market Rate)	Construction	RMT	2335	340	793,900	Civil works contract
	Subtotal (D)					**2,504,972**	
	CAPEX					**44,59,972.00**	
	OPEX					**720,000**	
	GRAND TOTAL					**51,79,972.00**	

IX. CONCLUSIONS AND RECOMMENDATIONS

306. The process described in this document has assessed the environmental impacts of all elements of the MBB College lake revitalization in Agartala. All potential impacts were identified in relation to preconstruction, construction, and operation phases. Planning principles and design considerations have been reviewed and incorporated into the site planning and design process wherever possible; thus, environmental impacts as being due to the project design or location were not significant.

307. There are no environmentally or archeologically sensitive areas within MBB college lake premises. There is no Protected forest area within 10 km of radius. Nearest Wildlife Sanctuary- Sepahijila at 18 km. The MBB lake is mostly surrounded by urban areas and MBB college, and lake is home for many migratory and residential birds and various measures are included to avoidany impacts on avian fauna.

308. There will be temporary negative impacts, arising mainly from construction dust and noise,hauling of construction material, waste and equipment on local roads (traffic, dust, safety etc.), mining of construction material, occupation health and safety aspects. The works will be conducted along defined boundary of lake within the urban area congested with people, activities and traffic, subproject is likely to significant impacts during construction. Impacts mainly arise from the construction dust and noise; from the disturbance of residents, businesses, traffic by the construction work, safety risk to workers, public, disposal of large quantities of construction waste,etc. These are all general impacts of construction in urban areas, and there are well developed methods of mitigation that are suggested in the EMP.

309. Mitigation will be assured by a program of environmental monitoring conducted during construction and operation to ensure that all measures are implemented, and to determine whether the environment is protected as intended. This will include observations on- and off-site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported to the PMU. Mitigation and monitoring measures, along with the project agency responsible for such actions, form part of the Environmental Management Plan.

310. Stakeholders were involved in developing the IEE through face-to-face discussions, on site meetings, and a city level consultation workshop, which was conducted for larger public participation in the project. Views expressed by the stakeholders were incorporated into the IEE and the planning and development of the project. The updated IEE will be made available at public locations and will be disclosed to a wider audience via the PMU

and ADB websites. The consultation process will be continued during project implementation to ensure that stakeholders are engaged in the project and have the opportunity to participate in its development and implementation. The project's grievance redress mechanism will provide the citizens with a platform for redress their grievances, and describes the informal and formal channels, time frame, and mechanisms for resolving complaints about environmental performance.

311. The EMP will assist the project agencies and contractor in mitigating the environmental impacts, and guide them in the environmentally sound execution of the proposed project. A copy of the updated EMP/ SEP shall be kept on-site during the construction period at all times. The EMP shall be made binding on all contractors operating on the site, and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance. The project will provide better and enhanced the ecotourism in MBB College Lake area, Therefore, as per ADB SPS, 2009 the project is classified as environmental category B and does not require further environmental impact assessment. This IEE has been updated by PMU due to change in pilling work methodology within lake water and night time work proposed by the contractor. Change in methodology will result some of the temporary impact on aquatic flora & fauna. No additional impact is envisaged. Night time safety measures has been included in the EMP.

Appendix 1: Updated Rapid Environmental Assessment (REA) Checklist (Urban Development)

Instructions:

(i) This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable DevelopmentDepartment

(ii) This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.

(iii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i)involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.

(iv) 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:	India/ Agartala City Urban Development Project - Revitalization of MBB College lake campus
Sector:	Urban Development

Screening Questions	Yes	No	Remarks
A. Project Siting Is the Project area adjacent to or within any of the following environmentally sensitive areas?			
Densely populated?		No	No negative impacts are envisaged as the lake development work will be done in and around the lake area where there is less population. Minimal road disruption is expected and measures such as best activity scheduling, traffic management, etc. will be employed to minimize the impact to acceptable levels.
Heavy with development activities?		No	The area is free from any major activities.
Adjacent to or within any environmentally sensitive areas?		No	Sepahijala Wildlife sanctuary is situated at about 17 km
Cultural heritage site		No	There are no cultural heritage sites identified on the project corridor. Ujjayanta Palace is a landmark tourist site located at a distance of 1.2 km. (Source: Tripura Tourism Website, http://tripuratourism.gov.in/heritage-sites)
Protected Area		No	There is no Protected area within 10 km of radius. Nearest Wildlife Sanctuary- Sepahijila at 17 km. (Source: Wildlife and protected areas of Tripura Map by Wildlife Institute of India)
Wetland	Yes		MBB College lake/ College Tilla lake is identified among the 7 important inland wetlands of Tripura in terms of biodiversity conservation.

Screening Questions	Yes	No	Remarks
			(Source: National Wetland Atlas of Tripura, prepared by Space Application Center)
Mangrove		No	
Estuarine		No	
Buffer zone of protected area		No	
Special area for protecting biodiversity		No	
B. Potential Environmental Impacts Will the Project cause			
Impacts on the sustainability of associated sanitation and solid waste disposal systems and their interactions with other urban services.		No	The sewage and solid waste generated during operation phase to the tune of 12 KLD and 50 KG per day respectively will be treated in toilets with biodigesters and solid waste will be collected in bins and handed over to AMC collection vehicles.
Deterioration of surrounding environmental conditions due to rapid urban population growth, commercial and industrial activity, and increased waste generationto the point that both manmade and natural systems are overloaded and the capacities to manage these systems are overwhelmed?		No	No such condition is envisaged.
Degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds and forests)?		No	The project will not cause degradation of land and ecosystem.
Dislocation or involuntary resettlement of people		No	
Degradation of cultural property, and loss of cultural heritage and tourism revenues?		No	Improvement in tourism revenue anticipated due to the development of the lake as an ecotourism destination
Occupation of low-lying lands, floodplains and steep hillsides by squatters andlow-income groups, and their exposure to increased health hazards and risks due to pollutive industries?		No	
Water resource problems (e.g. depletion/ degradationof available water supply, deterioration for surface and ground water quality, and pollution of receiving waters?	Yes		Sanitation problems may occur temporarily during construction phase due to generation of sewage and solid waste from the construction/ labour camp.
Air pollution due to urban emissions?	Yes		Minor impacts during construction phase are anticipated due to excavation, demolition, transport of

Screening Questions	Yes	No	Remarks
			materials and operation of equipment like diesel generators and concrete mixers.
Social conflicts between construction workers from other areas and local workers?		No	
Road blocking and temporary flooding due to land excavation during rainy season?	Yes		Temporary diversion or partial closure of MBB college road (near public zone B) may be required during construction phase. Flooding will be eliminated by planning excavation activities only during non-rainy days.
Noise and dust from construction activities?	Yes		Minor noise and dust from construction activities is anticipated which shall be temporary in nature coinciding only with the duration of construction activities.
Traffic disturbances due to construction material transport and wastes?	Yes		The transportation of construction material and wastes shall be site specific and restricted to daily requirements which is not expected to result into traffic disturbances.
Temporary silt runoff due to construction?	Yes		Temporary silt runoff may be there during rainy season.
Hazards to public health due to ambient, household and occupational pollution, thermal inversion, and smog formation?	Yes		The project will cause air, noise and water pollution during construction phase. Solid waste and sewage will be generated during the operation phase. These may cause hazard to public health.
Water depletion and/or degradation?	Yes		Degradation in water quality is envisaged due to construction activity. However, isolated construction using barriers will be adopted to ensure minimal damage to water quality. During the operation phase no water depletion and degradation is envisaged.
Overpaying of ground water, leading to land subsidence, lowered ground water table, and salination?		No	Not anticipated as per the nature of the work
Contamination of surface and ground waters due to improper waste disposal?		No	There will be around 50 kg per day of municipal solid waste and 12 KLD of sewage generation due to increase in visitors' footfall. However, the solid waste collected will be collected in 70 bins placed all over the lake and the waste will be handed over to AMC for further processing without disposing in the surroundings. The sewage will be processed in toilets with bio-digestors.
Pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?		No	No water pollution is envisaged during the operation phase, as the sewage generated will be treated in toilets with biodigesters and solid waste will be handed over to AMC without disposing in water bodies. The fishing activity will continue in the same way. There is no threat to fisheries from the proposed activities.
Climate Change and Disaster Risk Questions			
The following questions are not for environmental categorization. They are included in this checklist to help identify potential climate and disaster risks.			

Screening Questions	Yes	No	Remarks
Is the Project area subject to hazards such as earthquakes, floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and climate changes	Yes		The area is not subject to floods, landslides, tropical cyclone winds, storm surges, tsunami or volcanic eruptions and localized climate changes. However, the project area falls in high damage seismic Zone-V as per seismic zonation map of India. The structures are designed considering IS 1893: Part 1.
Could changes in temperature, precipitation, or extreme events patterns over the Project lifespan affect technical or financial sustainability (e.g., changesin rainfall patterns disrupt reliability of water supply; sea level rise creates salinity intrusion into proposed water supply source)?		No	
Are there any demographic or socioeconomic aspects of the Project area that are already vulnerable (e.g., high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		No	
Could the Project potentially increase the climate or disaster vulnerability of the surrounding area (e.g., by using water from a vulnerable source that is relied upon by many user groups, or encouraging settlement in earthquake zones)?		No	

A Checklist for Preliminary Climate Risk Screening

Screening Questions		Score	Remarks[22]
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?	0	No such issue may affect the project
	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	No such issue may affect the project

[22] 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 1

Screening Questions		Score	Remarks[21]
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)?	0	No such issues may affect the project
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	0	No such issue may affect the project
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?	0	No problem will envisaged in future which likely affect the performance of project output

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 allresponses 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 include 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): Low

Other Comments: The proposed subproject activity involves renovation of existing structures and no new area or infrastructure is proposed for construction and anticipated environmental impactsare very marginal and the construction activity does not impose any threat to the existing climaticconditions.

Appendix 2: "No Mitigation Scenario Checklist" (Scoping

Checklist)Part 1 - Questions on Project Characteristics

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
1. Will construction, operation or decommissioning of the Project involves actions which will cause physical changes in the locality (topography, land use, changes in water bodies, etc)?				
1.1	Permanent or temporary change in land use, land cover or topography including increases in intensity of land use?	Yes	The project involves revitalization of existing Maharaja Bir Bikram lake for the development of the site as a tourist destination in the future. The land-use change due to the proposed development is minimal without changing the overall land use of the area. However, the expected increased influx of people/tourist will affect the carrying capacity of area in terms of available facilities (toilets, solid waste handling facilities, water supply, etc.). The project is developed in Zone concept and the salient features of each zone are given below: - • Zone 1- Eco Park. Redevelopment and Up gradation of the existing Eco park at the main Lake edge. This will include Gazebo plaza, riverside entry plaza, shops and cafeteria. • Zone 2- Lake View Cafeteria. Refurbishment of existing cafeteria. • Zone 3- Public Zone A. development of public zone comprising of entrance, Jungle gym, Yoga/ meditation court and open-air gym. • Zone 4- Botanical Zone. Development of botanical garden with theme garden (Bamboo garden, butterfly garden), rain garden and on-site nursery. • Zone 5- Palm Walk. Development of 390 m long palm walk with 450 palm trees along the pedestrian pathway.	Yes, A public zone will be created on lake side along with widening of pathways leading to increase in tourism footfall. The land-use change during construction will be temporary in nature and the impact will be in a very limited area. The proposed project is to improve the existing facilities surrounding the lake area for promoting the tourism in area. The land use of the area will remain the same even after construction period.

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
			• Zone 6- Commercial Zone. Development of deck and ticket counter formanaging the commercial surfaced water activities like swimming, boating etc. • Zone 7- Public Zone B. Development of public gathering and activity spaces including- kids play area, Amphitheatre, food court and fountain plaza. Subproject involves construction of structures on the water body at Public Zone B. During this construction water will be obstructed temporarily in the work zone. The proposed MBB College lake project involves extensive landscaping with variety of native and exotic plants to add to the natural beauty of the place, which includes plantation of 365 large trees, 450 palm trees and small, medium and large shrubs covering an area of 16600 m^2.	
1.2	Clearance of existing land, vegetation and buildings?	Yes	Clearing vegetation like grass, herbs and shrubs (both small and large) for the construction activities like widening of pathways, creation of buildings and structures (cafeterias, ticket booths, viewing decks, seating areas, etc.) for 13905 m^2 area. Project will involve cutting of 7 number of trees. The proposed trees to be felled are common species of *Saraca asoca (2), Eucalyptus globulus (1), Mangifera indica (1), Artocarpus heterophyllus (1), lagerstroemia speciose (2).* No threatened or endangered species of plant were cited in the proposed MBB development area as per the 'Checklist of Rare and Threatened Plants of Tripura'	Yes The significant impact will be due to dust generation from the clearance activity and stockpiles and from therunoff from stockpile which may contaminate the MBB College lake if not managed properly. Other impacts will be: • Loss of greenery due to haphazard clearing and changes in micro climatic condition • Soil erosion • Damage to existing habitats • Disruption to other visitors/ users of MBB College lake • Disturbance/ damage to existing utilities.

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
			listed in www.indiabiodiversity.org. Clearing the existing watch Tower	The demolition of the existing watch tower will not have a significant impact as it will be re-developed.
1.3	Creation of new land uses?	No		
1.4	Pre-construction investigations e.g. boreholes, soil testing?	Yes	None. Soil investigation/ testing will be conducted for the design of structural foundation, but this involves small area.	No, Geotechnical investigations will involve obtaining a borehole sample for proposed infrastructures. Since undisturbed core would be extracted using a core cutter there would be no impacts on the topography or the geology
1.5	Construction works?	Yes	The following construction works are proposed: - • Refurbishment of the existing pathway (1450 m^2), Foot Bridge (12 m^2) and pontoon bridge (140 m^2). • Renovation of existing gazebos, 14 in no, 10 m^2 each. • Construction of new decks with ticket counter 91100 m^2). • Construction of play area (200 m^2), Amphitheatre (225 m^2) and food court (160 m^2). • Installation of fountain plaza spread in 350 m^2. • Construction of public toilets, 3 in no, with 120 m^2 each. • Construction of ghatin 60 m^2. • Up gradation of Boundary wall, 860 running meter and 2.4 m height. • Construction of 2 watch towers 0f 7.765 m height and 112 m^2 area.	Yes, The construction will continue for 18 months These triggers of pollution during construction phase will bring significant adverse impact to the receptors in the area (e.g. institutions and residential/ commercial establishments around the lake). The significant impacts due to the construction activity will be: • Deterioration in the Air Quality due to construction activity. • Noise impact on sensitive receptors like residential areas, institutional areas and the fauna at the site. Other impacts include • Siltation of MBB College lake and degradation of water quality • Impact on landscape and aesthetics

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
			This construction work will involve: **13025 cum** of **Piling work** for open air theatre, children's play area, food and beverages area, S2 area, walkways, water fountains, viewing deck, rain garden bridge, lake view seating etc., **7872 cum** of **excavation** for retaining walls, boundary walls, gazebo, viewing point, machan footing, public zone, ponton bridge, saucer drain, culverts etc., **6696 cum Filling of excavated earth** in roads, public zone, viewing point, boundary wall, probishti urban platform,saucer drain, as barrier for retaining water beforeconstruction etc.,	• Hindrance to traffic movement on MBB College Road. • Nuisance/ disturbance to sensitive receptors • Disturbance to migratory birds • Impact on water flow to MBB College lake.
1.6	Demolition works?	Yes	• Demolition of 2910 m^2 of existing CC interlocking paver blocks from footpaths/ central verge • Demolition of 60 cum of reinforced concrete, • Dismantling of steel works of 2500 kg from the existing watch tower, • Scarifying 900 m^2 of existing bituminous surface to a depth of 150 mm. • Dismantling old plaster from existing structures of 3242 m^2 area, • Demolishing brickwork of 32 cum. • Dismantling of tile work for 504 m^2 area.	Yes Demolition works will contribute to noise generation creating significant impact in the neighborhood of MBB College lake. Other impacts that are linked to demolition works are: • Air Pollution due to dust emission • Soil and Water contamination due to unsafe storage and disposal of demolition debris. • Hindrance to access of visitors to the lake area • The demolition debris may cause blocking of water coming to and from the MBB College lake.

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
1.7	Temporary sites used for construction works or housing of construction workers?	Yes	**Construction works**- the project will involve storage/ stockpiling of raw material, demolition debris etc. All these have potential of land, water and air pollution.	Yes. The discharge in the form of leakages, runoff etc. from the stockpiles or other construction works will degrade the water quality of the MBB College lake as well as the nearby waterbodies. This will also cause land and air pollution if not managed appropriately.
			Housing of construction workers- the labour camp will be for approximately 80 number of labours involved in the subproject. This will lead to generation of 8.64 KLD of waste water and 32 kgs of solid waste every day at the construction worker's camp.	Yes The establishment of labour camp will have significant impacts on environment due to: • Water and land pollution due to discharge of sewage from work camp • Loss of trees for fuelwood • Spread of diseases due to Ill health and unhygienic conditions.
1.8	Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations?	Yes	Construction of Ticketing booths, cafeteria, decks, steps, seating areas etc. 7872 cum. of excavation earth will be generated due to the following excavation activities for: • Retaining walls for Public Zone A, fisheries to BBMC College, amphitheater, viewing deck. • Footing for boundary walls, public zone, lakeview seating, sculpture platform, entry portal, probishti uthan platform. • Gazebo, viewing point, public zone, pontoon bridge, saucer drain, culverts etc.,	Yes. The excavation activities in the project will have significant environmental impacts due to: • Dust generation from stockpiles. • Dangers due to deep excavation and chances of accidents. Other impacts could be: • Runoff from stockpile of excavated soil • Noise generation from excavation • Siltation of MBB College lake
1.9	Underground works including mining or tunnelling?	No		
1.10	Reclamation works?	No		
1.11	Dredging?	No	The lake revitalization project does not involve any type of dredging activity.	

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
1.12	Coastal structures eg seawalls, piers?	No		
1.13	Offshore structures?	No		
1.14	Production and manufacturing processes?	No		
1.15	Facilities for storage of goods or materials?	Yes	Temporary yards will be set up for storage of pipes, construction material, backfill material, etc. These yards and materials could affect aesthetics at the site, and mobility or free movement of pedestrians and vehicles.	Yes, If not stored properly the stored material will affect the accessibility of the people visiting to the park, this may also cause inconvenience to pedestrians and vehicle movement in the area. The runoff from the storage and stockpile area if enters the MBB College lake can deteriorate the water quality.
1.16	Facilities for treatment or disposal of solid wastes or liquid effluents?	Yes	Labour camp for about 80 inhabitants will generates both solid and liquid waste of around 32 Kg/ day and 8.64 KLD respectively. The liquid waste/ sewage generated will contaminate water bodies and ground water if discharged without treatment. The solid waste generated from labour camp will contaminate the land and water if disposed directly.	Yes. The sewage generated from the labour camp may cause pollution of nearby water bodies if not treated, solid waste from the labour camp waste may also cause land contamination as well as pollution of water bodies. The solid waste generated if not handled properly will contaminate the land and water bodies.
			During operation phase around 1000 visitors are expected to visit the lake and other facilities. The visitors will generate around 50 Kg/ day of solid waste and around 12 KLD of wastewater/ sewage The solid waste generated during the operation phase will contaminate the land and water if disposed directly.	The solid waste and sewage generated from the toilets during operation phase if not adequately managed may contaminate the receiving water bodies i.e. MBB College lake and can also cause land pollution and visual pollution.
1.17	Facilities for long term housing of operational workers?	No		

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
1.18	New road, rail or sea traffic during construction or operation?	No		
1.19	New road, rail, air, waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc?	No		
1.20	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?	Yes	Development of Public Zone B adjoining the MBB College road may lead to temporary closure or diversion of the MBB College Road leading to change in traffic movement	Yes, This will cause inconvenience to the nearby residents during the time of construction
1.21	New or diverted transmission lines or pipelines?	No		
1.22	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?	No		
1.23	Stream crossings?	No		
1.24	Abstraction or transfers of water from ground or surface waters?	Yes	No ground water abstraction is proposed for the project During construction at PublicZone B, a temporary barricade will be created to segregate the work zone from the lake. Water from the construction/ work zone area will be pumped to the other side of the lake. Post construction the barricading will be removed.	Yes. There would be temporary impacts on aquatic flora and fauna In case the construction isnot planned section-wise, significant impact to the aquatic life of the entire water body
1.25	Changes in water bodies or the land surface affecting drainage or run-off?	No		
1.26	Transport of personnel or materials for construction,	Yes	Transportation vehicles for the movement of around 80 workers, construction equipment, and construction	Yes. The usage of construction vehicle and equipment will have significant noise

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
	operation or decommissioning?		materials will generate dust and noise.	generation due to its operation and soil and water pollution due to spillage/ leakage of fuel/ oil or lubricants. The other impacts could be Dust and emission generation from vehicle and equipment.
1.27	Long term dismantling or decommissioning or restoration works?	Yes	An old watch tower (Steel structure) will be demolished and redesigned. This will cause generation of scrap steel of about 2.5 MT.	Yes The scrap steel if not stored and disposed properly may cause inconvenience to passer by and trip hazard
1.28	Ongoing activity during decommissioning which could have an impact on the environment?	No		
1.29	Influx of people to an area in either temporarily or permanently?	Yes	There will be around 1000 visitors visiting the proposed MBB College lake area on daily basis after operation.	Yes. The influx of visitors due to the increased recreational amenities will lead to significant impact due to: • Water pollution due to generation of 12 KLD of sewage • Solid waste generation of 50 kg/ day causing environmental pollution • Air pollution from vehicle movement increase. There are also safety hazards like fall hazard into the MBB College lake and probability of snake bite.
1.30	Introduction of alien species?	No		
1.31	Loss of native species or genetic diversity?	No	The MBB project involves cutting of 7 trees and clearing of shurbs and jungle in an area of around 13,900 m^2.	No All the trees proposed to be cut are common species.This will not cause loss ofnative species of geneticdiversity.
1.32	Any other actions?	No		
2. Will construction or operation of the Project use natural resources such as land, water, materials or energy, especially any resources which are non-renewable or in short supply?				
2.1	Land especially undeveloped or agricultural land?	No	The revitalization is planned in the existing land area.	No Proposed development is planned in existing lake area

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
				no new undeveloped or agricultural land will be used.
2.2	Water?	Yes	During the construction phase, water would be used for construction purposes. During the operations phase water will be used for drinking, plantation etc.,	No, The amount of water to be used during the construction phase is small quantities. In Agartala no new water source would be constructed as part of the project. The existing source (municipal water supply and ground water) would be enough to supply water to the proposed project during operation stage.
2.3	Minerals?	Yes	2060 cu.m of sand will be required for construction. This will be sourced from Government approved quarries.	Yes. If material is not sourced from Government approved quarries, it is likely to have a significant impact to the aesthetics, topography and ecosystem at the sites or locations from where they are sourced or quarried. Transportation of aggregate will also cause air pollution.
2.4	Aggregates?	Yes	Aggregate of quantity 3078 cu.m will be required for construction.	
2.5	Forests and timber?	No		
2.6	Energy including electricity and fuels?	Yes	None. The required energy, electricity, and fuel during construction activities, vehicle, equipment, and machinery operations are negligible compared to supply.	No. The site is located within urban area where electricity from grid is easily available.
2.7	Any other resources?	No		
3. Will the Project involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health?				
3.1	Will the project involve use of substances or materials which are hazardous or toxic to human health or the environment (flora, fauna, water supplies)?	Yes	During the construction stage, likely leakage of discharge of Fuels like diesel, Petrol, and Oil & Grease will affect human health and environment. There is relocation of existing transformer from the site.	Yes. Any discharge of these substances into the land or water environment will have adverse impacts to environmental quality and human health.
3.2	Will the project result in changesin occurrence of	Yes	The labour camps generate around 32 Kg/ day of solid waste and 8.64 KLD of sewage	Yes. Airborne, water-borne or

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
	disease or affect disease vectors (e.g. insect or water borne diseases)?		and the operation of MBB College lake would generate50 Kg/ day of solid waste and 12 KLD of sewage which are having potential to spread diseases if not treated and processed.	vector-borne diseases could spread or transmitted easily from the construction camps to the outside communities.
3.3	Will the project affect the welfare of people e.g. by changing living conditions?	Yes	The project will enhance the recreational facilities in Agartala City thus having social benefit.	Yes The project will positively impact the residents in the area by improving their quality of life.
3.4	Are there especially vulnerable groups of people who could be affected by the project e.g. hospital patients, the elderly?	No	There is no orphanage, widow homes, hospitals, old age homes, shelters for differently abled and other vulnerable institutes in the project area surrounding.	
3.5	Any other causes?	No		
4. Will the Project produce solid wastes during construction or operation or decommissioning?				
4.1	Spoil, overburden or mine wastes?	Yes	There will be generation of 1167 cum of surplus excavated earth due to the subproject	Yes, The storage, handling and disposal of these waste will cause environment impact owing to: • Air pollution due to loading/ unloading and transportation of wastes. • Siltation of MBB College lake if soil flows to the lake with runoff water. • Degradation of aesthetics.
4.2	Municipal waste (household and or commercial wastes)?	Yes	There would be generation of municipal waste from construction camps (32 kgs) and during operation phase (50 kgs) due to influx of visitors.	Yes. Municipal solid waste generated during the project may cause contamination of land and water bodies if not managed appropriately.
4.3	Hazardous or toxic wastes (including radioactive wastes)?	Yes	116 Cum Bitumen will be used for the construction of road, the likely leakage and emissions will cause health and environmental impacts.	Yes, The accidental spills/ leakages of bitumen will cause water and land pollution.
4.4	Other industrial process wastes?	No		
4.5	Surplus product?	No		

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
4.6	Sewage sludge or other sludge from effluent treatment?	Yes	12 KLD Sewage and sewage sludge will be generated from the public toilets proposed in the Public Zone.	Yes, Untreated sewage will significantly impact the quality of water of the receiving water body andmay also cause land contamination if notmanaged properly. Sewage sludge if disposed without appropriate treatment will contaminate soil and water bodies.
4.7	Construction or demolition wastes?	Yes	The proposed development works will generate 364 cum of both construction and demolition wastes. If the wastes are not handled properly, the waste may cause problem to the people of the institute and passer-by. The waste may also end up in water body causing siltation.	Yes. Construction and demolition wastes generated or produced during construction phase will change the aesthetics in the project area. Soil and small rock debris could clog drainages and could cause siltation of receiving bodies during monsoon season.
4.8	Redundant machinery or equipment?	No		
4.9	Contaminated soils or other material?	No		
4.10	Agricultural wastes?	No		
4.11	Any other solid wastes?	No		
5. Will the Project release pollutants or any hazardous, toxic or noxious substances to air?				
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources?	Yes	Use of generators, machinery, and heavy vehicles during excavation and constructionwill produce emissions.	Yes. The impact of these emissions is significant to the health of all human receptors around the construction sites. Air pollution may also impact the flora of the area.
5.2	Emissions from production processes?	No		
5.3	Emissions from materials handling including storage or transport?	Yes	Vehicles used for transport of construction, material and machinery will generate emissions. There will be dust generation during unloading of materials such as cement, aggregates, etc.	Yes. The impact of these emissions is significant to the health of all human receptors around the construction sites.

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
5.4	Emissions from construction activities including plant and equipment?	No		
5.5	Dust or odours from handling of materials including construction materials, sewage and waste?	Yes	Air pollution due to dust generation during construction, excavation and backfilling, handling of excavated and fill material, cement, sand, gravel, aggregates, etc.	Yes. The impact of these emissions is significant to the health of all people residing nearby and members of the institute.
5.6	Emissions from incineration of waste?	No		
5.7	Emissions from burning of waste in open air (eg slash material, construction debris)?	Yes	The locality of the worker's camp may be affected by the open burning of waste generated from the worker's camp.	Yes There will be significant impact of these emissions on the health of all human receptors living in and around the construction and camp sites.
5.8	Emissions from any other sources?	No		
6. Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?				
6.1	From operation of equipment eg engines, ventilation plant, crushers?	Yes	Excavation by heavy machinery, cutters, etc. and piling work, use of generators, heavy vehicle movements will generate noise and vibration.	Yes. The impact of noise and vibration is significant to the health of all human receptors around the construction sites, including the workers.
6.2	From industrial or similar processes?	No		
6.3	From construction or demolition?	Yes	The noise generated from the construction and demolition works may disturb the nearby establishments and institution and may also impact the migratory bird habitations temporarily.	Yes. The impact of noise and vibration is significant to the health of all human receptors around the construction sites, including the workers.
6.4	From blasting or piling?	Yes	The noise generated from the piling work for building of deck structure may disturb the people residing.	Yes. The impact of noise and vibration is significant to the health of all human receptors around the construction sites, including the workers.
6.5	From construction or operational traffic?	Yes	Movement of heavy machinery used for construction work and vehicles transporting construction materials may generate noise that would	Yes. The impact of noise and vibration is significant to the health of all human receptors around the traffic congested

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
			cause inconvenience residential communities.	sites, including the workers working at these sites.
6.6	From lighting or cooling systems?	No	Night time construction is not envisaged.	No, as per current practices the construction works are allowed only in day time and no lighting for night time working is required.
6.7	From sources of electromagnetic radiation (consider effects on nearby sensitive equipment as well as people)?	No		
6.8	From any other sources?	No		
7. Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into sewers, surface waters, groundwater, coastal waters or the sea?				
7.1	From handling, storage, use or spillage of hazardous or toxic materials?	Yes	Due to accidental spillage / leakage of fuel and bitumen will pollute the land and water bodies.	Yes. If this occurs, the impact to groundwater and surface waters, including aquatic species, is significant.
7.2	From discharge of sewage or other effluents (whether treated or untreated) to water or the land?	Yes	The land and water bodies nearby the workers camp may be polluted by the discharge of sewage from camp.	Yes. The impact of discharge of sewage or effluents to land is significant as they could seep into the ground and pollute the groundwater. Likewise, the impact of discharge of sewage or effluent to receiving bodies of water in the area is significant as they could pollute the water and subsequently the aquatic species.
7.3	By deposition of pollutants emitted to air, onto the land or into water?	Yes	The land nearby the workers camp may be polluted by the construction related activities and daily activities of the workers residing there temporarily.	Yes. The discharge of pollutants to air, water or soil will contaminate these natural resources.
7.4	From any other sources?	No		
7.5	Is there a risk of long term build-up of pollutants in the environment from these sources?	No		
8. Will there be any risk of accidents during construction or operation of the Project which could affect human health or the environment?				

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
8.1	From explosions, spillages, fires etc from storage, handling, use or production of hazardous or toxic substances?	Yes	Handling of cement, paints, solvent and production/handling of concrete may affect the workers' health if not handled properly.	Yes. The impact of these substances to the environment or at the work sites, if released intentionally or unintentionally, will be significant.
8.2	From events beyond the limitsof normal environmental protection e.g. failure of pollution controls systems?	No		
8.3	From any other causes?	Yes	Accidents can happen due to the carelessness of workers and lapses of safety procedures at the construction sites.	Yes. The impact of accidents is very significant because it can lead to either disability or loss of lives of workers or community people.
8.4	Could the project be affected by natural disasters causing environmental damage (e.g. floods, earthquakes, landslip, etc)?	Yes	The project location is situated in High risk earth quake zone (Zone V) as per the Earthquake map released from National Disaster Management Authority (NDMA), Ministry of Home Affairs (MoH) Government of India. There may be impacts related to earthquake and flooding.	Yes, There would be damages to the structures in case of earthquake and flooding incidences.
9. Will the Project result in social changes, for example, in demography, traditional lifestyles, employment?				
9.1	Changes in population size, age, structure, social groups etc?	No		
9.2	By resettlement of people or demolition of homes or communities or community facilities e.g. schools, hospitals, social facilities?	No		
9.3	Through in-migration of new residents or creation of new communities?	No		

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
9.4	By placing increased demands on local facilities or services eg housing, education, health?	No		
9.5	By creating jobs during construction or operation or causing the loss of jobs with effects on unemployment and the economy?	Yes	Requirement of labour for the construction works prioritizethe local people hence, providing employment opportunities to the local people.	Yes, it is a positive impact, because the skills they learnt during their employment period can be utilized in the future in other similar kind of works. The project will create the employment opportunities in the region temporarily.
9.6	Any other causes?			
Question - Are there any other factors which should be considered such as consequential development which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality?				
10.1	Will the project lead to pressure for consequential development which could have significant impact on the environment e.g. more housing, new roads, new supporting industries or utilities, etc?	No		
10.2	Will the project lead to development of supporting facilities, ancillary development or development stimulated by the project which could have impact on the environment e.g. supporting infrastructure (roads, power supply, waste or waste water treatment, etc) housing development	No		

No.	Questions to be considered in Scoping	Yes/No/?	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why?
	extractive industries supply industries other?			
10.3	Will the project lead to after-use of the site which could have an impact on the environment?	No		
10.4	Will the project set a precedent for later developments?	No		
10.5	Will the project have cumulative effects due to proximity to other existing or planned projects with similar effects?	No		

Part 2 - Characteristics of the Project Environment (Environmental Sensitivity)

Question 1 - Are there features of the local environment on or around the Project location which could be affected by the Project?	No
• Areas which are protected under international or national or local legislation for their ecological, landscape, cultural or other value, which could be affected by the project?	No
• Other areas which are important or sensitive for reasons of their ecology e.g. • Wetlands, • Watercourses or other waterbodies, • the coastal zone, • mountains, • forests or woodlands	Yes, during the construction activity, the quality of MBB College lake water may degrade due to spillage. The dust rising due to construction activity could be problem to the surrounding vegetation and people residing close by.
• Areas used by protected, important or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, overwintering, migration, which could be affected by the project?	No
• Inland, coastal, marine or underground waters?	No
• Areas or features of high landscape or scenic value?	
• Routes or facilities used by the public for access to recreation or other facilities? • Transport routes which are susceptible to congestion or which cause environmental problems? • Areas or features of historic or cultural importance?	Yes, The movement of construction material by vehicle may lead to traffic congestion for temporary period of time.
Question 2 - Is the Project in a location where it is likely to be highly visible to many people?	Yes. There is habitation and an institutional building adjacent to the project area.
Question 3 - Is the Project located in a	No

previously undeveloped area where there will be loss of greenfield land?	
Question - Are there existing land uses on or around the Project location which could be affected by the Project? For example: • Homes, gardens, other private property, • Industry, • Commerce, • Recreation, • public open space, • community facilities, • agriculture, • forestry, • tourism, • mining or quarrying	No
Question 4 - Are there any plans for future land uses on or around the location which could be affected by the Project?	No.
Question 5 - Are there any areas on or around the location which are densely populated or built-up, which could be affected by the Project?	No.
Question 6 - Are there any areas on or around the location which are occupied by sensitive land uses which could be affected by the Project? • hospitals, • schools, • places of worship, • community facilities	Yes. There is an institutional building adjacent but the entry to the institute is separate.
Question 7 - Are there any areas on or around the location which contain important, high quality or scarce resources which could be affected by the Project? For example: • groundwater resources, • surface waters, • forestry, • agriculture, • fisheries, • tourism, • minerals.	Yes, MBB College lake is just besides.
Question 8 - Are there any areas on or around the location of the Project which are already subject to pollution or environmental damage e.g. where existing legal environmental standards are exceeded, which could be affected by the project?	Yes the baseline data shows that ambient Air Quality Concentration for all pollutants are within the permissible limits as per NAAQS 2009. The water quality of the surface and ground water is also as per the ISO drinking water standards for most of the parameters. The noise levels in few areas are beyond the permissible levels as per the residential standards of noise Quality (NAAQS). This is attributed due to the various religious activities as well as road traffic.
Question 9 - Is the Project location susceptible to earthquakes, subsidence, landslides,	Yes, the project area lies under Zone V and may be susceptible to flooding

erosion, flooding or extreme or adverse climatic conditions e.g. temperatureinversions, fogs, severe winds, which could cause the project to present environmental problems?	
Question 10 - Is the Project likely to affect the physical condition of any environmental media? • The atmospheric environment including microclimate and local and larger scale climatic conditions? • Water – e.g. quantities, flows or levels of rivers, lakes, groundwater. Estuaries, coastal waters or the sea? • Soils – e.g. quantities, depths, humidity, stability or erodibility of soils? • Geological and ground conditions?	Yes, but in the positive way because the project is designed to improve the physical conditions at the site. The growth of flora and fauna will be in structured manner.
Question 11 - Are releases from the Project likely to have effects on the <u>quality</u> of any environmental media? • Local air quality? • Global air quality including climate change and ozone depletion • Water quality – rivers, lakes, groundwater. Estuaries, coastal waters or the sea? • Nutrient status and eutrophication of waters? • Acidification of soils or waters? • Soils • Noise? • Temperature, light or electromagnetic radiation including electrical interference? • Productivity of natural or agricultural systems?	Yes, the construction activities may affect local air quality through dust emissions especially during dry season. The runoff may carry some amount of construction and demolition waste and cause siltation of water bodies. It also generates noise pollution by the movement of vehicles for transporting materials, and demolition works.
Question 12 - Is the Project likely to affect the availability or scarcity of any resources either locally or globally? • Fossil fuels? • Water? • Minerals and aggregates? • Timber? • Other non-renewable resources? • Infrastructure capacity in the locality - water, sewerage, power generation and transmission, telecommunications, waste disposal roads, rail?	No
Question 13 - Is the Project likely to affect human or community health or welfare? • The quality or toxicity of air, water, foodstuffs and other products consumed by humans? • Morbidity or mortality of individuals, communities or populations by exposure to pollution? • Occurrence or distribution of disease vectors including insects? • Vulnerability of individuals, communities or populations to disease? • Individuals' sense of personal security? • Community cohesion and identity? • Cultural identity and associations?	Yes. Proper project implementation will promote public health, active community and social interaction among the residents/ users. It will also assist in Rainwater harvesting and protection of biological resource, enhancement of ground water quality and watershed management.

• Minority rights? • Housing conditions? • Employment and quality of employment? • Economic conditions? • Social institutions?	

Part 3: Significance of Impacts

Questions to be Considered
1. Will there be a large change in environmental conditions?
2. Will new features be out-of-scale with the existing environment?
3. Will the effect be unusual in the area or particularly complex?
4. Will the effect extend over a large area?
5. Will there be any potential for trans boundary impact?
6. Will many people be affected?
7. Will many receptors of other types (fauna and flora, businesses, facilities) be affected?
8. Will valuable or scarce features or resources be affected?
9. Is there a risk that environmental standards will be breached?
10. Is there a risk that protected sites, areas, features will be affected?
11. Is there a high probability of the effect occurring?
12. Will the effect continue for a long time?
13. Will the effect be permanent rather than temporary?
14. Will the impact be continuous rather than intermittent?
15. If it is intermittent will it be frequent rather than rare?
16. Will the impact be irreversible?
17. Will it be difficult to avoid, or reduce or repair or compensate for the effect?

Prepared by:	
Designation and Office:	
Date:	

Appendix 3: Letter Regarding Status of MBB College Lake

EE(RP) 11/10/19

No.F. 2(630) -DHE/GTCA/2018 - 2036 (2)
Government of Tripura
Directorate of Higher Education

Dated, Agartala, the 11/10/2019

To
The Chief Executive Officer
Agartala Smart City Limited &
Municipal Commissioner, AMC.

Sub: - Status of MBB College Lake.

Sir,

In inviting reference to the subject cited above, I am to inform you that there is no relevant document available in regard to the classification of the lakes within the complex of MBB College with various components which is required as a part of Smart City Plan Projects. But so far the information collected from the senior citizen of the state who had pursued their study at MBB College are of the opinion that the lake possessing within the complex of the MBB College are natural and there is no other record of manual activities under taken for the development of the lake neither by the College or by the department.

This is for favour of your kind information and doing the needful.

(Saju Vaheed A, IAS)
Director of Higher Education
Tripura

Copy to:-

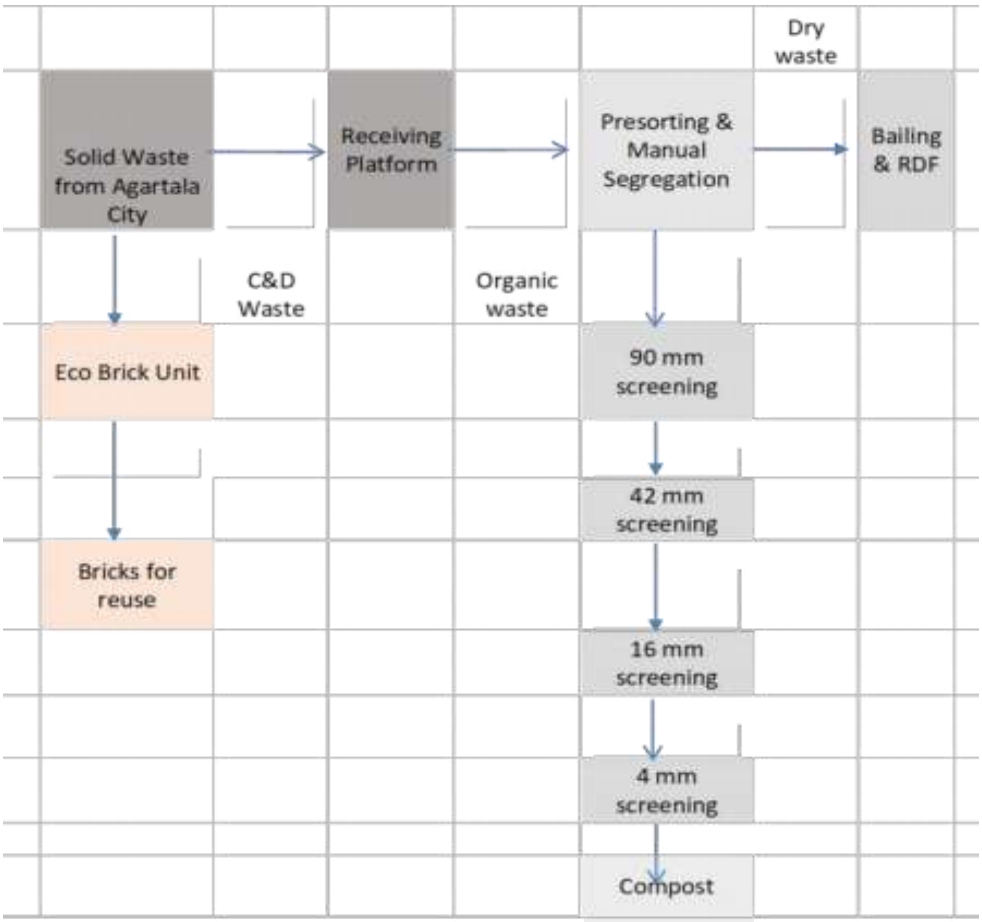
1. The PS to the Secretary, Education (Higher) Department for kind information of the Secretary.

11/10/19

(Saju Vaheed A, IAS)
Director of Higher Education
Tripura

Appendix 4: Environmental Audit Report of Existing C&D Waste Management Site inAgartala

Introduction

Location	DC Nagar Lunga, Agartala. Area Available – 14.568 hectares
Start of operation (year)	2012
Owned by	Agartala Municipal Corporation Operator of the Plant – Joint Venture of Proton Enviro Solutions Pvt. Ltd. And Hydro air Tectonics Ltd.
Contact person and designation	Chinmay Chakraborty, Asst. Engineer, Mechanical Division
Capacity	250 TPD Daily Waste Processed – 126 TPD Waste Landfilled per day – 6.2 TPD
Treatment process	Windrow Based Composting **Facilities Present:** Compost Plant (1 no.), Sanitary Landfill (1 no.), Eco Brick Unit (1 no.), Plastic Granulating Unit (1 no.) Weighbridge and Internal Roads
Process flow diagram	 Chinmay Chakraborty, Asst. Engineer, Mechanical Division
Reuse	Reuse of Eco bricks

Google map of Site

Compliance with Applicable National and State Laws, Rules, and Regulations

Law, Rules, and Regulations	Description and Requirement	
		Y = compliant (if applicable, specify expiration date of permit/clearance) *N = non-compliant*[23] *N/A = not applicable (state justification)*
EIA Notification	The EIA Notification of 2006 states that environmental clearance is required for certain defined activities/projects.	N Environmental Clearance to be obtained from State Environmental Impact Assessment Authority (SEIAA)
Manufacture, Storage, and Import of Hazardous Chemical Rules, 1989	Storage of chlorine (threshold quantity greater than 10 tons butless than 25 tons) in WTPs will require clearance from Tripura Pollution Control Board .and Directorate of Industrial Health and Safety	NA No hazardous waste is stored or processed in DC Nagar Lunga SWM Site

[23] Compliant = There is sufficient and appropriate evidence to demonstrate that the particular regulatory requirement has been complied with; non-compliant = clear evidence has been collected to demonstrate the particular regulatory requirement has not been complied with.

Law, Rules, and Regulations	Description and Requirement	
		Y = compliant (if applicable, specify expiration date of permit/clearance) *N = non-compliant*[22] *N/A = not applicable (state justification)*
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments	Consent to operate from TSPCB	Y CTE/ CTO copy is attached in Appendix 4. Consent is valid till 17-01-2025.
Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments.	Consent to operate from TSPCB	Y CTE/ CTO copy is attached in Appendix 4. Consent is valid till 17-01-2025.
Environment (Protection) Act, 1986 and CPCB Environmental Standards	Emissions and discharges from the facilities to be created, refurbished, or augmented shall comply with the notified standards. a. Wastewater disposal standards	Y
Noise Pollution (Regulation and Control) Rules, 2002 amended up to 2010	Applicable ambient noise standards with respect to noise for different areas/zones	NA The operations of SWM site doesn't come under Noise Pollution Rules 2002.
National Institute of Occupational Safetyand Health (NIOSH) Publication No. 2002-149	Compliance with NIOSH Guidance for Controlling Potential Risks to Workers Exposed to Class B Biosolids	Y All workers are provided with required PPEs like hand gloves, safety shoes and face masks.
Forest (Conservation) Act, 1980 and Forest Conservation Rules, 2003 as amended	As per Rule 6, every user agency, who wants to use any forest land for non-forest purposes shall seek approval of the central government.	NA. No forest land is acquired for the SWM site, land is already in possession of AMC.
Ancient Monuments and Archaeological Sites and Remains Rules of 1959	No development activity is permitted in the "protected area," and all development activities likely to damage the protected property are not permitted in the "controlled area" without prior permission of the Archaeological Survey of India (ASI). Protected property includes the site, remains, and monuments protected by ASI or the State Department of Archaeology.	NA Site is not situated near any 'protected area' identified by the ASI.
The Child Labor (Prohibition and Regulation) Act, 1986	No child below 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 are present.	NA No hazardous waste is stored or processed in DC Nagar Lunga SWM Site

Institutional Arrangement

Parameter	
Operations	8 hours
Manager per shift	1
No of engineer on-site	

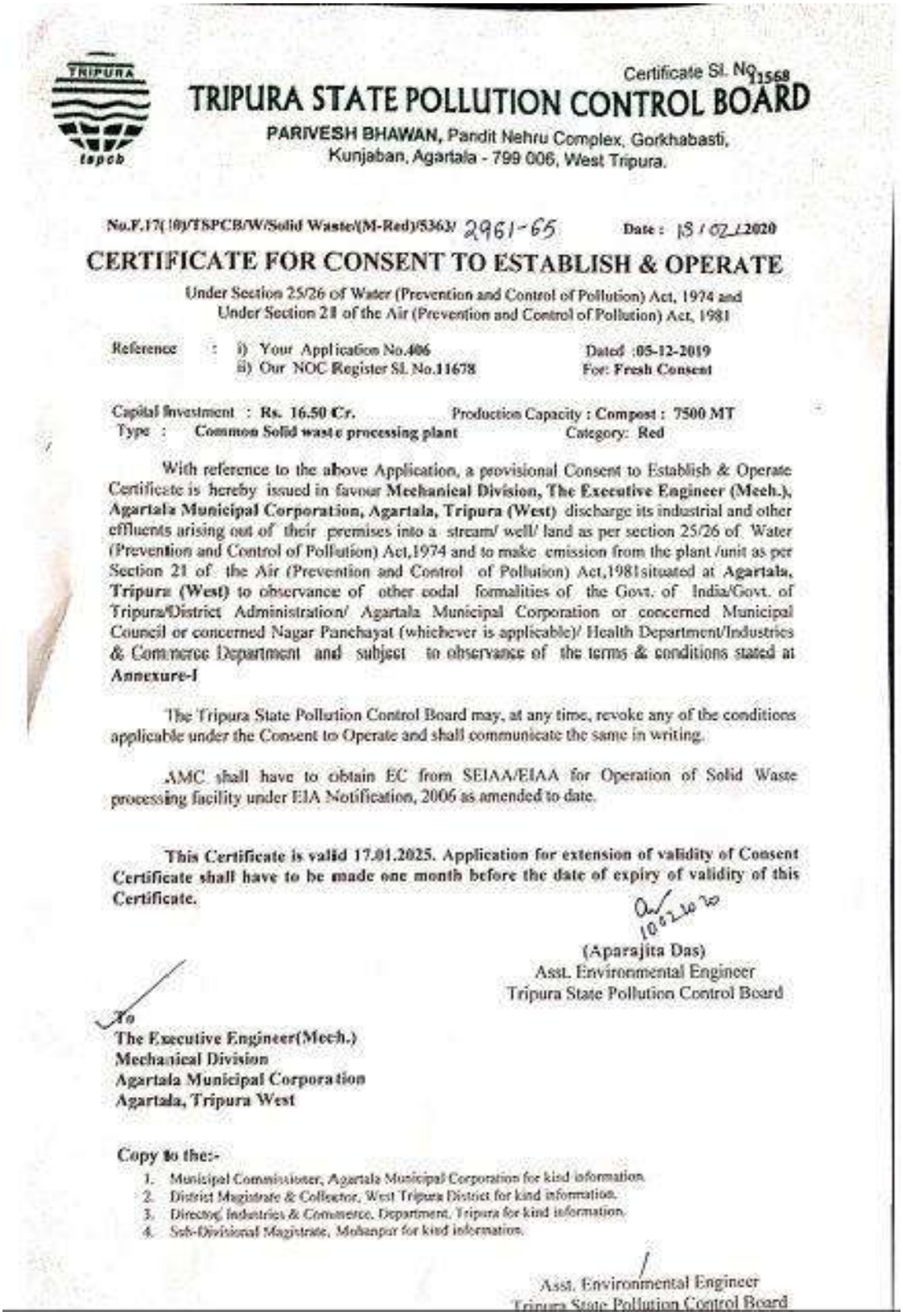
Parameter	
Estimated number of technical employees on-site per shift	2
Estimated number of laborers on-site per shift	21
Estimated number of employees in charge of environmental management and monitoring	NA
Frequency of air quality monitoring	NA, No Regular Monitoring is done
Frequency of water quality monitoring	NA, No Regular Monitoring is done
In-house laboratory for water quality analyses (Yes/None). If none, provide name of third-party laboratory.	No in-house laboratory. Need based monitoring is done by Tripura State Pollution Control Board.

Corrective Action Plan

(i) Environmental Clearance for the Solid Waste Management Site to be obtainedfrom State Environmental Impact Assessment Authority (SEIAA).

(ii) Regular Environmental Monitoring to be carried out by Agartala MunicipalCorporation (AMC).

Copy of Consent Certificate for DC Nagar Lunga Waste Management Facility of AMC



Certificate Sl. No. 11568

TRIPURA STATE POLLUTION CONTROL BOARD

PARIVESH BHAWAN, Pandit Nehru Complex, Gorkhabasti,
Kunjaban, Agartala - 799 006, West Tripura.

No.F.17(10)/TSPCB/W/Solid Waste/(M-Red)/5363/ 2961-65 Date : 18/02/2020

CERTIFICATE FOR CONSENT TO ESTABLISH & OPERATE

Under 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.406 Dated :05-12-2019
ii) Our NOC Register Sl. No.11678 For: Fresh Consent

Capital Investment : **Rs. 16.50 Cr.** Production Capacity : **Compost : 7500 MT**
Type : **Common Solid waste processing plant** Category: **Red**

With reference to the above Application, a provisional Consent to Establish & Operate Certificate is hereby issued in favour **Mechanical Division, The Executive Engineer (Mech.), Agartala Municipal Corporation, Agartala, Tripura (West)** 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,1981situated at **Agartala, Tripura (West)** 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 terms & conditions stated at **Annexure-I**

The Tripura State Pollution Control Board may, at any time, revoke any of the conditions applicable under the Consent to Operate and shall communicate the same in writing.

AMC shall have to obtain EC from SEIAA/EIAA for Operation of Solid Waste processing facility under EIA Notification, 2006 as amended to date.

This Certificate is valid 17.01.2025. 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.

18/2/2020

(Aparajita Das)
Asst. Environmental Engineer
Tripura State Pollution Control Board

To
The Executive Engineer(Mech.)
Mechanical Division
Agartala Municipal Corporation
Agartala, Tripura West

Copy to the:-

1. Municipal Commissioner, Agartala Municipal Corporation for kind information.
2. District Magistrate & Collector, West Tripura District for kind information.
3. Director, Industries & Commerce, Department, Tripura for kind information.
4. Sub-Divisional Magistrate, Mohanpur for kind information.

Asst. Environmental Engineer
Tripura State Pollution Control Board

Compliance to CTO Conditions

Sr. No.	Consent Conditions	Compliance
General Conditions		
1.	Agartala Municipal Corporation (AMC) shall prepare a solid waste management plan as per the State Policy and Strategy on Solid Waste Management.	Will be complied and prepared
2.	AMC shall arrange for door to door collection of segregated solid waste from all households including slums and informal settlement, commercial, institutional and other non-residential premises. From multi-storage buildings, large commercial complexes, malls, housing complexes, etc., this may be collected from the entry gate or any other designated location.	Door to door collection of segregated waste is being done.
3.	AMC shall establish a system to recognize organizations of waste pickers and promote and establish a system for integration of these authorized waste-pickers and waste collectors to facilitate their participation in solid waste management including door to door collection of waste.	Will be complied
4.	AMC shall facilitate formation of Self Help Groups, provide identify cards and thereafter encourage integration in solid waste management including door to door collection of waste.	Will be complied
5.	AMC shall frame bye-laws incorporating the provisions of these rules within one year from the date of notification of these rules and ensure timely implementation.	Will be complied
6.	AMC shall prescribe from time to time user fee as deemed appropriate and collect the fee from the waste generators on its own or through authorized agency.	Complied, user fee are being levied to waste generators.
7.	AMC shall direct waste generators not to litter i.e. throw or dispose of any waste such as paper, water bottles, liquor bottles, soft drinks cans, tetra packs etc., or burn or burry waste on streets, open public spaces, drains, waste bodies and to segregate the waste at source as prescribed under these rules and hand over the segregated waste to authorized the waste pickers or waste collectors authorized by the local body.	Will be complied
8.	AMC shall setup material recovery facilities or secondary storage facilities with sufficient space for sorting of recyclable materials to enable informal or authorized waste pickers and waste collections to separate recyclables from the waste and provide easy access to waste pickers and recyclers for collection of segregated recyclable waste such as paper, plastic, metal, glass, textile from the source of generation or from material recovery facilities; Bins for storage of bio-degradable wastes shall be painted green, those for storage of recyclable wastes shall be printed white and those for storage of other wastes shall be printed black.	Will be complied
9.	AMC shall establish waste depositions centers for domestic hazardous waste and give direction for waste generators to deposit domestic hazardous wastes at this center for its safe disposal. Such facility shall be established in a city or town in a matter that one center is set up for the area of 20 Sq. Km or part thereof and notify the timings of receiving domestic hazardous waste at such centers.	Will be complied

Sr. No.	Consent Conditions	Compliance
General Conditions		
10.	AMC shall ensure safe storage and transportation of the domestic hazardous waste to the hazardous waste disposal facility or as may be directed by the Tripura State Pollution Control Board.	Will be complied
11.	AMC shall direct street sweepers not to burn tree leaves collected from street sweeping and store them separately and handover to the waste collectors or agency authorized by local body.	Will be complied
12.	AMC shall provide training on solid waste management to waste-pickers and waste collectors	Will be provided
13.	AMC shall collect waste from vegetable, fruit, flower, meat, poultry and fish market on day to day basis and promote setting up of decentralized compost plant or bio-methanation plant at suitable locations in the markets or in the vicinity of markets ensuring hygienic conditions.	Will be complied
14.	AMC shall collect separately waste from sweeping of the streets, lanes and by-lanes daily, or on alternate days or twice a week depending on the density of population, commercial activity and local situation.	Will be complied
15.	AMC shall set up covered secondary storage facility for temporary storage of street sweepings and silt removed from surface drains in case where direct collection of such waste into transport vehicles is not convenient. Waste so collected shall be collected and disposed of at regular intervals as decided by the local body.	Will be complied
16.	AMC shall collect horticulture, parks and garden waste separately and process in the parks and gardens, as far as possible.	Will be complied
17.	AMC shall transport segregated bio-degradable waste to the processing facilities like compost plant, bio-methanation plant or any such facility. Preference shall be given for onsite processing of such waste.	Will be complied
18.	AMC shall transport non bio-degradable waste to the respective processing facility or material recovery facilities or secondary storage facility.	Will be complied
19.	AMC shall transport construction and demolition waste as per the provisions of the Construction and Demolition Waste management Rules, 2016.	Will be complied
20.	AMC shall involve communities in waste management and promotion of home composting, bio-gas generation, decentralized processing of waste at community level subject to control of odour and maintenance of hygienic conditions around the facility.	Will be complied
21.	AMC shall phase out the use of chemical fertilizer in two years and use compost in all parks, gardens maintained by the local body and whenever possible in other places under its jurisdiction. Incentives may be provided to recycling initiatives by informal waste recycling sector.	Will be complied
22.	AMC shall facilitate construction, operation and maintenance of solid waste processing facilities and associated infrastructure on their own or with private sector participation or through any agency for optimum utilization of various components of solid waste adopting suitable technology	Will be complied

Sr. No.	Consent Conditions	Compliance
General Conditions		
	including the following technologies and adhering to the guidelines issues by the MoUD from time to time and standards prescribed by the CPCB. Preference shall begiven to decentralized processing to minimize transportationcost and environmental impacts such as a. Bio-methanation, microbial composting, vermin-composting, anaerobic digestion or any other appropriate processing for bio-stabilization of biodegradable wastes. b. Waste to energy processes including refused derived fuel for combustible fraction of waste or supply as feedstock to solid wastebased plants or cement kilns.	
23.	AMC shall undertake on their own or through any other agency construction, operation and maintenance of sanitary landfill and associated infrastructure as per Schedule 1 for disposal of residual wastes in a manner prescribed under these rules.	Will be complied
24.	AMC shall make adequate provision of funds for capital investments as well as operation and maintenance of solid waste management services in the annual budget ensuring that fund for discretionary functions of the local body have been allocated only after meeting the requirement of necessary fund for solid waste management and other obligatory functions of the local body as per these rules.	Will be complied
25.	AMC shall submit application for renewal of authorization at least sixty day before expiry of the validity of authorization.	Will be complied
26.	AMC shall prepare and submit annual report in Form IV on or before the 30th April of the succeeding year to the Commissioner or Director, Municipal Administration or designated Officer	Will be complied
27.	AMC shall send the annual report to Secretary-in-Charge of the State Urban Development Department and to the Tripura State Pollution Control Board or Pollution Control Committee by the 31st May of every year.	Will be complied
28.	AMC shall educate workers including contract workers and supervisors for door to door collection of segregated waste and transporting the unmixed waste during primary and secondary transportation to processing or disposal facility.	Will be complied
29.	AMC shall ensure that the operator of a facility provides PPE including uniform, fluorescent jacket, hand gloves, raincoats, appropriate footwear and masks to all workers handling solid waste and the same are used by the workforce.	Will be complied
30.	AMC shall ensure that provisions for setting up of centers for collection, segregation and storage of segregated wastes are incorporated in building plan while granting approval of building plan of a group housing society or market complex.	Will be complied
31.	AMC shall frame bye-laws and prescribe criteria for levying of spot fine for persons who litters or fails to comply with the provisions of these rules and delegate powers to officers or local bodies to levy spot fines as per the bye laws framed	Will be complied

Sr. No.	Consent Conditions	Compliance
General Conditions		
32.	AMC shall create public awareness through information, education and communication campaign and educate the waste generators on the following namely a. Not to litter. b. Minimize generation of waste. c. Reuse the waste to the extent possible. d. Practice segregation of waste into bio-degradable, non-biodegradable (recyclable and combustible), sanitary waste and domestic hazardous wastes at source. e. Practice home composting, vermi-composting, bio-gas generation or community level composting. f. Wrap securely used sanitary waste as and when generated in the pouches provided by the brand owners or a suitable wrapping as prescribed by the local body and place the same in the bin meant for non-biodegradable waste. g. Storage of segregated waste at source in different bins. h. Handover segregated waste to waste pickers, waste collectors, recyclers or waste collection agencies. i. Pay monthly user fee or charges to waste collectors or local bodies or any other person authorized by the local body for sustainability of solid waste management.	Will be complied
33.	AMC shall stop landfilling or dumping of mixed waste soon after the timeline as specified in the rule 23 for setting up and operationalization of sanitary landfill is over.	Will be complied
34.	AMC shall allow only the non-usable, non-recyclable, non-biodegradable, non-combustible and non-reactive inertwaste and pre-processing rejects and residues from waste processing facilities to go to sanitary landfill and the sanitary landfill sites shall meet the specifications as given in Schedule-I, however, every effort shall be made recycle or reused the rejects to achieve the desired objectives of zero waste going to landfill.	Will be complied
35.	AMC shall investigate and analyze all old open dumpsites and existing operational dumpsites for their potential of bio-mining and bio-remediation and wherever feasible take necessary action to bio-mine or bio-remediate the sites. In absence of potential bio-mining and bio-remediation, it shall be scientifically capped as per landfill capping norms to prevent further damage to environment.	Will be complied
Specific Conditions		
1.	The ground water quality within 50 m of the periphery of landfill site shall be periodically monitored covering different seasons in a year that is, summer, monsoon and post-monsoon period to ensure that the ground water is not contaminated.	Will be complied
2.	Ambient air quality at the landfill site and at the vicinity shall be regularly monitored. Ambient air quality shall meet the standards prescribed by the Central Pollution Control Board for Industrial area.	Will be complied

Sr. No.	Consent Conditions	Compliance
General Conditions		
3.	The notifications of Government of Tripura regarding banning of Plastic Carry Bags issued vide Notification No. F.8(30)/DSTE/ENV/ Pt-22/1679-97 dated 10-03-2015 and No. F.8(30)/DSTE/ENV/ Pt-11/1984-2003 dated 19-03-2015 should be strictly adhered to	Will be complied
4.	Public liability insurance coverage shall have to be provided to the workers of the unit	Will be complied
5.	A copy of the consent Certificated should be displayed in the office of the unit	Will be complied
6.	The unit will have to follow other norms and standards issued by TSPCB from time to time	Will be complied

Appendix 5: Applicable Ambient Air Quality Standards

NATIONAL AMBIENT AIR QUALITY STANDARDS
CENTRAL POLLUTION CONTROL BOARD
NOTIFICATION

New Delhi, the 18th November, 2009

No. B-29016/20/90/PCI-L—In exercise of the powers conferred by Sub-section (2) (h) of section 16 of the Air (Prevention and Control of Pollution) Act, 1981 (Act No.14 of 1981), and in supersession of the Notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998, the Central Pollution Control Board hereby notify the National Ambient Air Quality Standards with immediate effect, namely:-

NATIONAL AMBIENT AIR QUALITY STANDARDS

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Methods of Measurement
(1)	(2)	(3)	(4)	(5)	(6)
1	Sulphur Dioxide (SO_2), $\mu g/m^3$	Annual*	50	20	- Improved West and Gaeke
		24 hours**	80	80	-Ultraviolet fluorescence
2	Nitrogen Dioxide (NO_2), $\mu g/m^3$	Annual*	40	30	- Modified Jacob & Hochheiser (Na-Arsenite)
		24 hours**	80	80	- Chemiluminescence
3	Particulate Matter (size less than 10µm) or PM_{10} $\mu g/m^3$	Annual*	60	60	- Gravimetric - TOEM
		24 hours**	100	100	- Beta attenuation
4	Particulate Matter (size less than 2.5µm) or $PM_{2.5}$ $\mu g/m^3$	Annual*	40	40	- Gravimetric - TOEM
		24 hours**	60	60	- Beta attenuation
5	Ozone (O_3) $\mu g/m^3$	8 hours**	100	100	- UV photometric - Chemilminescence
		1 hour**	180	180	- Chemical Method
6	Lead (Pb) $\mu g/m^3$	Annual*	0.50	0.50	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter
		24 hours**	1.0	1.0	
7	Carbon Monoxide (CO) mg/m^3	8 hours**	02	02	- Non Dispersive Infra Red (NDIR) spectroscopy
		1 hour**	04	04	
8	Ammonia (NH_3) $\mu g/m^3$	Annual*	100	100	-Chemiluminescence
		24 hours**	400	400	-Indophenol blue method

(1)	(2)	(3)	(4)	(5)	(6)
9	Benzene (C_6H_6) $\mu g/m^3$	Annual*	05	05	- Gas chromatography based continuous analyzer - Adsorption and Desorption followed by GC analysis
10	Benzo(a)Pyrene (BaP) - particulate phase only, ng/m^3	Annual*	01	01	- Solvent extraction followed by HPLC/GC analysis
11	Arsenic (As), ng/m^3	Annual*	06	06	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper
12	Nickel (Ni), ng/m^3	Annual*	20	20	- AAS /ICP method after sampling on EPM 2000 or equivalent filter paper

* Annual arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform intervals.

** 24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

Note. — Whenever and wherever monitoring results on two consecutive days of monitoring exceed the limits specified above for the respective category, it shall be considered adequate reason to institute regular or continuous monitoring and further investigation.

SANT PRASAD GAUTAM, Chairman
[ADVT-III/4/184/09/Exty.]

Note: The notifications on National Ambient Air Quality Standards were published by the Central Pollution Control Board in the Gazette of India, Extraordinary vide notification No(s). S.O. 384(E), dated 11th April, 1994 and S.O. 935(E), dated 14th October, 1998.

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and Published by the Controller of Publications, Delhi-110054.

NATIONAL AMBIENT AIR QUALITY STANDARDS

Parameter	Location [a]	India Ambient Air Quality Standard ($\mu g/m^3$)[b]	WHO Air Quality Guidelines ($\mu g/m^3$)		
			Global Update [c] 2005	Second Edition 2000	Air Pollution Guideline 2021
PM_{10}	Industrial Residential, Rural and Other Areas	60 (Annual) 100 (24-hr)	20 (Annual) 50 (24-hr)	-	15 (Annual) 45 (24-hr)
	Sensitive Area	60 (Annual) 100 (24-hr)	20 (Annual) 50 (24-hr)	-	
PM_{25}	Industrial Residential, Rural and Other Areas	40 (Annual) 60 (24-hr)	10 (Annual) 25 (24-hr)	-	05 (Annual) 15 (24-hr)
	Sensitive Area	40 (Annual) 60 (24-hr)	10 (Annual) 25 (24-hr)		
SO_2	Industrial Residential, Rural and Other Areas	50 (Annual) 80 (24-hr)	20 (24-hr) 500 (10-min)	-	40 (24-hr) 500 (10-min)
	Sensitive Area	20 (Annual) 80 (24-hr)	20 (24-hr) 500 (10-min)	-	
NO_2	Industrial Residential, Rural and Other Areas	40 (Annual) 80 (24-hr)	40 (Annual) 200 (1-hr)	-	10 (Annual) 25 (24-hr) 200 (1-hr)
	Sensitive Area	30 (Annual) 80 (24-hr)	40 (Annual) 200 (1-hr)	-	
CO	Industrial Residential, Rural and Other Areas	2,000 (8-hr) 4,000 (1-hr)	-	10,000 (8-hr) 100,000 (15-min)	4 mg/ m^3 (24-hr) 10 mg/ m^3 (8-hr) 35 mg/ m^3(1-hr) 100 mg/ m^3(15-minute)
	Sensitive Area	2,000 (8-hr) 4,000 (1-hr)	-	10,000 (8-hr) 100,000 (15-min)	
Ozone (O_3)	Industrial Residential, Rural and Other Areas	100 (8-hr) 180 (1-hr)	100 (8-hr)		60 (peak season) 100 (8-hr)
	Sensitive Area	100 (8-hr) 180 (1-hr)	100 (8-hr)		
Lead (Pb)	Industrial, Residential, Rural and Other Areas	0.5 (Annual) 1.0 (24-hr)		0.5 (Annual)	
	Sensitive Area	0.5 (Annual) 1.0 (24-hr)		0.5 (Annual)	
Ammonia (NH_3)	Industrial Residential, Rural and Other Areas	100 (Annual) 400 (24-hr)			
	Sensitive Area	100 (Annual) 400 (24-hr)			
Benzene (C_6H_6)	Industrial Residential, Rural and Other Areas	5 (Annual)			
	Sensitive Area	5 (Annual)			
Benzo(o)pyrene (BaP) particulate phase only	Industrial Residential, Rural and Other Areas	0.001 (Annual)			
	Sensitive Area	0.001 (Annual)			
Arsenic (As)	Industrial Residential, Rural and Other Areas	0.006 (Annual)			
	Sensitive Area	0.006 (Annual)			
Nickel (Ni)	Industrial	0.02 (Annual)			

Parameter	Location [a]	India Ambient Air Quality Standard (µg/m^3)[b]	WHO Air Quality Guidelines (µg/m^3)		
			Global Update [c] 2005	Second Edition 2000	Air Pollution Guideline 2021
	Residential, Rural and Other Areas				
	Sensitive Area	0.02 (Annual)			

a *Sensitive area refers to such areas notified by the India Central Government.*

b Notification by Ministry of Environment and Forests, Government of India Environment (Protection) Seventh Amendment Rules, 2009

c WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide. Global update 2005. WHO 2006

d Air Quality Guidelines for Europe Second Edition. WHO 2000

e Per ADB SPS, the government shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS

Appendix 6: Applicable Ambient Noise Standards

Receptor/ Source	India National Noise Level Standards[a] (dBA)		WHO Guidelines Value For Noise Levels Measured Out of Doors[b] (One Hour LA_q in dBA)		Applicable Per ADB SPS[c] (dBA)	
	Day	Night	07:00 – 22:00	22:00 – 07:00	Day time	Night time
Industrial area	75	70	70	70	70	70
Commercial area	65	55	70	70	65	55
Residential Area	55	45	55	45	55	45
Silent Zone	50	40	55	45	50	40

[a] Noise Pollution (Regulation and Control) Rules, 2002 as amended up to 2010.
[b] Guidelines for Community Noise. WHO. 1999
[c] Per ADB SPS, the government shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

Appendix 7: IBAT Proximity Analysis Report

Rapid Biodiversity Assessment Report of MBB College Lake is included as Appendix 8

REPORT ON ECOLOGY AND BIOLOGICALSTUDIES OF MBB LAKE, AGARTALA

Submitted by

TerraNero®
Environmental Solutions

B3-1304, Varun Gardens, Manpada, Thane (W) 400607
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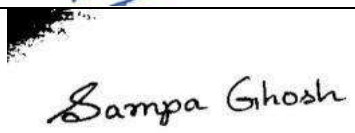
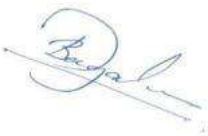
+91- 9833800072

Table of Contents

List of Experts:

Sr. no.	Name	Designation	Signature
1	Dr. Deepti Sharma	Biodiversity Expert	
2	Mr. Adwait Jadhav	Zoology Expert	
3	Mr. Sushant More	Botany Expert	
4	Ms. Sampa Ghosh	Botany Expert	
5	Ms. Dhanashree Bagade	Zoology Expert	

INTRODUCTION

Biodiversity can be defined as the variety of life on Earth which is the product of millions of years ofevolution and thousands of years of cultivation of plants and domestication of animals.

Biodiversity is recognized to be of global importance, yet species and habitats continue to be underincreasing pressure from human- induced influences, whether in urban, rural or wilderness settings.Environmental concerns have never before been so high on the political agenda, driving increased legislation which places major emphasis on individual, public and corporate responsibility.

The following are different facets of biodiversity:

- **Genetic diversity**: variety in the genetic makeup among individuals within a species

- **Species diversity**: variety among the species or distinct types of living organisms found in different habitats of the planet.

- **Ecosystem or ecological diversity**: variety of forests, deserts, grasslands, streams, lakes, oceans, coral reefs, wetlands and other biological communities

- **Functional diversity**: Biological and chemical processes of functions such as energyflow and matter cycling needed for the survival of species and biological communities' diversity with each including a number of components.

IMPORTANCE OF BIODIVERSITY

Biodiversity is extremely important to people and the health of ecosystems.

- Biodiversity allows us to live healthy and happy lives. It provides us with an array of foods and materials and it contributes to the economy. Without a diversity of pollinators, plants, andsoils, we would have much little produce.
- Most medical discoveries to cure diseases and lengthen life spans were made because of research into plant and animal biology and genetics.
- Biodiversity is an important part of ecological services that make life livable on Earth. Theyinclude everything from cleaning water and absorbing chemicals, which wetlands do, to providing oxygen for us to breathe.
- Biodiversity allows for ecosystems to adjust to disturbances like extreme fires and floods.
- Genetic diversity prevents diseases and helps species adjust to changes in their environment.

THREATS TO BIODIVERSITY

Extinction is a natural part of life on Earth. Over the history of the planet, most of the species thatever existed, evolved and then gradually went extinct. Species go extinct because of natural shiftsin the environment that take place over long periods of time, such as ice ages.

Today, **species are going extinct at an accelerated and dangerous rate**, because of non-natural environmental changes caused by human activities. Some of the activities have direct effects on species and ecosystems, such as:

- Habitat loss/ degradation
- Over exploitation (such as overfishing)
- Spread of Non-native Species/ Diseases

Some human activities have indirect but wide-reaching effects on biodiversity, including:

- Climate change
- Pollution

All of these threats have put a serious strain on the diversity of species on Earth. According to the International Union for Conservation of Nature (IUCN), globally about one third of all known speciesare threatened with extinction.

SCOPE OF WORK

Ecological and biodiversity survey for the following three areas in Agartala:

- MBB lake

Battery limit of the projects is defined as follows:

- MBB Lake - core area is the lake precinct and the adjoining area within thedevelopment plan, buffer area is 5 km radius from the project site.

STUDY AREA DETAILS

The MBB Lake is located in Agartala near MBB College. This lake was once famous for the blue lotus which is on its way to become extinct. A 5 km buffer study area was select around the Lake, google earth imagery of which is given in Fig. 1.

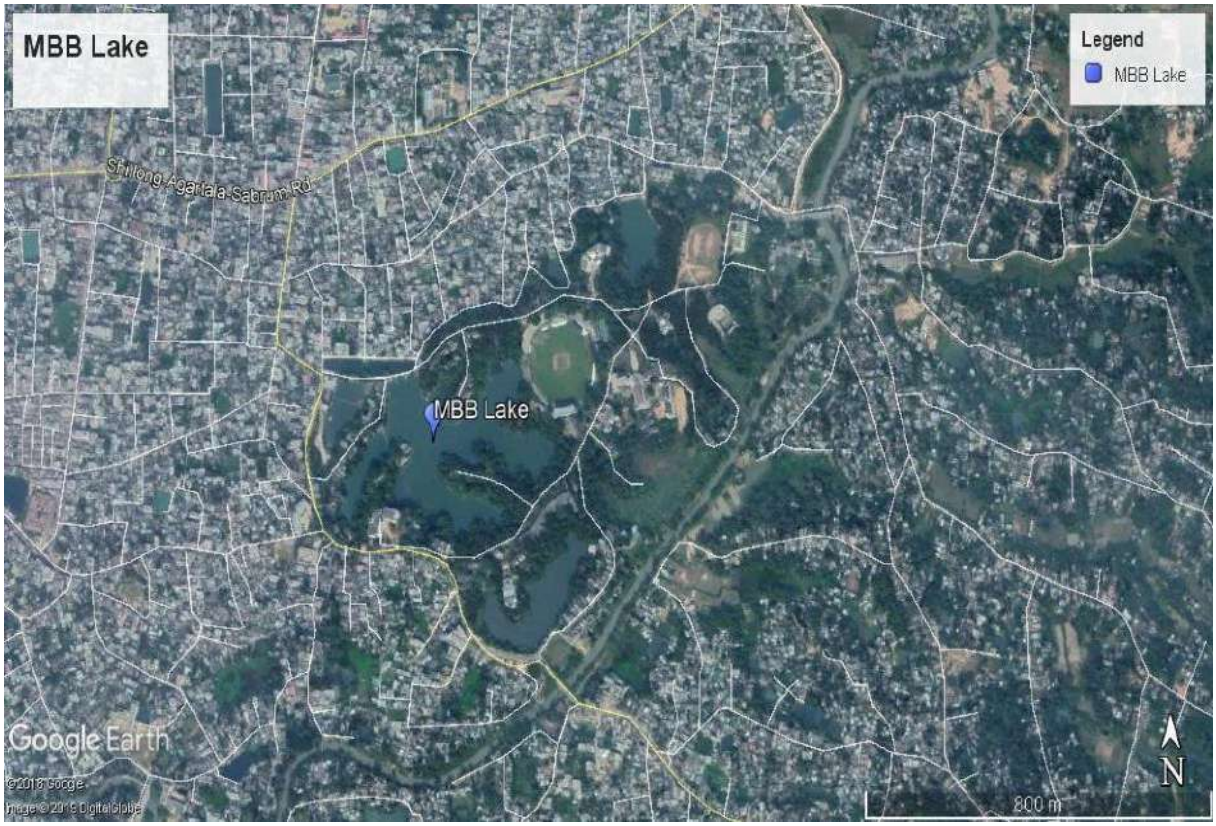

MBB Lake
Legend
MBB Lake
Shillong-Agartala-Sabrum Rd
MBB Lake
Google Earth
©2018 Google
Image © 2018 DigitalGlobe
800 m
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Fig.1: Google Earth Imagery of MBB Lake

METHODOLOGY

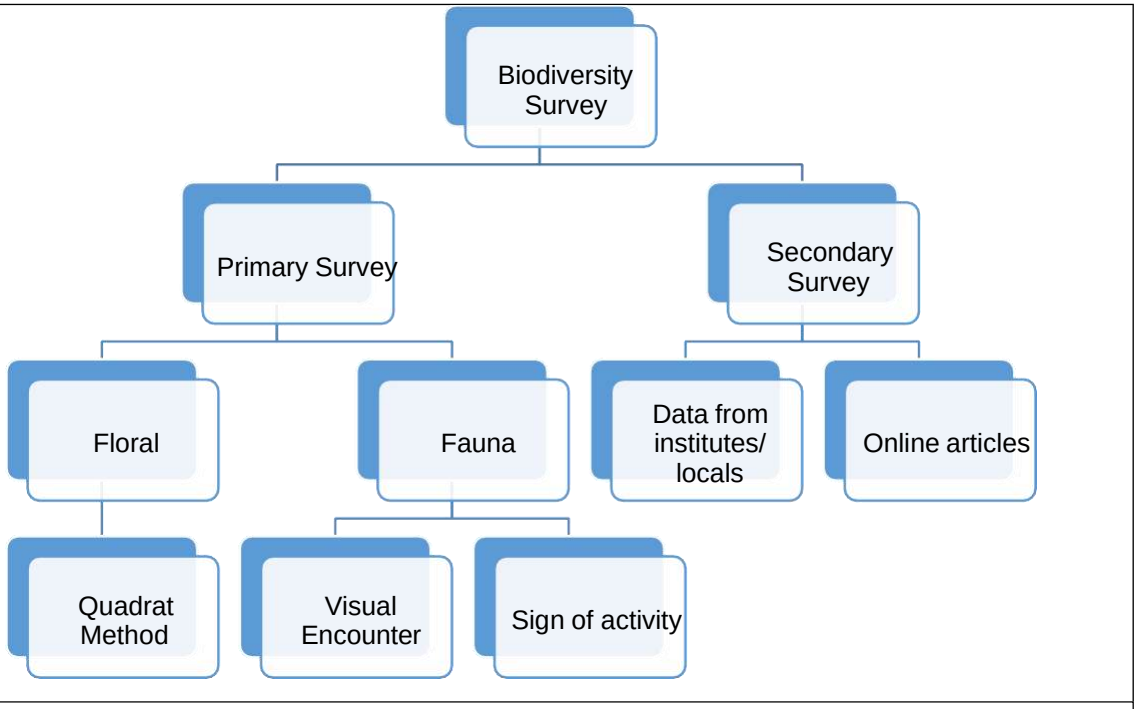


Fig. 2: Methodology of Biodiversity Survey

A rapid biodiversity survey was conducted for a single season in December 2018. Following is themethodology:

a. **Study Area Demarcation**: The ecology and biodiversity survey was conducted in Agartala, Tripura. Agartala is the capital city of Tripura, a northeast Indian state. Detailed qualitative and quantitative study of flora and fauna was conducted. Secondary data was collected forthe study area. **Fig. 2** gives the location of the study area. The MBB Lake is located in Agartala near MBB College. This lake was once famous for the blue lotus which is on its wayto become extinct. A 5 km buffer study area was select around the Lake, google earth imagery of which is given in Fig.3

b. **Data Collection**: In a biodiversity survey data was collected in two ways:

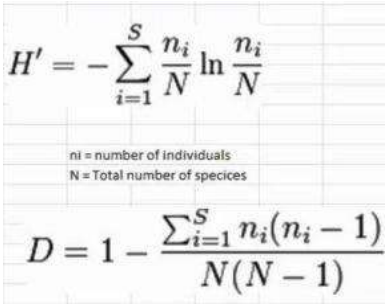
   - **Primary Survey**: In primary survey data was collected by conducting on field survey in which various techniques are used.
   - **Secondary Survey:** Secondary survey was carried out by collecting data from publisheddocuments, such as projects documents, research articles, other internet sources, data from local institutes, and relevant government bodies.

PRIMARY SURVEY

a. Floral Survey: About 13 quadrats were laid in various areas according to various type of ecosystem. The floral species were recorded on basis of visual observation. In the study area quadrats of size 10 x 10 m for trees and 5 x 5 m for shrubs/ herbs were laid and the floral species within the quadrat were noted. Data on number of individuals per species was noted.

Calculation of various biodiversity aspects was done in following way:

- **Simpson's index (D):** The Simpson's index is a dominance index because it gives more weight to common or dominant species. In this case, a few rare species with only a few representatives will not affect the diversity.
- **Shannon's index (H'):** The Shannon's index is an information statistic index, which means itassumes all species are represented in a sample and that they are randomly sampled.



- **Margalef's index:** The Margalef diversity index (Margalef, 1958) expressed as 'd' can becalculated by using the formula: d = (S − /)1 ln N

  Where S is the number of species, and N is the total number of individuals in the sample.

- **Pielou's evenness index (J'):** It expresses how evenly the individuals are distributed amongthe different species.

It is calculated as J' = H'/ln S,

Where ln S = H' max H' max (the maximum value of Shannon diversity) is what H' would be if all thespecies in the community had an equal number of individuals; S is the number of species.

A diversity index is a mathematical measure of species diversity in a community. Diversity indices provide more information about community composition than simply species richness (i.e., the number of species present); they also take the relative abundances of different species into account. Diversity indices provide important information about rarity and commonness of species in a community. The ability to quantify diversity in this way is an important tool for biologists tryingto understand community structure. Realistic measures of biodiversity should reflect not only the relative abundances of species, but also the differences between them. It is important to ascertainthese indices as they give a quantitative estimate of how good or bad the baseline biodiversity is. This ensures that if in the near future there is going to be a disturbance to the ecosystem, we knowwhat exactly and how much of our biodiversity resources will be lost, so that we can attempt to compensate accordingly.

Phytosociology Indicators:

$$\text{Density} = \frac{\text{Total number of individuals of a species in all quadrats}}{\text{Total number of quadrats studied}}$$

$$\text{Relative Density} = \frac{\text{Number of individuals of one species}}{\text{Total number of all individuals counted}} \; X\ 100$$

$$\text{Frequency} = \frac{\text{Number of quadrats in which the species occures}}{\text{Total number of quadrats sampled}}$$

$$\text{Relative Frequency} = \frac{\text{Frequency of one species}}{\text{Total frequency of all species}} \; X\ 100$$

$$\text{Abundance} = \frac{\text{Total Number of individuals of a species in all quadrats}}{\text{Total number of quadrats in which the species occured}}$$

$$\text{Relative Abundance} = \frac{\text{The abundance of one species}}{\text{Total all species counted}} \; X\ 100$$

(The calculation was carried out only for trees – shrubs and climbers were omitted)

Floral Survey locations:

Floral survey was carried out using Quadrat method and transects method. Even selection of thesite was done for accurate results. **Locations around the MBB Lake were selected** in which quadrats were laid the GPS co-ordinates are given in **Table 1**.

Table 2: Floral Survey Locations (MBB Lake)

Sr. no.	Quadrat	GPS Coordinates
1	Quadrat 1	23°49'48.17"N, 91°18'22.79"E
2	Quadrat 2	23°50'27.45"N, 91°15'2.83"E
3	Quadrat 3	23°47'49.14"N, 91°19'9.49"E
4	Quadrat 8	23°49'48.17"N, 91°18'22.79"E
5	Quadrat 9	23°49'44.02"N, 91°19'14.04"E
6	Quadrat 10	23°52'50.96"N, 91°16'32.20"E
7	Quadrat 11	23°49'35.42"N, 91°16'13.51"E
8	Quadrat 12	23°48'54.34"N, 91°19'3.84"E
9	Quadrat 13	23°51'8.54"N, 91°15'55.35"E

b. **Faunal Survey:** Faunal Survey was carried using line transect and point transect method.Direct and indirect observation techniques were used for identification of the fauna.

I. **Direct observation/Visual Encounter:** In this method, the species of animals observed visually were noted. Also, a count of each species observed was recorded.

II. **Searching for signs:** Signs such as dung, feeding signs, footprints, burrows and dens areevidence of the presence of mammals. For proper accuracy, the burrows and den were checked, whether they are active or abandoned. Birds were recognized by their uniquesongs and calls. Notable behaviours of the bird such as feeding, nesting, or breeding and the associated habitats were observed and accordingly the record was made.

Calculation and identification of fauna was done as follows:

- Biodiversity indices were calculated for birds.
- Fauna was checked for their IUCN status (International union for Conservation ofnature) and also their status in schedule of Wildlife Protection Act, 1972.

The GPS locations of start and end point of respective transects are given in **Table 2** while those ofpoint locations are given in **Table 3.**

Table 2: GPS co-ordinates of Transect (MBB Lake)

Sr. no.	Transect	Start Point	End Point
a. MBB Lake:			
1	Transect 1	23°50'40.93"N, 91°19'56.34"E	23°49'52.14"N, 91°17'27.35"E
2	Transect 2	23°49'1.41"N, 91°18'23.19"E	23°47'18.57"N, 91°19'17.11"E
3	Transect 6	23°51'28.77"N, 91°17'29.93"E	23°50'36.17"N, 91°17'48.47"E
4	Transect 7	23°50'40.93"N, 91°19'56.34"E	23°49'52.14"N, 91°17'27.35"E
5	Transect 8	23°51'11.74"N, 91°17'8.38"E	23°50'11.29"N, 91°17'14.65"E
6	Transect 9	23°52'20.53"N, 91°16'58.40"E	23°51'6.84"N, 91°16'59.85"E
7	Transect 10	23°50'5.99"N, 91°16'12.85"E	23°50'1.52"N, 91°17'29.00"E
8	Transect 11	23°49'54.95"N, 91°16'57.35"E	23°48'44.40"N, 91°16'54.61"E
9	Transect 12	23°48'44.40"N, 91°16'54.61"E	23°49'54.95"N, 91°16'57.35"E

Table 3: GPS coordinates of point locations

Sr. no.	Spot	Location
1	Spot 1	23 50'49.37"N,91 16'53.90"E
2	Spot 2	23°52'22.36"N, 91°16'59.32"E

FINDINGS

The findings of the Ecology and Biodiversity Survey are given in Table 4.

Table 4: Summary of Findings

Sr. No.	Taxon/Habit	Number of species
1	Trees	11
2	Herbs	36
3	Shrubs	7
4	Climbers	5
5	Avifauna	51
6	Mammals	2
7	Reptiles	3
8	Insects	30

FINDINGS OF FLORA:

Total 11 tree species, 7 shrub species, 36 herb species and 5 climber species were observed duringthe primary survey. All the studied locations were calculated for various biodiversity indices, using floral data, the details are mentioned in **Table 6.** The flora were also estimated for phytosociology indicators, details of which are given in **Table 7.**

Table 5: Checklist of Floral Species (MBB Lake)

List of Herbal Species		
Sr. no.	**Scientific Name**	**Family**
1	*Chromolaena odorata*	Asteraceae
2	*Acmella radicans*	Asteraceae
3	*Mimosa pudica*	Mimosaceae
4	*Alternanthera ficoidea*	Amaranthaceae
5	*Cassia tora*	Caesalpiniaceae
6	*Synedrella nodiflora*	Asteraceae

List of Herbal Species		
Sr. no.	**Scientific Name**	**Family**
7	*Amaranthus spinosus*	Amaranthaceae
8	*Rungia pectinata*	Acanthaceae
9	*Leucas stelligera*	Lamiaceae
10	*Lindernia antipoda*	Linderniaceae
11	*Curcuma* sp.	Zingiberaceae
12	*Cyathula prostrata*	Amaranthaceae
13	*Sida acuta*	Malvaceae
14	*Cassia occidentalis*	Caesalpiniaceae
15	*Ageratum conyzoides*	Asteraceae
16	*Ammania baccifera*	Lythraceae
17	*Hydrolea zeylanica*	Hydroleaceae
18	*Physalis minima*	Solanaceae
19	*Ludwigia perennis*	Onagraceae
20	*Acmella paniculata*	Asteraceae
21	*Alternanthera sessilis*	Amaranthaceae
22	*Colocasia esculenta*	Araceae
23	*Triumfetta* sp	Tiliaceae
24	*Eclipta alba*	Asteraceae
25	*Cleome rutidosperma*	Cleomaceae
26	*Amaranthus spinosus*	Amaranthaceae
27	*Spermacoce hispida*	Rubiaceae
28	*Scoparia dulcis*	Scrophulariaceae
29	*Eichhornia crassipes*	Pontederiaceae
30	*Polygonum hydropiper*	Polygonaceae

List of Herbal Species		
Sr. no.	**Scientific Name**	**Family**
31	*Solanum virginianum*	Solanaceae
32	*Alocasia* sp.	Araceae
33	*Triumfetta* sp	Tiliaceae
34	*Nymphaea rubra*	Nymphaeaceae
35	*Sida spinosa*	Malvaceae
36	*Triumfetta rhomboidea*	Tiliaceae

Sr. no.	***Scientific Name***	**Family**
1	*Lantana camara*	Verbenaceae
2	*Clerodendrum infortunatum*	Verbenaceae
3	*Ludwigia* sp	Onagraceae
4	*Microcos paniculata*	Tiliaceae
5	*Macaranga peltata*	Euphorbiaceae
6	*Melastoma malbathricum*	Melastomataceae
7	*Ipomoea carnea*	Convolvulaceae
List of Trees		
Sr. no.	***Scientific Name***	**Family**
1	*Artocarpus heterophyllus*	Moraceae
2	*Carica papaya*	Caricaceae
3	*Trema orientalis*	Cannabaceae
4	*Bambusa* sp	Poaceae
5	*Terminalia arjuna*	Combretaceae
6	*Ficus religiosa*	Moraceae
7	*Washingtonia* sp	Arecaceae
8	*Dillenia indica*	Dilleniaceae
9	*Delonix regia*	Caesalpiniaceae
10	*Albizia saman*	Mimosaceae
11	*Syzygium cumini*	Myrtaceae

List of Climbers		
Sr. no.	**Scientific name**	**Family**
1	*Mikania micrantha*	Asteraceae
2	*Cissampelos pareira*	Menispermiaceae
3	*Ipomoea* sp.	Convolvulaceae
4	*Ipomoea aquatica*	Convolvulaceae
5	*Lablab purpureus*	Fabaceae

Table 6: Biodiversity Index

Sr. No.	Quadrat	Simpson's Indices	Shannon's Indices	Margalef's Indices	Pielou's Indices
1	Quadrat 1	0.885	2.274	2.157	0.915
2	Quadrat 2	0.795	1.946	2.326	0.759
3	Quadrat 3	0.845	1.947	1.694	0.846
8	Quadrat 8	0.851	2.125	2.32	0.785
9	Quadrat 9	0.782	1.719	1.468	0.782
10	Quadrat 10	0.823	1.861	1.551	0.847
11	Quadrat 11	0.633	1.366	1.701	0.570
12	Quadrat 12	0.765	1.68	2.201	0.701
13	Quadrat 13	0.879	2.3	2.185	0.872

On basis of the biodiversity indices it was found that study area is fairly rich in biodiversity. Amongwoody speices *Clerodendrum infortunatom, Microcos paniculata*, *Lantana camara, Trema orientalis, Melastoma malbathricum* were found to be dominant. Non- woody species such as *Mikania micrantha, Chromolaena odorata, Acmella radicens, Acmella paniculata, Mimosa pudica, Alternanthera ficoidea, and Alternanthera sessilis* were found to be dominant.

Table 7: Phytosociology Indicators (MMB Lake)

Sr. no.	Name of Species	RF	RD	RA	IVI
1	*Chromolaena odorata*	0.956041224	20.37243602	9.05366794	30.38214518
2	*Acmella radicans*	0.38241649	7.74617339	8.606148232	16.73473811

Sr. no.	Name of Species	RF	RD	RA	IVI
3	*Mimosa pudica*	0.956041224	11.54179835	5.129264346	17.62710392
4	*Alternanthera ficoidea*	0.191208245	4.647704034	10.32737788	15.16629016
5	*Cassia tora*	0.573624735	5.809630043	4.303074116	10.68632889
6	*Synedrella nodiflora*	0.573624735	2.556237219	1.893352611	5.023214565
7	*Amaranthus spinosus*	0.573624735	1.704158146	1.262235074	3.540017955
8	*Rungia pectinata*	0.191208245	0.619693871	1.376983717	2.187885833
9	*Leucas stelligera*	0.38241649	4.182933631	4.647320045	9.212670166
10	*Lindernia antipoda*	0.191208245	0.077461734	0.172122965	0.440792943
11	*Solanum virginuanum*	0.38241649	0.852079073	0.946676306	2.181171868
12	*Curcuma* sp.	0.191208245	1.007002541	2.23759854	3.435809326
13	*Colocasia esculenta*	0.573624735	4.95755097	3.671956579	9.203132284
14	*Cyathula prostrata*	0.191208245	1.239387742	2.753967434	4.184563422
15	*Sida acuta*	0.191208245	0.852079073	1.893352611	2.936639929
16	*Cassia occidentalis*	0.191208245	1.936543348	4.303074116	6.430825709
17	*Ageratum conyzoides*	0.191208245	3.56323976	7.917656374	11.67210438
18	*Ammania baccifera*	0.191208245	2.014005081	4.475197081	6.680410407
19	*Hydrolea zeylanica*	0.191208245	0.619693871	1.376983717	2.187885833
20	*Physalis minima*	0.191208245	0.154923468	0.344245929	0.690377642
21	*Ludwigia perennis*	0.38241649	0.619693871	0.688491859	1.69060222
22	*Acmella paniculata*	0.573624735	8.056020326	5.966929441	14.5965745
23	*Alternanthera sessilis*	0.191208245	4.647704034	10.32737788	15.16629016
24	Alocasia sp.	0.573624735	4.95755097	3.671956579	9.203132284
25	*Triumfetta* sp.	0.573624735	2.788622421	2.065475576	5.427722731
26	*Eclipta alba*	4.015373143	0.154923468	0.016392663	4.186689274
27	*Cleome rutidosperma*	4.971414367	0.077461734	0.006620114	5.055496215

Sr. no.	Name of Species	RF	RD	RA	IVI
28	*Amaranthus spinosus*	4.206581388	0.232385202	0.023471313	4.462437903
29	*Spermacoce hispida*	1.338457714	0.077461734	0.024588995	1.440508443
30	*Scoparia dulcis*	0.573624735	0.077461734	0.057374322	0.70846079
31	*Eichhornia crassipes*	10.70766171	0.154923468	0.006147249	10.86873243
32	*Polygonum hydropiper*	0.191208245	0.077461734	0.172122965	0.440792943
33	*Triumfetta* sp	2.676915429	0.154923468	0.024588995	2.856427891
34	*Nymphaea rubra*	1.912082449	0.077461734	0.017212296	2.006756479
35	*Sida spinosa*	1.147249469	0.077461734	0.028687161	1.253398364
36	*Triumfetta rhomboidea*	6.883496816	0.232385202	0.01434358	7.130225598
37	*Ludwigia perennis*	1.529665959	0.154923468	0.043030741	1.727620168
38	*Mikania micrantha*	43.97789633	0.619693871	0.005986886	44.60357708
39	*Cissampelos pareira*	0.38241649	0.077461734	0.086061482	0.545939706
40	*Ipomoea* sp	1.147249469	0.077461734	0.028687161	1.253398364
41	*Ipomoea aquatica*	3.059331918	0.077461734	0.010757685	3.147551338
42	*Lablab purpureus*	1.529665959	0.077461734	0.021515371	1.628643064

Woody Species:					
Sr. no.	**Name of Species**	**RF**	**RD**	**RA**	**IVI**
1	*Artocarpus heterophyllus*	1.103022281	6.734006734	6.87994496	14.71697398
2	*Carica papaya*	0.735348187	3.367003367	5.15995872	9.262310275
3	*Trema orientalis*	0.735348187	6.734006734	10.31991744	17.78927236
4	*Bambusa* sp.	9.559526436	3.367003367	0.396919902	13.3234497
5	*Artocarpus hetereophyllus*	1.103022281	6.734006734	6.87994496	14.71697398
6	*Terminalia arjuna*	0.367674094	3.367003367	10.31991744	14.0545949
7	*Ficus religiosa*	0.367674094	3.367003367	10.31991744	14.0545949

Woody Species:					
Sr. no.	**Name of Species**	**RF**	**RD**	**RA**	**IVI**
8	*Washingtonia* sp	1.103022281	6.734006734	6.87994496	14.71697398
9	*Dillenia indica*	0.367674094	3.367003367	10.31991744	14.0545949
10	*Delonix regia*	0.367674094	3.367003367	10.31991744	14.0545949
11	*Albizia saman*	0.367674094	3.367003367	10.31991744	14.0545949
12	*Syzygium cumini*	1.470696375	3.367003367	2.57997936	7.417679102
13	*Lantana camara*	15.44231193	3.367003367	0.24571232	19.05502762
14	*Clerodendrum infortunatum*	41.54717259	16.83501684	0.456633515	58.83882294
15	*Ludwigia* sp	3.676740937	3.367003367	1.031991744	8.075736048
16	*Microcos paniculata*	9.191852342	10.1010101	1.238390093	20.53125254
17	*Macaranga peltata*	1.103022281	3.367003367	3.43997248	7.909998128
18	*Melastoma malbathricum*	9.559526436	6.734006734	0.793839803	17.08737297
19	*Ipomoea carnea*	1.838370468	3.367003367	2.063983488	7.269357324

FINDINGS OF FAUNA*:*

Total two species of mammals, 49 species of avifauna, 29 species of butterflies and two species of reptiles were observed in the study area. A consolidated list of fauna observed during the survey near the MBB Lake has been provided in **Table 8** below along with their IUCN status and WPA, 1972.

Table 8: Checklist of Faunal Species (MBB College)

Sr. No.	**Common Name**	**Scientific Name**	**Family**	**IUCN,3.1 Status**	**WPA,1972 (Schedule)**
1	Great tit	*Parus major*	Paridae	LC	Schedule IV
2	Lesser Whistling Duck	*Dendrocygna javanica*	Anatidae	LC	Schedule IV
3	Little Cormorant	*Microcarbo niger*	Phalacrocoracidae	LC	Schedule IV
4	House Crow	*Corvus splendens*	Corvidae	LC	Schedule V
5	Asian Koel	*Eudynamysscolopaceus*	Cuculidae	LC	-
6	White-Breastedwaterhen	*Amaurornisphoenicurus*	Rallidae	LC	
7	Common kingfisher	*Alcedo atthis*	Alcedinidae	LC	Schedule IV

Sr. No.	Common Name	Scientific Name	Family	IUCN,3.1 Status	WPA,1972 (Schedule)
8	Greater Coucal	*Centropus sinensis*	Cuculidae	LC	Schedule IV
9	Grey-backed shrike	*Lanius tephronotus*	Vangidae	LC	Schedule IV
10	Asian palm swift	*Cypsiurus balasiensis*	Apodidae	LC	-
11	Rose Ringed parakeet	*Psittacula krameri*	Psittacidae	LC	Schedule IV
12	lineated Barbet	*Psilopogon lineatus*	Megalaimidae	LC	Schedule IV
13	Thick-billed greenpigeon	*Treron curvirostra*	Columbidae	LC	Schedule IV
14	Common moorhen	*Gallinula chloropus*	Rallidae	LC	-
15	Long-tailed shrike	*Lanius schach*	Laniidae	LC	-
16	Taiga Flycatcher	*Ficedula albicilla*	Muscicapidae	LC	Schedule IV
17	Striated prinia	*Prinia crinifera*	Cisticolidae	LC	Schedule IV
18	Blyth's reed warbler	*Acrocephalus dumetorum*	Leiothrichidae	LC	Schedule IV
19	Booted eagle	*Aquila minuta*	Accipitridae	LC	-
20	Pied Starling	*Gracupica contra*	Sturnidae	LC	Schedule IV
21	Pond Heron	*Ardeola grayii*	Ardeidae	LC	-
22	Pied Kingfisher	*Ceryle rudis*	Alcedinidae	LC	Schedule IV
23	Ashy Drongo	*Dicrurus leucophaeus*	Dicruridae	LC	Schedule V
24	Yellow-footed green pigeon	*Treron phoenicoptera*	Columbidae	LC	Schedule IV
25	Red-breasted parakeet	*Psittacula alexandri*	Psittaculidae	NT	Schedule IV
26	Brown hawk-owl	*Ninox scutulata*	Strigidae	LC	Schedule IV
27	Spotted owlet	*Athene brama*	Strigidae	LC	Schedule IV
28	Barn owl	*Tyto alba*	Strigidae	LC	Schedule IV
29	Large billed Crow	*Corvus macrorhynchos*	Corvidae	LC	Schedule V
30	Black Drongo	*Dicrurus macrocercus*	Dicruridae	LC	Schedule V
31	Spotted Dove	*Spilopelia chinensis*	Columbidae	LC	Schedule V
32	Spangled Drongo	*Dicrurus bracteatus*	Dicruridae	LC	Schedule IV
33	Red Vented Bulbul	*Pycnonotus cafer*	Pycnonotidae	LC	Schedule IV
34	House Sparrow	*Passer domesticus*	Passeridae	LC	-
35	Common Myna	*Acridotheres tristis*	Sturnidae	LC	-
36	Black Kite	*Milvus migrans*	Accipitridae	LC	-
37	Brown Shrike	*Lanius cristatus*	Laniidae	LC	-
38	Black-rumped flameback	*Dinopium benghalense*	Picidae	LC	Schedule IV
39	Oriental Magpie- Robin	*Copsychus Saularis*	Muscicapidae	LC	Schedule IV
40	Jungle Myna	*Acridotheres fuscus*	Sturnidae	LC	-
41	Common Tailorbird	*Orthotomus sutorius*	Cisticolidae	LC	Schedule IV

Sr. No.	Common Name	Scientific Name	Family	IUCN,3.1 Status	WPA,1972 (Schedule)
42	Green bee eater	*Merops orientalis*	Meropidae	LC	Schedule IV
43	Black hooded oriole	Oriolus xanthornus	Oriolidae	LC	Schedule IV
44	Blue Rock pigeon	*Columba livia*	Columbidae	LC	
45	Rufous Treepie	*Dendrocittavagabunda*	Corvidae	LC	Schedule IV
46	Asian openbilled Stork	*Anastomus oscitans*	Ciconiidae	LC	Schedule IV
47	White throatedKingfisher	*Halcyon smyrnensis*	Alcedinidae	LC	Schedule IV
48	Laughing Dove	Spilopelia senegalensis	Columbidae	LC	Schedule IV
49	Chestnut-tailed Starling	*Sturnia malabarica*	Sturnidae	LC	Schedule IV

Insects:					
Sr No.	**Common Name**	**Scientific Name**	**Family**	**IUCN status, 3.1**	**WPA, 1972 (Sch.)**
1	Peacock pansy	*Junonia almana*	Nymphalidae	LC	
2	Chocolate pansy	*Junonia iphita*	Nymphalidae	LC	
3	Common palmfly	*Elymnias hypermnestra*	Nymphalidae		
4	Common jezebel	*Delias eucharis*	Pieridae	-	
5	Common emigrant	*Catopsilia pomona*	Pieridae	-	
6	Common crow	*Euploea core*	Nymphalidae		
7	Common sailor	*Neptis hylas*	Nymphalidae		
8	common mormon	*Papilio polytes*	Papilionadae		
9	Common gull	*Cepora nerissa*	Pieridae		Schedule- II
10	Common castor	*Ariadne merione*	Nymphalidae		
11	Psyche	*Leptosia nina*	Pieridae		
12	striped tiger	*Danaus genutia*	Nymphalidae		
13	Tailed Jay	*Graphium agamemnon*	Papilionadae		
14	common pierrot	*Castalius rosimon*	Lycaenidae		Schedule-I
15	Lime Butterfly	*Papilio demoleus*	Papilionidae		
16	Blue tiger	*Tirumala limniace*			
17	Red spotted jezebel	*Delias aganippe*	Pieridae		

Insects:					
Sr No.	**Common Name**	**Scientific Name**	**Family**	**IUCN status, 3.1**	**WPA, 1972 (Sch.)**
18	Punchinello	*Zemeros flegyas*	Riodinidae		
19	Common rose	*Pachliopta aristolochiae*	Papilionidae		
20	Common bush brown	*Mycalesis perseus*	Nymphalidae		
21	Grey pansy	*Junonia atlites*	Nymphalidae		
22	Three spot grass yellow	*Eurema blanda*	Pieridae		
23	lemon pansy	*Junonia lemonias*	Nymphalidae		
24	Plain tiger	*Danaus chrysippus*	Nymphalidae		
25	Common birdwing	*Troides helena*	Papilionidae		
26	striped tiger	*Danaus genutia*	Nymphalidae		
27	Thai knight	*Lebadea marthamartha*	Nymphalidae		
28	Funnel Web Spider				
29	Giant wood spider	*Nephila pilipes*			

Mammals:					
Sr No.	**Common Name**	**Scientific Name**	**Family**	**IUCN status, 3.1**	**WPA, 1972 (Sch.)**
1	Flying fox	*Pteropus giganteus*	Pteropodidae	LC	Schedule V
2	Pallas's Squirrel	*Callosciurus erythraeus*	Sciuridae	LC	-
Reptiles					
Sr No.	**Common Name**	**Scientific Name**	**Family**	**IUCN status, 3.1**	**WPA, 1972 (Sch.)**
1	Many-lined Grass Skink	*Eutropis multifasciata*	Scincidae	LC	
2	Checkered Keelback	*Xenochrophis piscator*	Colubridae	LC	Schedule II

B. AQUATIC ECOSYSTEM:

About six sampling points were selected for aquatic biodiversity survey, locations of the same aregiven in **Table 9**.

Table 9: PBZ Sampling Locations

Sr. no.	Sample	Location
1	Sample 1	23°49'40.6"N 91°17'36.3"E
2	Sample 2	23°49'33.9"N 91°17'39.1"E
3	Sample 3	23°49'36.4"N 91°17'42.7"E
4	Sample 4	23°49'40.6"N 91°17'46.2"E
5	Sample 5	23°49'37.6"N 91°17'40.7"E
6	Sample 6	23°49'38.2"N 91°17'34.8"E

Phytoplankton:

Phytoplankton, also known as microalgae, are similar to terrestrial plants in that they contain chlorophyll and require sunlight in order to live and grow. Most phytoplankton are buoyant and float in the upper part of the ocean, where sunlight penetrates the water. Phytoplankton also requires inorganic nutrients such as nitrates, phosphates, and sulfur which they convert into proteins, fats, and carbohydrates. The two main classes of phytoplankton are dinoflagellates and diatoms. Phytoplankton provides food for a wide range of sea creatures including whales, shrimp, snails, and jellyfish.16 species of phytoplankton were observed.

Methodology:

Large-bottle-type samplers have been found to be slightly more efficient for phytoplankton sampling (Kuparinen et. al.2009). The sampling protocol followed was as per USEPA (LG400), with the significant difference that instead of a rosette sampler, a large bottle type sampler was used. Briefly, composite samples were collected at each point till the euphotic depth. Samples were mixed. Sample preservation was with Lugol's iodine (final concentration 1% v/v). Samples were stored in the dark and refrigerated. Phytoplankton was viewed under a 40X lens in a compound microscope. List of phytopanktons observed in the area is given in Table 10.

Table 10: List of phytoplanktons observed in samples obtained from study area

Sr. no		Sample I (1 ml)	Sample II (1 ml)	Sample III (1 ml)	Sample IV (1 ml)	Sample V (1 ml)	Sample VI (1 ml)
	Temp	22.7	22.9	22.6	20.1	20.5	22.6
	PH	8.62	8.67	8.56	8.52	8.43	8.39
	mS	0.11	0.11	0.11	0.11	0.11	0.11
	ppt	0.06	0.05	0.06	0.06	0.05	0.06
1	*Pediastrum tetras*	2	4	3	5	2	1
2	*Pediastrum simplex*	-	3	2	4	1	2
3	Ceartium Sp.	3	8	5	8	15	7
4	Ankistrodesmus sp.	1	3	4	2	2	3
5	Cymbella	4	3	4	7	2	2
6	Navicula	-	2	-	-	3	2
7	Melosira(chain)	30	35	25	37	20	31
8	Merismopedia	6	4	10	3	5	2
9	*Crueigenia crusifera*	-	1	-	-	2	-
10	scenedesmus sp.	-	-	2	4	3	5
11	*Schroederia spiralis*	7	3	17	6	10	18
12	*Tetraedron regulare*	5	7	4	5	5	10
13	*Tetraedron gracile*	-	-	3	5	-	2
14	*Desmodesmus communis*	2	1	-	3	2	-
15	*Microcystis wesenbergii* (Colony)	6	14	7	5	17	21
16	*Microcystis aeruginosa* Colony	30	37	34	45	19	60
17	*Gloeocapsa* sp.	10	19	-	16	10	17
18	*Planktolyngbya circumcreta*	3	2	6	5	8	4
19	*Spirogyra hylina*	3	5	2	4	4	3
20	*Synedra*	3	2	6	4	8	3
21	*Actinastrum hantzschii*	1	-	2	-	-	-
22	*Nitzschia* sp.	4	8	4	6	6	4
23	*Monoraphidium arcuatum*	2	12	16	10	5	17
24	*Scenedesmus acuminatus*	-	6	2	1	4	3
25	Sele*nastrum* sp.	4	5	-	-	3	4
26	*Staurastrum* sp.	-	16	10	14	8	11
27	*Corethron* sp	-	-	-	-	1	-
28	*Trachelomonas* Sp.	-	1	-	-	3	1

Zooplanktons:

Zooplankton is the common name given to many small species of animals found in fresh and marinewaters. Zooplanktons migrate vertically in the water column each day, feeding on the phytoplankton. Two general groups of zooplankton exist: those that remain planktonic throughouttheir entire life (holoplankton), and those that are larval stages of larger life forms (meroplankton).Zooplankton species is a heterogeneous assemblage of animals covering many taxonomic groups, largely composed of lower invertebrates like copepods, amphipods, rotifers, cladocerans and larvaeof fish, prawn, shrimp, crabs etc. (Varghese and Krishnan 2009).

Methodology:

Zooplankton was sampled using a standard zooplankton net. The net was dipped slowly in water and raised. It was rinsed thoroughly and the sample was concentrated. It was fixed first with 4-5% formalin (1 part formalin and 9 parts sample). Few drops of Rose Bengal solution was used for sample staining. This protocol was as per NIO Field manual (2004). Zooplanktons were viewed under a 20X lens. List of zoopanktons observed in the area is given in **Table 11.**

Table 11: List of zooplanktons observed in samples obtained from study area

		Day 1			Day 2		
Sr. no		**Sample I (1 ml)**	**Sample II (1 ml)**	**Sample III (1 ml)**	**Sample IV (1 ml)**	**Sample V (1 ml)**	**Sample VI (1 ml)**
	Temp	22.7	22.9	22.6	20.1	20.5	22.6
	PH	8.62	8.67	8.56	8.52	8.43	8.39
	mS	0.11	0.11	0.11	0.11	0.11	0.11
	ppt	0.06	0.05	0.06	0.06	0.05	0.06
1	Nauplius	3	12	5	9	6	3
2	Copepod	5	3	10	14	5	12
3	bivalve	-	2	3	4	-	6
4	Keratella tropica	-	-	-	1	2	2

Benthos:

Benthic organisms are of ecological as well as of economic importance in mangroves and adjacent tidal flats. They affect internal nutrient cycling and exchange processes with adjacent ecosystems. Benthic fauna is a major food source for numerous juvenile fish and crustacean species and thus crucial for the survival of many commercially harvested species. In addition, benthic crabs and mollusks are important fisheries resources for the local population.

Methodology:

Benthic invertebrates were sampled using a plastic scoop. The procedure used for sampling and preservation of sample was as per USEPA protocol (LG406). Briefly, the sediment sampler was lowered slowly through the water column, being allowed to fall freely towards the end. Post that, it was pulled up, and the contents lowered into a tub. The sediment was then mixed with water tohave a slurry like consistency. This was then filtered through a mesh of size 500µm after thorough but low pressure rinsing to ensure sample concentration. Residue was fixed with 4% (v/v) formalin(final volume of formalin 5-10% v/v of sample). Benthic organisms were viewed under a 20X lens ofa stereo microscope. A list of bentic organisms observed is given in **Table 12.**

Table 12: List of Benthos observed in the study area

Sr. no.	Name	
1	Larvae of ephemeroptera (Mayfly)	

Sr. no.	Name	
2	Small fresh water clam (bivalve)	2
3	Annelid	1

SECONDARY DATA

Secondary data was collected from various sources:

I. **Online survey:** With reference to various articles on Google scholar list of flora and fauna availablein the region were noted.

Secondary data collected through literature review is given in **Table 13.**

Table 13: Secondary data

Sr. no.	Citation	Finding
Flora:		
1	Majumdar, T., & Selvan, T. (2018). Carbon Storage in Trees of Urban and Peri-urban Forests of Agartala, Tripura	A total 3470 trees of 111 species, 92 genera and in 45 families were recorded. *Mangifera indica; Artocarpus heterophyllus; Gmelina arborea; Tectona grandis; Areca catechu;*
		Azadirachta indica and *Psidium gujava* were the dominant species recorded in the area.
Fauna:		
Sr. no.		
1	Majumder, J., Lodh, R., & Agarwala, B. K. (2012). Variation in butterfly diversity and unique species richness along different habitats in Trishna Wildlife Sanctuary, Tripura, northeast India. *Check List*, *8*(3), 432-436.	A total of 1005 individuals representing 59 species in 48 genera belonging to five families were recorded in Trishna Wildlife Sanctuary, Tripura.
2	Bhattacharjee, P. P., Lodh, R., Laskar, D., Majumder, J., & Agarwala, B. K. (2013). An ornithological survey in the vicinity of Agartala city of Tripura state, north eastern India. *Journal of Research in Biology*, *3*(3), 852-860.	73 bird species were recorded from Agartala city and its adjacent areas belonging to 41 families and 14 orders.

Sr. no.	Citation	Finding
3	Dey, A., Deb, D., Chaudhuri, S. D., & Chaudhuri, P. (2013). A preliminary study on avifaunal species diversity of Maharaja Bir Bikram College campus, Tripura, North East India. *International Multidisciplinary Research Journal*, *3*(2), 36-43.	Seventy six species of birds belonging to 42 families and 14 orders were recorded near MBB college.

CONCLUSION:

On basis of the ecology and biodiversity survey of MMB lake it was found total number of flora species observed in study area is 59. Among the faunal species Asian open billed Stork and Red Breasted Parakeet which are near threatened species according to IUCN 3.1, were found in the study area. MMB lake is rich in butterfly diversity total species being 30. According to the study it was found that the area is fairly rich in biodiversity.

PHOTO PRESENTATION OF FAUNA

A.) AVIFAUNA

Fig.1: Pied Starling

Fig.2: Chestnut tailed starling

Fig.3: Yellow footed green pigeon

Fig.4: Lesser Whistling Duck

Fig.5: Lineated Barbet

Fig.6: Jungle Myna

Fig.7: Common Myna

Fig.8: Great tit

Fig.9: Spotted Dove

Fig.10: Open Billed stork

Fig.11: House Sparrow

Fig.12: Red Vented bulbul

Butterflies	
	
Fig.1: Lemon Pansy	**Fig.2: Peacock Pansy**

	
Fig. 3: Common mormon	**Fig.4: Common Palmfly**
	
Fig.5: Common Sailor	**Fig.6: Knight**

Fig.7: Punchinello

Fig.8: Chocolate Pansy

Fig.9: Common bush brown

Fig.10: Red Spot Jezebel

SPIDERS:

Fig13: Funnel Web Spider

Fig 14: Giant wood spider

REPTILES:

Fig.1: Checkered Keelback

Fig2: Many-lined Grass Skink

Mammals

Fig1: Flying Fox

Fig 2: Pallas's Squirrel

PHOTO PRESENTATION OF FLORA

A. HERBS:	
	
Fig.1: *Ageratum conyzoides*	**Fig.2: *Acmella paniculata***

B. TREES:	
	
Fig.3: *Ficus religiosa*	Fig.: *Artocarpus heterophyllus*
C. SHRUBS:	

	
Fig. 1: ***Lantana camara***	**Fig.2:** ***Melastoma malbathricum***
D. CLIMBERS	
	
Fig.: *Mikania micrantha*	Fig.: *Ipomea* Sp.

Appendix 9: Migratory Birds Recorded in the Maharaja Bir Bikram College Campus overTwo Winter Seasons (2013 to 2015)

Common name	Binomial name	Conservation status	Abundance category	Migration status
Order: Anseriformes				
Family: Anatidae				
Fulvous Whistling Duck	*Dendrocygna bicolor* (Vieillot)	LC	RA	WMNR
Lesser Whistling Duck	*Dendrocygnajavanica* (Horsfield)	LC	C	WMR
Order: Pelecaniformes				
Family: Anhingidae				
Oriental Darter	*Anhinga melanogaster* (Pennan)	NT	VR	WMNR
Family: Phalacrocoracidae				
Little Cormorant	*Microcarboniger* (Vieillot)	LC	OC	WMR
Order: Falconiformes				
Family: Falconidae				
Peregrine Falcon	*Falco peregrinus* (Tunstall)	LC	RA	WMNR
Family; Accripitridae				
Oriental Honey-buzzard	*Pernisptilorhynchus* (Temminck)	LC	RA	WMNR
Order: Gruiformes				
Family: Rallidae				
Common Moorhen	*GallinulaChioropus* (L.)	LC	RA	WMR
Order: Charadriiformes				
Family: Rostratulidae				
Greater Painted snipe	*Rostratulabenghalensis* (L.)	LC	OC	WMR
Family: Scoiopacidae				
Common Snipe	*Gallinagogallinago* (L.)	LC	C	WMNR
Common Sandpiper	*Actitishypoleucos* (L.)	LC	C	WMNR
Wood Sandpiper	*Tringaglareola(L.)*	LC	C	WMNR
Order: Coraciiformes				
Family: Upupidae				
Hoopoe	*Upupaepops* (L.)	LC	VR	WMNR
Order: Passeriformes				
Family: Laniidae				
Brown Shrike	*Laniuscristatus* (L.)	LC	C	WMNR
Grey-backed shrike	*Laniustephronotus* (Vigors)	LC	RA	WMNR
Long-tailed Shrike	*Laniusschach tricolor* (Hodgson)	LC	OC	WMNR
Family: Dicruridae				

Common name	Binomial name	Conservation status	Abundance category	Migration status
Spangled Drongo	*Dicrurushottentottus* (L.)	LC	FR	WMR
Family: Oriolidae				
Black-naped Oriole	*Orioluschinensis* (L.)	LC	VR	WMNR
Family: Hirundinidae				
Red-rumped Swallow	*Cecropisdaurica* (Laxmann)	LC	RA	WMNR
Family: Phylloscopidae				
Yellow-browed Warbler	*Phylloscopusinornatus* (Blyth)	LC	RA	WMNR
Dusky Warbler	*Phylloscopusfuscatus (Blyth)*	LC	RA	WMNR
Family: Pellorneidae				
Puff-throated Babbler	*Pellorneumruficeps* (Swainson)	LC	FR	WMR
Family: Turnidae				
Blue Rock Thrush	*Monticolasolitariuspando o* (L.)	LC	VR	WMNR
Family: Muscicapidae				
Siberian Rubythroat	*Lucinia calliope* (Pallas)	LC	RA	WMNR
Siberian Stonechat	*Saxicolamaurus* (Pallas)	LC	OC	WMNR
Taiga Flycatcher	*Ficedulaalbicilla* (Pallas)	LC	OC	WMNR
Family: Stenostiridae				
Grey-headed Canary Flycatcher	*Culicicapaceylonensis* (Swainson)	LC	OC	WMNR
Family: Motacillidae				
Citrine Wagtail	*Motacilla citreola* (Pallas)	LC	OC	WMNR
White Wagtail	*Motacilla alba leucopsis* (L.)	LC	OC	WMNR

Source: Majumder (2018)
Abbreviations: LC = Least Concern, NT = Near Threatened, OC = Occasional, RA = Rare, VR = Very Rare, C=Common, WMNR = Winter-migrant Non-resident, WMR = Winter-migrant Resident

Appendix 10: Spoil Management Plan

A. Spoil Management Plan

1. **Purpose and Application:** Spoils Management plan **(**SMP) is to describe how ASCL/ PIU will manage the spoil generated and reuse related to design, and construction works. This is an integral part of EMP. The objective of SMP is to reuse of spoil from works in accordance with the spoil management hierarchy outlined in this document.

2. **Objectives of SMP:** The objectives of SMP are:

- To minimize spoil generation where possible
- Maximize beneficial reuse of spoil from construction works in accordance with spoil management hierarchy
- Mange onsite spoil handling to minimize environmental impacts on resident and other receivers
- Minimize any further site contamination of land, water, soil
- Manage the transportation of spoil with consideration of traffic impacts and transport related emissions

3. Structure of SMP:

Section 1: Introduction of SMP
Section 2: Legal and other requirements
Section 3: Roles and responsibilities
Section 4: Identification and assessment of spoil aspects and impacts
Section 5: Spoil volumes, characteristics and minimization
Section 6: Spoil reuses opportunities, identification and assessment
Section 7: On site spoil management approach
Section 8: Spoil transportation methodology
Section 9: Monitoring, Reporting, Review, and Improvements

4. **Aspects and Potential Impacts**: The key aspects of potential impacts in relation to SMP are listed in Table below:

Key Aspect of Potential Impacts

Aspect	**Potential Impact**
Air Quality	Potential for high winds generating airborne dust from the stock piles
Sedimentation	Potential for sediment laden site runoff from spoil stockpiles and potential for spillage of spoil from truck on roads
Surface and Groundwater	Contamination of water (surface and ground water)
Noise	Associated with spoil handling and haulage and storage
Traffic	Impacts associated with spoil haulage
Land Use	Potential for spoil to be transported to a receivable site that doesn't have permission for storage/disposal
Design specifications	Limitations on opportunities to minimize spoil generation
Sustainability	Limited sites for storage, reuse opportunities

B. Spoil volumes, Characteristics and Minimization

5. **Spoil Volume Calculations.** Estimate the volumes of spoils produced from each of theconstruction site
6. **Characterization of Spoil**. Based on the type of spoil; characterization is done (sand stone,mix materials, reusable materials.

7. **Adopt Spoil Reduce, Reuse Opportunities.** An overview of the assessment methodology tobe used is mentioned below.

- Consideration of likely spoil characteristics
- Identification of possible reuse sites
- Screening of possible reuse opportunities

8. **Identification of Possible Safe Disposal Sites for Spoil.** Those spoils which can't be reuseshall be properly disposed in designated areas (DC Nagar Lunga in Agartala). Such disposal areas should be safe from environmental aspects and there should be any legal and resettlementrelated issues. Such areas need to be identified and prior cliental approval should be obtained touse it as spoil disposal area. The local administration must be consulted and if required permissionshould be obtained from them.

C. Storage and Stock Piling

9. **Stockpiling**. Spoils shall be stockpiled at locations at least 300 m away from water courses and covered.

10. **Transportation and Haulage Route.** Based on the above, the contractor will prepare a transport and route plan, and submit it to the PIU for their review and approval.

D. Summary of Key Issues and Remedial Actions

11. Summary of follow up time-bound actions to be taken within a set timeframe.

Appendix 11: Sample Traffic Management Plan (TMP)

Principles

1. One of the prime objectives of this TMP is to ensure the safety of all the road users along the work zone, and to address the following issues:

(i) the safety of pedestrians, bicyclists, and motorists travelling through the construction zone;
(ii) protection of work crews from hazards associated with moving traffic;
(iii) mitigation of the adverse impact on road capacity and delays to the road users;
(iv) maintenance of access to adjoining properties
(v) Avoid hazards in addressing issues that may delay the project.

Operating Policies for TMP

2. The following principles will help promote safe and efficient movement for all road users (motorists, bicyclists, and pedestrians, including persons with disabilities) through and around work zones while reasonably protecting workers and equipment.

(i) Make traffic safety and temporary traffic control an integral and high-priority element of every project from planning through design, construction, and maintenance.
(ii) Inhibit traffic movement as little as possible.
(iii) Provide clear and positive guidance to drivers, bicyclists, and pedestrians as they approach and travel through the temporary traffic control zone.
(iv) Inspect traffic control elements routinely, both day and night, and make modifications when necessary.
(v) Pay increased attention to roadside safety in the vicinity of temporary traffic control zones.
(vi) Train all persons that select, place, and maintain temporary traffic control devices.
(vii) Keep the public well informed.
(viii) Make appropriate accommodation for abutting property owners, residents, businesses, emergency services, railroads, commercial vehicles, and transit operations.

Analyze the impact due to street closure, if required

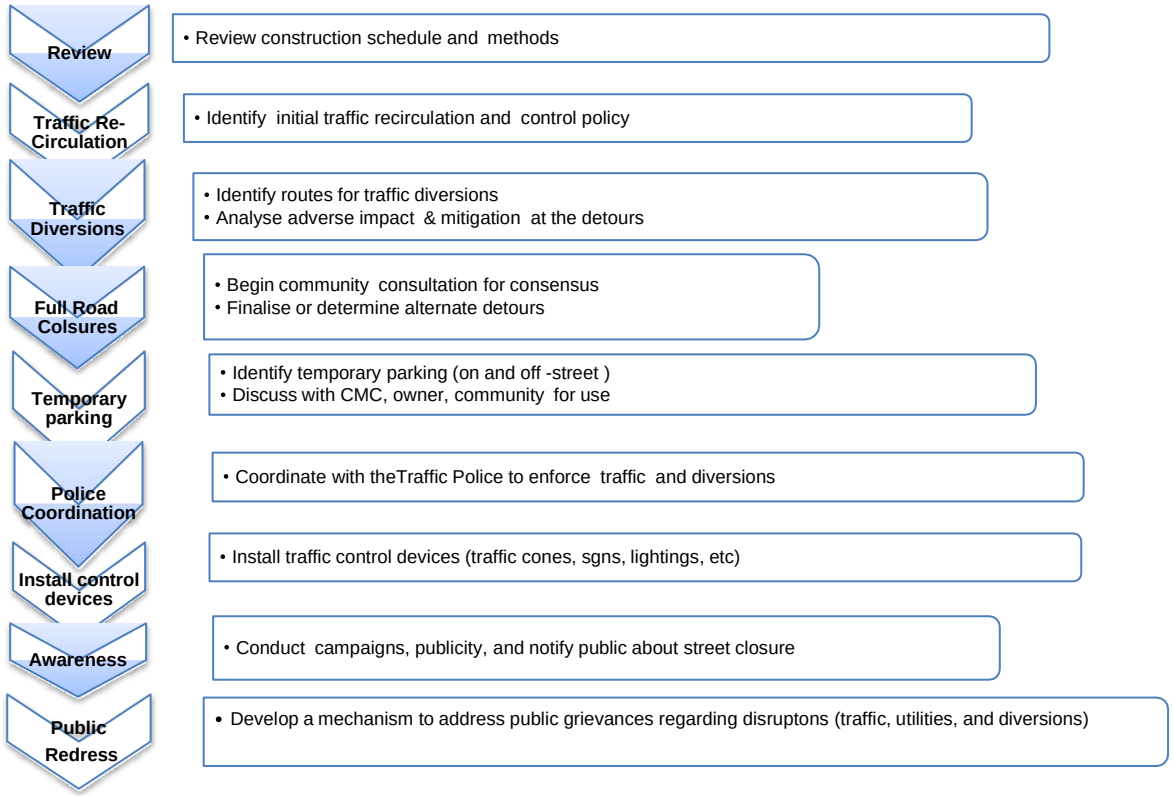
3. Apart from the capacity analysis, a final decision to close a street and divert the traffic should involve the following steps:

(i) approval from the PIU, local administration to use the local streets as detours;
(ii) consultation with businesses, community members, traffic police, PWD, etc, regarding the mitigation measures necessary at the detours where the road is diverted during the construction;
(iii) determining of the maximum number of days allowed for road closure, and incorporation of such provisions into the contract documents;
(iv) determining if additional traffic control or temporary improvements are needed along the detour route;
(v) considering how access will be provided to the worksite;
(vi) contacting emergency service, school officials, and transit authorities to determine if there are impacts to their operations; and

(vii) developing a notification program to the public so that the closure is not a surprise. As part of this program, the public should be advised of alternate routes that commuters can take or will have to take as result of the traffic diversion.

4. If full road-closure of certain streets within the area is not feasible due to inadequate capacity of the Detour Street or public opposition, the full closure can be restricted to weekends with the construction commencing on Saturday night and ending on Monday morning prior to the morning peak period.

Policy Steps for the TMP



Public awareness and notifications

5. As per discussions in the previous sections, there will be travel delays during the constructions, as is the case with most construction projects, albeit on a reduced scale if utilities and traffic management are properly coordinated. There are additional grounds for travel delays in the area, as most of the streets lack sufficient capacity to accommodate additional traffic from diverted traffic as a result of street closures to accommodate the works.

6. The awareness campaign and the prior notification for the public will be a continuous activity which the project will carry out to compensate for the above delays and minimize public claims as result of these problems. These activities will take place sufficiently in advance of the time when the roadblocks or traffic diversions take place at the particular streets. The reason for this is to allow sufficient time for the public and residents to understand the changes to their travel plans. The project will notify the public about the roadblocks and traffic diversion through public notices, ward level meetings and city level meeting with the elected representatives.

7. The ASCL/ PIU will also conduct an awareness campaign to educate the public about the following issues:

(i) Traffic control devices in place at the work zones (signs, traffic cones, barriers, etc.);
(ii) Defensive driving behaviour along the work zones; and
(iii) Reduced speeds enforced at the work zones and traffic diversions.

8. It may be necessary to conduct the awareness programs/campaigns on road safety during construction.

9. The campaign will cater to all types of target groups i.e. children, adults, and drivers. Therefore, these campaigns will be conducted in schools and community centers. In addition, the project will publish a brochure for public information. These brochures will be widely circulated around the area and will also be available at the PIU, and the contractor's site office. The text of the brochure should be concise to be effective, with a lot of graphics. It will serve the following purpose:

(i) explain why the brochure was prepared, along with a brief description of the project;
(ii) advise the public to expect the unexpected;
(iii) educate the public about the various traffic control devices and safety measures adopted at the work zones;
(iv) educate the public about the safe road user behaviour to emulate at the work zones;
(v) tell the public how to stay informed or where to inquire about road safety issues at the work zones (name, telephone, mobile number of the contact person; and
(vi) indicate the office hours of relevant offices.

Vehicle Maintenance and Safety

10. A vehicle maintenance and safety program shall be implemented by the construction contractor. The contractor should ensure that all the vehicles are in proper running condition and it comply with roadworthy and meet certification standards of Tripura Govt./ GoI. All vehicles to be used shall be in perfect condition meeting pollution standards of Tripura Govt./ GoI. The vehicle operator requires a pre state of shift checklist. Additional safety precautions will include the requirement for:

(i) Driver will follow the special code of conduct and road safety rules of Government of India
(ii) Drivers to ensure that all loads are covered and secured drivers to ensureoperation equipment can’t leak materials hauled
(iii) Vehicles will be cleaned and maintained in designed places.

Install traffic control devices at the work zones and traffic diversion routes

10. The purpose of installing traffic control devices at the work zones is to delineate these areas to warn, inform, and direct the road users about a hazard ahead, and to protect them as well as the workers. As proper delineation is a key to achieve the above objective, it is important to install good traffic signs at the work zones. The following traffic control devices are used in work zones:

(i) Signs
(ii) Pavement Markings
(iii) Channelizing Devices

(iv) Arrow Panels
(v) Warning Lights

11. Procedures for installing traffic control devices at any work zone vary, depending on roadconfiguration, location of the work, construction activity, duration, traffic speed and volume, and pedestrian traffic. Work will take place along major roads, and the minor internal roads. As such,the traffic volume and road geometry vary. The main roads carry considerable traffic; internal roads in the new city areas are wide but in old city roads very narrow and carry considerable traffic. However, regardless of where the construction takes place, all the work zones should be cordoned off, and traffic shifted away at least with traffic cones, barricades, and temporary signs(temporary “STOP” and “GO”).

12. The work zone should take into consideration the space required for a buffer zone between the workers and the traffic (lateral and longitudinal) and the transition space required fordelineation, as applicable. For the works, a 30 cm clearance between the traffic and the temporarySTOP and GO signs should be provided. In addition, at least 60 cm is necessary to install the temporary traffic signs and cones.

13. Traffic police should regulate traffic away from the work zone and enforce the traffic diversion result from full street closure in certain areas during construction. Flaggers/ personnel should always be equipped with reflective jackets and have traffic control batons (preferably the LED type) for regulating the traffic during night time.

14 In addition to the delineation devices, all the construction workers should always wear fluorescent safety vests and helmets to be visible to the motorists. There should be provision for lighting beacons and illumination for night constructions.

15. The ASCL/ PIU and contractor will coordinate with the local administration and traffic police regarding the traffic signs, detour, and any other matters related to traffic. The contractor will prepare the traffic management plan in detail and submit it along with the EMP for the final approval.

Appendix 12: Record of Public Consultation

Issues discussed

(i) Awareness and extent of the project and development components;
(ii) Benefits of the subproject for the improvement in quality of life.
(iii) Labour availability in the subproject locations or requirement of outside labourinvolvement;
(iv) Local disturbances due to construction works like air and noise pollution
(v) Necessity of tree felling etc. at subproject location;
(vi) Water logging and drainage problem if any;
(vii) Traffic Congestion problem;
(viii) Sensitive area nearby the subproject locations
(ix) Environmental Impacts of bathing and washing in the MBB College lake.

Areas: MBB College, Anglers Society, areas near bathing ghat

Date and Time- 15 November 2018

Table- Issues of Public Consultation- Design Stage

Sr. No.	Key Issue/ Demands	Perception of Community	Action to be taken
1	Awareness of the project – including coverage area	Local people are not much aware on components of the project.	Awareness program at different project locations related to project components is essential
2	In what way they may associate with the project	At the construction phase some people can work as laborer's, after completion nearby residents can use the lake for recreational purpose. The cafeteria will also increase employment opportunity during operation stage.	
3	Presence of any forest, wild life or any sensitive / unique environmental components nearby the project area	There is no forest area nearby the project location, migratory birds are found in the MBB College lake, the construction may impact these habitats.	Mitigation measures to ensure minimum disturbance to the migratory bird habitat will be implemented
4	Presence of historical/ cultural/ religious sites nearby	Temples are present nearby the proposed subproject roads. Local people requested not to impact on those sites	Access to the cultural and religious sites is included in EMP and Traffic Management Plan
5	Unfavorable climatic condition	The peak summer is hot and humid and not suitable for continuous work at open area	
6	Traffic issues during construction period	The traffic movement on the MBB College road may be impacted during the construction period.	Traffic Management plan approved by Traffic department will be implemented

Sr. No.	Key Issue/ Demands	Perception of Community	Action to be taken
7	Occurrence of flood	No such case is reported During monsoon water stagnation is reported in case of continuous rain	Drainage project already under implementation
8	Present solid waste collection and disposal problem	As per local people – done properly by AMC	
9	Availability of labour during construction time	Yes, labours are easily available in the nearby villages	
10	Access road to project Site	Yes, existing bitumen road in most of the cases	
11	Perception of locals on tree felling and afforestation.	Generally, not required in most of the cases.	If required compensatory plantation will be done as per Govt. rule
12	Dust and noise pollution and disturbances during construction work	Request for arresting of dust and protection of habitation from noise pollution	Mitigation measures will be applied as per EMP
13	Setting up worker camp site within the village/ project locality	Project area is having sufficient space for workers camp. Local people will allow to set up labour camp	
14	Safety of residents during construction phase and plying of vehicle for construction activities	Local requested for safety arrangement particularly where excavation is being planned near main city road.	

Group meeting 1

One Public Consultation was held at Angling and Aquatic Conservation Society of Tripura on 16thNovember 2018. Questions were asked about the concerns of the people, and the points were as follows:

(i) Anglers are very positive about the development and see overall benefits.
(ii) Anglers Society wants to participate in the planned development.
(iii) Society conducts a fishing competition every year with a gathering in the area.
(iv) With regard to the proposed development works to be undertaken for lake area,their concerns are with reference to: -
  (a) Design of the fishing platform: Platforms constructed during earlier projectwere not found useful by anglers who have constructed temporary bambooplatforms.
  (b) Continuation of the society's activities related with angling post development.
  (c) Boundary wall should be constructed for the entire area as open access has led to destruction of earlier facilities provided in the lake area. Securityfor the area should also be available as absence of security has led to

people damaging the facilities provided and dumping wastes. Youth alsogather in some of the area for drinking.

(d) Access to inner areas for fishing post development and restriction of accessin these areas as people have create damage or create disturbances.

(e) The society requires office space in the lake area for society activities andthey have requested space from the AMC.

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>PMC and ADB consultants consulting public</td><td>Angling and Aquatic Conservation Society of Tripura</td></tr>
<tr><td>  </td><td>  </td></tr>
</table>

Group meeting 2

A meeting was held with students of MBB College on 16th November 2018 and they were informed about the proposed project and then asked about their opinion and views regarding the upcomingproject. The points shared by the autorickshaw drivers were as follows:

- The students consulted, did not use the lake area for recreation as they do not findit attractive and the women students have safety and security concerns.
- Students from the Botany dept. visit the area for botanical survey as part of courserequirements.

- They do not visit as facilities and entertainment for their age group is not available.
- Cafeteria is closed at present and people visiting the lake area are not from their age group.
- The students would like ropeway and bicycle if it is affordable for them. Families
  may find it difficult to spend large sum for such facilities. In an average they were willing to pay up to Rs. 50 for ropeway and a smaller amount for bicycles.
- Their expectation is looking at better arrangements, facilities, safety and security in the lake area in terms of security guards, well-lit areas, activities which appealedto young people.
- Key points for developed area were as follows: Sanitary facilities especially for women; securities of light, electricity; transport facilities; swimming facilities and sports facilities.

	
MBB College students	MBB College students

Group meeting 3

A discussion was held with a small shop owner and few youngsters near the bathing ghat area.The points shared by the respondent are:

- About 15-20 people visit the ghat for either bathing or washing clothes.
- The number rises in summer season.
- Mostly people come to MBB College lake ghat for recreational bathing.
- Some people living in rented accommodation in the nearby areas come for bathingdue to water scarcity at those places.
- People gathered there were explained about the ill effects of polluting lake water.They agreed to give up bathing on the MBB College lake ghat if proper alternativeprovision was made.

	
Public Consultation	

MINUTES OF MEETING: STAKEHOLDERS MEETING

AGARTALA SMART CITY LIMITED
(CIN: U74999TR2016SGC013499)
AGARTALA MUNICIPAL CORPORATION, 5TH FLOOR, CITY CENTRE, PARADISE CHOUMUHANI, AGARTALA, WEST TRIPURA- 799001

Minutes of the Meeting

A Stakeholders Meeting related to "MBB College Revitalization"and "Renovation and Restoration of Ujjayanta Palace Garden", held on 04.12.2018 from15:00 Hrs at 5th floor of Agartala Smart City Office Conference Hall. The meeting notice was circulated vide this office letter No.4 (31)/ASCL/2018/2094-3008 Dated-30.11.2018.

This meeting has been called upon the observations received during the site visits and meetings held with the representatives of Asian Development Bank (ADB) from 12th to 16th of November, 2018.

The following points have been discussed:

Sl. No.	Points discussed	Action taken
01	Details of ownership of the land area under the scope of development.	Land Records and Settlement department agreed to provide MBB lake surrounding area land ownership details and areas by 6th December 2018. PMC has provided plot number that are falling within lake development are submitted to LRS department for details. AMC confirmed that lake is with fisheries department and any approval (Demolition/refurbishment/construction) for same will be provided by Fisheries department.
02	Demarcation/Identification of area for parking in MBB college.	HOD (Botany Dept., MBB college) along with the other House Members have expressed that after college hours, open space along MBB college road can be used for off-street parking for the visitors only, without any Civil modification. Accordingly PMC has been advised by the house not to consider parking space for the visitors by the side of MBB college road (MBB college gate to stadium by the left side) by providing retaining wall and filling of land thereon.

Sl. No.	Points discussed	Action taken
03	Check on the legal permissibility of the temporary structures erected for fishing, etc on the lake waters.	Legal permissibility of fishing decks (Permanent & temporary) to be discussed with Fisheries department. PMC will interact with the Fisheries department separately.
04	Lease details of lakes to Anglers society and relocation of fishing decks of Anglers society.	Lake lease details to be discussed with Fisheries department. PMC will interact with the fishery department separately.
05	Ownership details of Signage/ advertisements/ Hoardings and revenue generated from same.	AMC confirmed that signages/advertisements/hoardings within the lake development area can be removed.
06	Design and maintenance of proposed Botanical Garden by Botanical department of MBB College or the Tripura State Horticultural Society.	MBB college agreed that at the end of O&M period of five (5) years after completion, MBB college shall maintain the Botanical garden.
07	Apart from angling society fishing and repopulation any other user and activities within the MBB lake precinct.	AMC confirmed that apart from Angling society and Fisheries department no other stakeholder is involved in the precinct of MBB lake.
08	Viability and requirement of Ropeway.	Based on the present footfall and previous experience, Tourism department expressed their concern regarding viability of ropeway. Anyhow financial viability of same needs to checked once by PMC.
09	Viability and requirement of Bike track and smart biking system.	It was decided by all concerned that cycle track is not viable due to adverse impact on the ecology, biodiversity and unsuitable gradient along the lake bed.
10	Anticipated concerns like safety/security of women, children, lighting, walkway, solid waste disposal, or any other concerns that may arise due to the future development.	AMC agreed that at the end of O&M period of five (5) years after completion, AMC shall take care of Solid Waste or they may lease out same to third party.
		Joint site visit is proposed on 05.12.2018 with TSECL to check feasibility of relocation feeder transformer at near the Lake.
Revitalization & Renovation and Restoration of Ujjayanta Palace Garden		
1	Heritage Building	It was informed that Ujjayanta Palace is not listed as a heritage building in Archaeological Survey of India (ASI) state heritage building list.
2	Façade lighting and Fountain lighting colour scheme	It was discussed that Façade lighting and Fountain lighting colour scheme has already been approved by Hon'ble Chief Minister, Tripura on 13-08-2018. Hence, no need to change the colour scheme.

Sl. No.	Points discussed	Action taken
3	Provision of light and sound show	Tourism Department confirmed that Light & Sound shows including sitting arrangement has already considered in separate project.
4	Parking facility for visitors' vehicle	It was informed that dedicated parking zone is there opposite to the entry plaza for visitors.

06/12/18

(Er. R. Pal)
Executive Engineer
Agartala Smart City Limited

Enclo : List of attendance

AGARTALA SMART CITY LIMITED
(CIN: U74999TR2016SGC013499)
AGARTALA MUNICIPAL CORPORATION, 5TH FLOOR, CITY CENTRE, PARADISE CHOUMUHANI, AGARTALA, WEST TRIPURA- 799001

No.4 (31)/ASCL/2018/ 3025- 3040 Dated-06.12.2018

Copy to:

1) Managing Director, Agartala Smart City Limited.
2) The Chief Executive Officer, Agartala Smart City Limited (Municipal Commissioner, AMC).
3) The Director, Department of Revenue (Settlement Dept./Directorate of Land Records).
4) The Chairman Pollution Control Board.
5) The Director, Higher Education Department.
6) The Deputy Director Fisheries (Tripura West).
7) The Superintending Engineer, Agartala Municipal Corporation
8) The Senior Architect, PWD.
9) The General Manager (Tech), TSECL, Bidyut Bhavan, Agartala
10) The Director, Department of Forest/ Horticulture.
11) The Principal, MBB College, Agartala.
12) The Managing Director, Tripura Tourism Development Department.
13) The Curator, Tripura State Museum
14) Shri. D. K. Majumder, Conservation Assistant, Archaeological Survey of India, Udaipur Sub Circle.
15) The President, Angler's Society
16) The Team Leader, PMC (Project Management Consultant).

06/12/18

(Er. R. Pal)
Executive Engineer
Agartala Smart City Limited

Attendance of the meeting of the Stake Holders related to MBB College Lake Revitalisation & Restoration of Ujjayanata Palace to be held on 4th December, 2018 at 3rd floor of AMC Building

Sl.No	Name	Designation	E-mail	MobileNo.	Signature
1	Sankar Debnath	Addl. director LRS	debnathsankar479@gmail.com	9774388539	4/12/18
2	Narayan Ch. Tripura	A. S.O. D. L.R.S.	Narayan.ASO@gmail.com	8932801655	4-12-18
3	Dr. Khokan Majumdar, Associate Prof.	HOD. Deptt. of Botany MBB. College.	Khokanmajumdar9936@gmail.com	9436518395	04.12.2018
4	Er. Asish Manik	Ex. Engg, TTDC	tripuratourism09@rediffmail.com	9089185430	04/12/18
5	Er. S. Debbarma	EE, ASCL		9862807148	04/12/2018
6	Er. Mina Debbarma	DGM, EDI, Agartala TSECL	minatsecl@gmail.com	9436134074	04/12/18
7	Abir Ghosh	TL - AMC.	abirg@tec.co.in	9774853653	04/12/18
8	S Sreekanth	Urban planner - AMC	ssreekanth@tec.co.in	9440414905	
9	MANAS KANTI MAJI	Urban Designer AMC	mkmaji@tec.co.in	9999083285	
10	Rajat Pal	EE/ASCL			
11					

Community Consultation

Date : 16/11/2018

Place : MBB Lake Area,

Sl No	Name of Person	M - F	Address/Contact No	Signature
1	Subhash Ch Sarkar	M	9436456414 Agartala	
2	Surendra DebBarma	M	9856548058 Agartala	
3	Mahitosh Saha	M	9862779662	
5	Rabindra Ch. Saha	M	986220 8102	
6	Sreenath Bhattacharjee	M	9612488823	
7	Ratan Kanti Dey	M	9862212586	
8	Biswajit Chakraborty	M	9862165782	
9	Shyam Dey	M	9862103777	
10	Thakur Debnath	M	9863057479	
11	Kajal Das.	M		
12	Sujan Debbarma	M	7308107573	

Community Consultation

Date : 16/11/2018

Place : MBB Lake Area, [illegible]

Sl No	Name of Person	M - F	Address/Contact No	Signature
13.	Brahmananda [illegible]	M	[illegible] Lane, Krishnanagar 9436157988(M)	[signature]
14.	Biswajit Deb (Baban)	m	8837202361	[signature]
15	Subir Debbarma	[illegible]	9862526645	[signature]
16	Chandan Mukherjee	M	9436570247	[signature]
17	Amiya Chowdhury V.P.	M.	9436167546	[signature]
18.	Subhrajyoti [illegible]	M	9774533599	[signature]
19	Dibendhusan	m.	9615457830	
20)	[illegible]	M		
21	Akash Chowdhury	M	8974501708	
22.	K. S. [illegible]	M		[signature]
23	S. Debbarma EE, ASCL	M	9862807148	[signature]
24.	Govind Singh Rathore	M		[signature]
25.	Rajan Iyer	F	—	[signature]

Community Consultation

Date : 16/11/2018

Place : MBB College students

Sl No	Name of Person	M - F	Address/Contact No	Signature
1	Subrata Acharjee	M	Teliamura. Khowai. Tripura. Contact No- 8794449088	Subrata Acharjee
2.	Sayan Kundu	M	Ghurkhabasti Agartala, Tripura 7005835037	Sayan Kundu
3	Sumit saha	M	Joynagar, Agartala 799001	Sumit Saha
4	Suman Sutradhar	M	Agartala, Khayarpur 7005353804	Suman Sutradhar
5	Satyajit Debbarma	M	Teliamura. Khowai Tripura 8732867959	Satyajit Debbarma
6		M		
7	S. Debbarma EE, RSLL	M	9862807148	Debbarma
8.	Govind Singh Rathore	M		
9.	Rajni Iyer	F		
10.	Zita Patrick	F		Patrick

Community Consultation

Date : 16/11/2018

Place : MBB lake Area, Students

Sl No	Name of Person	M - F	Address/Contact No	Signature
1	Moumita Sarkar	F	Chailengta. L.T.V. 9862733664	Moumita. Sarkar.
2	Sarbani Das	F	melaghar 7005332692	Sarbani Das.
3.	Pallabi De	F	Ampinagar 8794064347	Pallabi De
4.	Kakali Sarkar	F	A.D Nagar Rd. No. 5, Agartala 8259025802	Kakali Sarkar
5.	Rumashree Rudra Pal	F	Netaji chowmohani, Agartala, Tripura (W) 7005957805	Rumashreee Rudra Pal.
6.	Mayuri Banik	F	East Narayanpur Agartala (E) Tripura 9436557822	Mayuri Banik.
7.	Rima Saha	F	Jagaharimura, Agartala, Tripura(W) 8257852212	Rima Saha
8.	Rashmi Ale.	F	Bhattapukur, Agartala, Tripura (W) 8416040790	Rashmi Ale.
9.	Sagarika Das	F	R.K Nagar Agartala, Tripura 9089660485	Sagarika Das
10.	Baishani chakma	F	Kalyani Bo c. 7005979232	Baishnki chakma

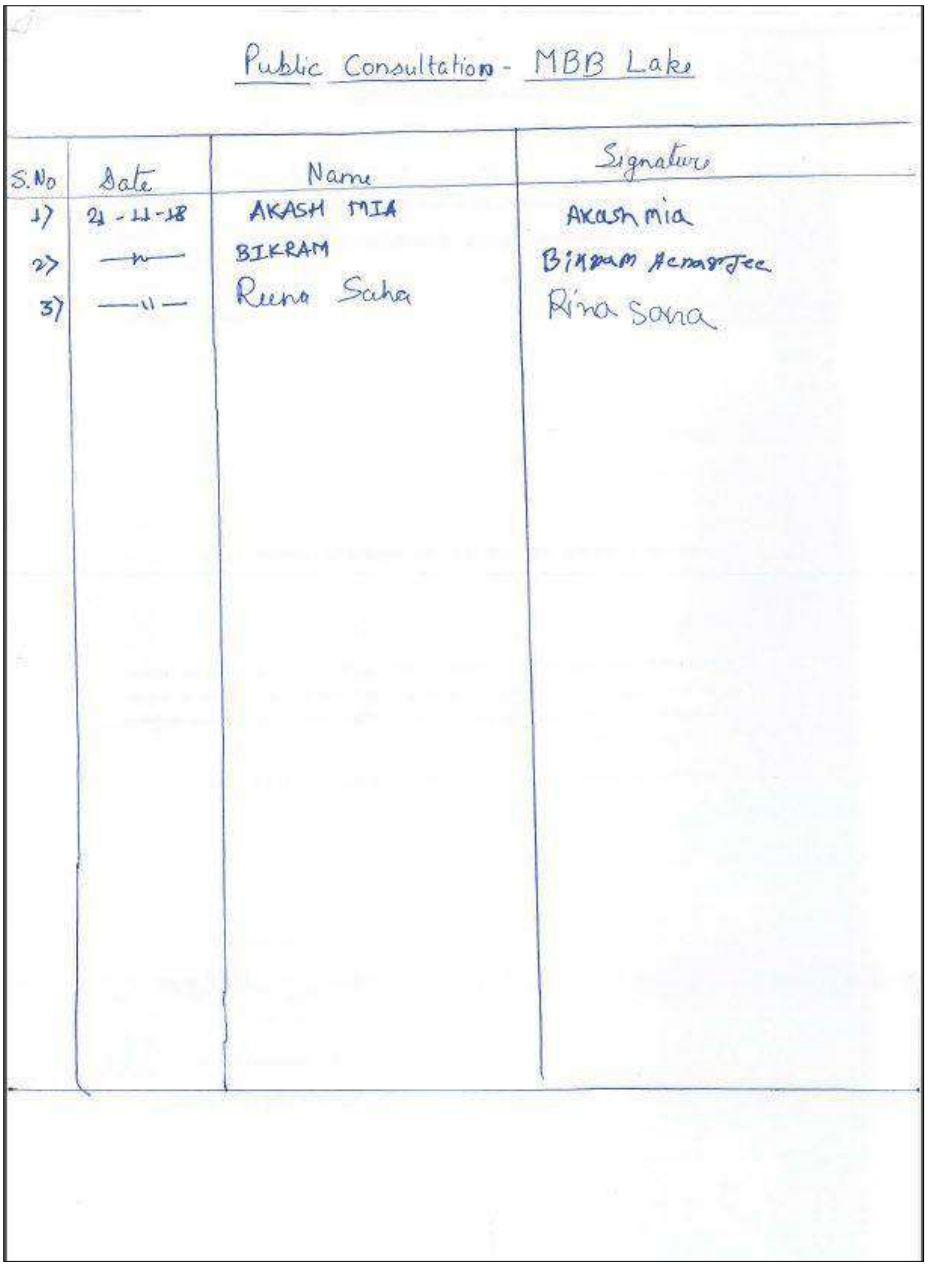
Community Consultation

Date : 16/11/2018

Place : MBB Kaka Area, Students.

Sl No	Name of Person	M - F	Address/Contact No	Signature
1.	Shalinee Dalla	Female	Ramnagar 3, Agartala Trip -ura. 7678241659	Shalinee Dalla.
2.	Shreya Chakra -borty	Female	Jagaharimura Agartala, Tripura(W) 9366375447	
3.	Rishi Gupta Sharma.	Female.	Kamalpur, P.O. and P.S. 8974089937	Rishi Gupta Sharma.
4.	Naina Dasgupta	Female	Jogendranagar 8730055712	
5.	Manisha Chakraborty.	Female	Collegetilla 9774145166	Manisha Chakraborty.
6.	Mukta chakraborty	Female	8256931030	Mukta Chakraborty.

Public Consultation at Bathing Ghat



Public Consultation - MBB Lake

S.No	Date	Name	Signature
1)	21-11-18	AKASH MIA	Akash mia
2)	—"—	BIKRAM	Bikram Acharjee
3)	—"—	Reena Saha	Rina Saha

A workshop was organized by ASCL on 05th November, 2022 for awareness and knowledge sharing of Project MBB college lake , where all stakeholders were present. It was conducted near the MBB College Lake at 3 pond lake.

CEO ASCL presents about the existing condition of the MBB college lake and how the project contribute to the improvement of lake. Contractor showed the new piling methodology in details using pictorial and video graphical representation. Environmental safeguards and mitigation measures were also suggested by ASCL and PMC environmental team for the new piling methodology.

মোহনপুর: আগরতলা কলেজ লেক পুনরুজ্জীবিত করার লক্ষ্যে কর্মশালা আয়োজিত হল শিবনগর মডার্ন ক্লাব এলাকায়, উপস্থিত মেয়র দীপক মজুমদার

8.5k views | Mohanpur, West Tripura | Nov 5, 2022

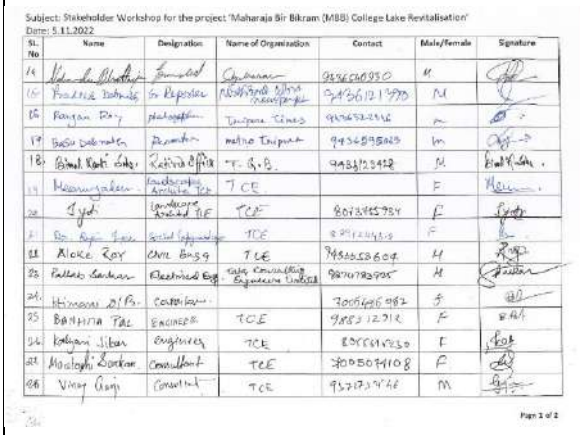
TRIPURA OBSERVER
SUNDAY, 6TH NOVEMBER, 2022

Mayor attend in a stakeholder workshop at Agartala on Saturday. PicTO

MBB Lake beautification

Piling to be in pontoon method to avert pollution

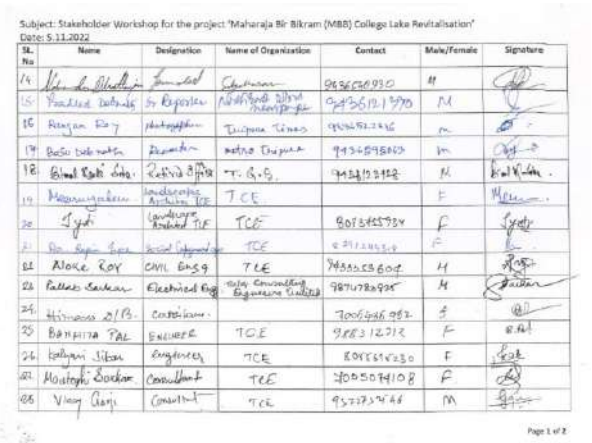
List of Participants:



Subject: Stakeholder Workshop for the project 'Maharaja Bir Bikram (MBB) College Lake Revitalisation'
Date: 5.11.2022

Sl. No	Name	Designation	Name of Organization	Contact	Male/Female	Signature
14				9436760930	M	
15				9436121970	M	
16				9436521246	M	
17				9436898603	M	
18				9436123412	M	
19					F	
20				8073455934	F	
21				8974124613	F	
22	Alaka Roy	Civil Engg	TCE	9436538604	M	
23				9854782995	M	
24				7005695982	F	
25				9883112712	F	
26				8575619230	F	
27				9005074108	F	
28				9577374746	M	

Page 1 of 2



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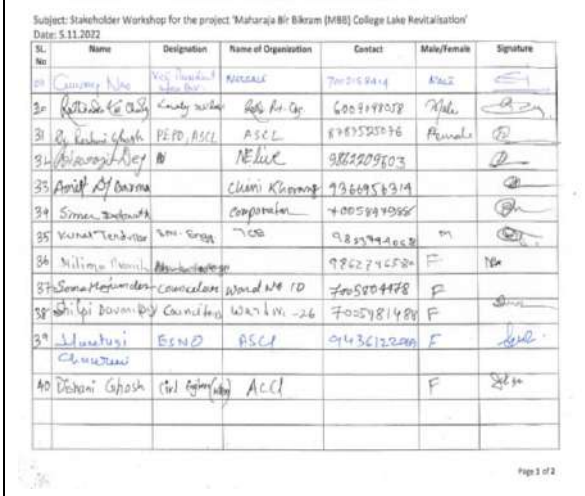
14				9436760930	M	
15				9436121970	M	
16				9436521246	M	
17				9436898603	M	
18				9436123412	M	
19					F	
20				8073455934	F	
21				8974124613	F	
22	Alaka Roy	Civil Engg	TCE	9436538604	M	
23				9854782995	M	
24				7005695982	F	
25				9883112712	F	
26				8575619230	F	
27				9005074108	F	
28				9577374746	M	

Page 1 of 2



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Date: 5.11.2022

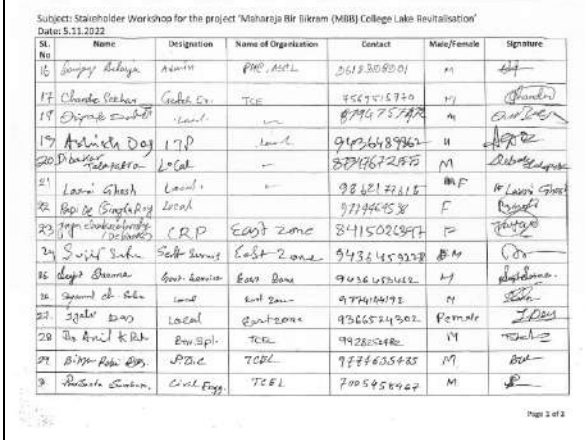
Sl. No	Name	Designation	Name of Organization	Contact	Male/Female	Signature
29						
30				6009199058		
31				8787555036		
32				9862209603		
33				9366958319		
34				9005849955		
35				9859994053	M	
36				9862774580	F	
37				7005804778	F	
38				7005481488	F	
39				9436122994	F	
40					F	

Page 1 of 2

Subject: Stakeholder Workshop for the project 'Maharaja Bir Bikram (MBB) College Lake Revitalisation'
Date: 5.11.2022

Sl. No	Name	Designation	Name of Organization	Contact	Male/Female	Signature
1		Local		9005563886	M	
2				9366919029	M	
3				9862179739	M	
4				6909572154	M	
5				8974178747	M	
6				8837075746	M	
7				9612663667		
8				6033336172	M	
9				9436641518	M	
10				7479605671	M	
11				8837079784	M	
12				9854018611	M	
13				8100881484	M	
14				8794628313	M	
15				8837013947	M	

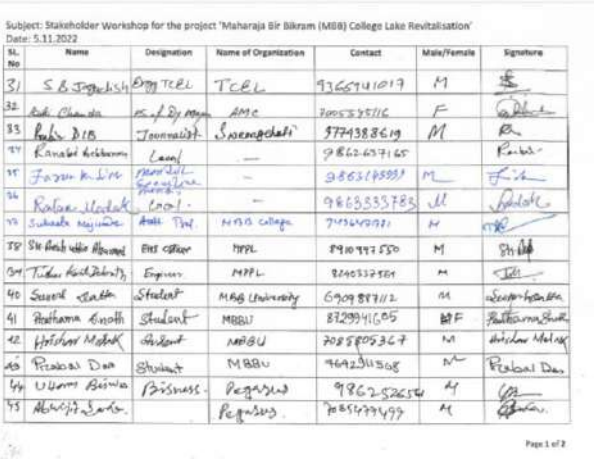
Page 1 of 2



Subject: Stakeholder Workshop for the project 'Maharaja Bir Bikram (MBB) College Lake Revitalisation'
Date: 5.11.2022

Sl. No	Name	Designation	Name of Organization	Contact	Male/Female	Signature
16				8413080801	M	
17				7554715720	M	
18				8794757472	M	
19				9863648962	M	
20				8794767255	M	
21				9862177115	M/F	
22				9774644558	F	
23				8415026947	F	
24				9436145238	M	
25				9436458428	M	
26				9774104192	M	
27				9366524302	Female	
28				9928052482	M	
29				9774655485	M	
30				7005458467	M	

Page 1 of 2



Subject: Stakeholder Workshop for the project 'Maharaja Bir Bikram (MBB) College Lake Revitalisation'
Date: 5.11.2022

Sl. No	Name	Designation	Name of Organization	Contact	Male/Female	Signature
31				9365941019	M	
32				7005545116	F	
33				9774938619	M	
34				9862-657165		
35				9863195993	M	
36				9863933783	M	
37				7439493931	M	
38				8910997550	M	
39				8240332451	M	
40				6909887112	M	
41				8729941605	M/F	
42				7085805367	M	
43				9692311508	M	
44				9862-526554	M	
45				7085779499	M	

Page 1 of 2

Subject: Stakeholder Workshop for the project 'Maharaja Bir Bikram (MBB) College Lake Revitalisation'
Date: 5.11.2022

SL. No	Name	Designation	Name of Organization	Contact	Male/Female	Signature
46	Sujit Karmakar	Business	Lalbahadur Club - Agt	7005442473	M	
47	Goutam Saha	"	"	9774601712	M	
48	Mondita Das	local			F	M Das
49	Rana-DCb			9362342470	M	
50	Rajat Dutta.			7005682631	M	
51	Pupak Debnath	JE/ASCL	JUNIOR ENGINEER	7005120733	M	
52	Ratnakar Mayuri	PMC	TCE	8840321337	M	
53.	Jayasree Deb	JE; ASCL	ASCL	7005742112	F	
54.	Rakesh Nath	Local	Chandrapur. Dist.	9366487622	M	
55.	[illegible]	"		7005512265	M	[illegible]
56.	Jayanta Chakraborty	"		6009378297	M	Jayanta Chakraborty
57.	Engula Uchoi	Manager, ICCC (ASCL)	ASCL	8787584657	M	
58.	Hemendra Sukla	Engineer (KMPL)		7752031983	M	
59.	Ranjit Ghosh	Surveyor (KMPL)		9862077870	M	

Appendix 13: Letter to Forest Department - Requesting Information on MBB College Lake Wetland Status

AGARTALA SMART CITY LIMITED

(CIN: U74999TR2016SGC013499)

AGARTALA MUNICIPAL CORPORATION, 5TH FLOOR, CITY CENTRE, PARADISE CHOUMUHANI, AGARTALA, WEST TRIPURA- 799001

No. F. No. 4(25)/(ASCL)/2018/1560-61 **Date: 28-06-2019.**

To,
The Sub-divisional Forest Officer,
Forest Office,
Agartala

Sir,

Sub: Request for information on MBB Lake Wetland Status – developed under Agartala Smart City Limited -reg.

With reference to the above subject, MBB Lake is being revitalized and transformed into an active recreational and community area at the same time retaining prevailing ambience. The lake is proposed to be developed considering the guidelines of Department of Science, Technology and Environment for Protection and Preservations of Lakes and water bodies vide its letter no. No.F.11(35)/DSTE/CC/Pt-1/ 3813 24 dated 24-05-2017.

As per the Tripura Forests Department, Government of Tripura website, the MBB lake is identified as wetland important from the point of view of Bio-diversity conservation and centers of socio-economic values. The lake is ranked 3 and categorized as medium use.

In the above circumstances, we like to understand any clearance or permission requirement from the Forest Department and/ or Wetland Authority to take up the proposed developmental works.

Kindly advise on the same.

Yours faithfully,

20/6/19

(Dr. Shailesh K. Yadav, IAS)
Chief Executive Officer
Agartala Smart City Limited

Copy to: Team Leader, PMC for information & necessary action.

Response from Forest Dept.

No.F.3-31/Bio-Diversity/Dev/SSD/2020-21/ 2755-56
Government of Tripura
Office of the Sub-Divisional Forest Officer
Sadar Forest Sub-Division
Agartala, West Tripura
Mail: sdfosadar@gmail.com

Dated, 17 /06/2022

To
The District Forest Officer
West Tripura Forest District
Agartala. Tripura

Sub : Request for information on MBB lake wetland status – developed under Agartala Smart City Ltd.- regarding.

Ref : No. F. No. 4(25)/ABCL/2018/1560-61 dated,28.06.2019 of the CEO, Agartala Smart City.

Sir,

With reference to the above may I have the honour to inform you that the CEO, Agartala Smart City had made a communication with this office vide the above referred letter where he wanted to know whether any clearance from Forest Department is required to take up any developmental activities in the lake to revitalize and transform the said lake in to an active recreational and community area retaining its prevailing ambience under the Agartala Smart City Project, as the said lake is already identified as an wetland, important from biodiversity conservation point of view and centre for Socio-economic views. The lake is ranked 3 and categorized as medium use. In this regard he has also mentioned that all such developmental activities will be taken up in conformity with the guidelines of Department of Science and Technology for protection and preservation of lakes and water bodies vide it's letter no.F.11(35) DSTE/CC/Pt.-1/3813 dated.24.06.2017.

Therefore I am forwarding the above mentioned letter of the CEO, Agartala, Smart City to your honour for your valuable suggestion and guidance in this regard to send a comprehensive reply to the CEO, Agartala Smart City.

This is for favour of your kind information and doing the needful please.

Yours faithfully,-

Enclo: 01 sheet.

(P. Chakraborty, TFS)
Sub-Divisional Forest Officer
Sadar Forest Sub-Division

Copy to:
The Chief Executive Officer, Agartala Smart City for favour of kind information.

Sub-Divisional Forest Officer
Sadar Forest Sub-Division

Letter from Dy Conservator of Forest to Member Secretary to Tripura State Pollution Control Board for issuance of directive letter to ASCL

No.F.17(54)/For-Dev/WAT/2022/ 22704-708
Government of Tripura
Office of the Principal Chief Conservator of Forests
Tripura: Agartala.

Dated, The 01 / 10 / 2022

To
The Member Secretary,
TSPCB, Agartala

Ref.: Request for information on MBB Lake wetland status-developed under Agartala Smart City Limited.

Sir,

I am directed to refer to the above and to enclose herewith the letter vide No.F.4(98)/ASCL/2021/2780-81 dated 01.09.2022 of Chief Executive Office, Agartala Smart City Limited wherein he has sought information whether any clearance or permission is required from the Forest Department or Wetland Authority to proceed further with the work of development of MBB Lake.

Notification No.F.11(35)/DSTE/CC/Part-1/3813-24 dated 25.05.2017 of Department of Science, Technology and Environment contains guide lines for protection and preservation of Lakes, Ponds and Water Bodies in the State of Tripura. As per para 4 of above notification apart from others, Member Secretary of TSPCB is authorized to initiate legal action for violation of the above guide line.

In view of this I am directed to request you dispose of the above application of CEO, Agartala Smart City Limited with suitable direction.

Yours faithfully,

01/10/22

(K.G. Roy)
Dy. Conservator of Forests (HQ)

Enclo: As stated above

Copy to:
1. PPS to the PCCF & HoFF, Tripura for kind information.
2. PS to the Principal Secretary, STE, Govt. of Tripura for kind information.
3. PS to the Chief Wildlife Warden, Trioura for kind information.
4. The Chief Executive Officer, Agartala Smart City Limited for kind information.

799001

01/10/22

Dy. Conservator of Forests (HQ)

Letter from Member Secretary TSPCB to ASCL regarding follow up of DST guideline related to conservation of protection & Preservation of Lakes, Ponds and water bodies

TRIPURA STATE POLLUTION CONTROL BOARD

(A Statutory Organisation Under Government of Tripura)
Department of Science Technology & Environment

No.F.19(74)/TSPCB/MS/ 8554-58 October 27, 2022

To
The Chief Executive Officer
Agartala Smart City Limited

Sub: Request for information on MBB College Lake Wetland status-developed under Agartala Smart City Limited-reg.

Sir,

A letter has been received from the office of the Principal Chief Conservator of Forests. Government of Tripura alongwith a letter of Agartala Smart City Limited dated 01.09.2022 egarding the information on MBB College Lake Wetland status-developed under Agartala Smart City Limited.

2. I would like to inform that a Statutory Guidelines has been notified vide Notification No.F.11(35)/DSTE/CC/Part-I/3813-24 dated 25.058.2017 for protection and preservation of lakes, ponds and water bodies in the State of Tripura by the Department of Science, Technology & Environment, Government of Tripura. A Copy of the said guideline is attached herewith.

3. The protection, rejuvenation and beautification activities of the MBB College Lake may be carried out following the Statutory Guidelines for Protection and Preservation of lakes, ponds and water bodies.

This is for your information.

Yours faithfully,
27.10.2022
(Dr. Bishu Karmakar)
Member Secretary

Copy to.

i) The PPS to the Principal Secretary, Science, Technology & Environment, Government of Tripura for kind information of the Principal Secretary.
ii) The PA to the Chairman, Tripura State Pollution Control Boar d for kind information of the Chairman.
iii) The PS to the Chief Wild Life Warden, Tripura for kind information of the Chief Wild Life Warden.
iv) The Director, Science, Technology & Environment, Government of Tripura for kind information.

Address :
PARIVESH BHAWAN
Pandit Nehru Complex. Gorkhabasti.
PO : Kunjaban. Agartala. West Tripura - 799 006

website :
www.tspcb.tripura.gov.in / trpenvis.nic.in
e-mail :
tripuraspcb@gmail.com / hoospcb-tr@gov.in

Contact :
Chairman : 0381 - 2322462
Member Secretary : 0381 - 2325421
Head of Office : 0381 - 2322455
OCMS Help Desk : 0381 - 2328702

Appendix 14: Draft Lake Conservation Guideline By DST

No.F.11(35)/DSTE/CC/Pt-I/ 3813-24
GOVERNMENT OF TRIPURA
DEPARTMENT OF SCIENCE, TECHNOLOGY & ENVIRONMENT

*****

Dated, Agartala, the 24/05/2017

NOTIFICATION

Sub:- Statutory Guidelines for Protection and Preservation of lakes, ponds and water bodies in the State of Tripura.

In pursuance of the Judgment & Order dated 16.08.2016 of the Hon'ble High Court of Tripura in WP(C)(PIL) No.2 of 2014 in the matter of Shri Bibash Ch.Saha Vs. State of Tripura & Ors., the Government had constituted a committee under the Chairmanship of the Principal Chief Conservator of Forests, Govt. of Tripura in October, 2016, for framing the guidelines taking into account the suggestions/recommendations of the experts in the field to protect and preserve the ecosystem and environmental balance of all the water bodies in the State. A copy of the Memorandum dated 20th October, 2016 vide which the above Committee was constituted is at **Annexure I.** The Committee submitted a report before the State Government on 27th April, 2016.

2. After careful consideration of the recommendations of the Committee and in exercise of the powers conferred under section 24 of the Water (Prevention & Control of Pollution) Act,1974, and Section 5 of the Environment (Protection) Act, 1986, it is hereby decided that all Local Bodies [like - Municipal Corporations, Municipal Councils, Nagar Panchayat, Panchayat Samities, Block Advisory Committees, Zilla Parishad etc.], PWD (R&B), PWD(Water Resource), PWD(Minor Irrigation), Forest Department, Fishery Department, District/Sub-Division/Block level Administrations, Wetland Management Authority of Tripura, Committees of Religious Organization like Matarbari Temple/Kasba Kalibari Temple/Chaturdas Devata Bari Temple etc. and industrial unit or any individual, being owner of a pond, should observe the following guidelines for 'determination of the embankments of water bodies' regarding protection and preservation of ecosystem and environmental balance of water bodies:-

i. For the existing water bodies which have permanent structures (permanent structure means brick wall, RCC structures, concrete wall etc.), proper provision for free movement of the aquatic life and water and the natural slope may be made by using eco-friendly materials/interventions like earth mounding geo-textiles, bamboo, grass etc., wherever feasible and applicable. However, adequate care may be taken to ensure that nearby habitation/structures are also protected from erosion.

1 | Page

ii. Disposal of any waste materials (includes solid wastes, bio-medical waste, e-waste, hazardous waste, construction and demolition waste and sewage and effluent as defined under concerned rules) in the water bodies should be strictly prohibited.

iii. Illumination by using powerful lights (like flood lights, street lights, search lights) should be avoided. Pedestal lights or duly covered tube lights may be installed for illumination of foot-paths, walking tracks etc. It should be ensured that nearby trees are not illuminated. These are to be completed within next 6 months.

iv. For monitoring of the water bodies, a committee consisting of representatives of the concerned department (owner of the water bodies), Forest Department, Fishery Department, Tripura State Pollution Control Board (TSPCB) and experts from Fishery College should be formed. The committees should periodically check the water quality with the help of TSPCB and take necessary action for maintaining the ecosystem of the water body. The Committee to be constituted within next 1 month.

v. A committee at State level with concerned stakeholders for monitoring and implementation of these guidelines should be formed. The Committee to be constituted within next 1 month.

vi. The TSPCB, with the help of concerned stakeholders should take up large scale awareness programmes about various acts and rules about the pollution control and ecological well-being of water bodies in the State. This should be an ongoing activity of the board.

Note :- *Where Bamboos, Sal, eucalyptus or other eco-friendly items for pilling is undertaken it should be kept into consideration that no cut-drum sheets or tin plates are fitted with the bullahs as these tin-sheets separate the land and water. This separation of land and water is very unhygienic for the water body and the surrounding areas according to scientists.*

3. Authorities of all Local Bodies [like - Municipal Corporations, Municipal Councils, Nagar Panchayat, Panchayat Samities, Block Advisory Committees, Zilla Parishad etc.] PWD (R&B), PWD(Water Resource), PWD(Minor Irrigation), Forest Department, Fishery Department, Wetland Management Authority of Tripura, Committee of Religious Organization like Matarbari Temple/Kasba Kalibari Temple/Chaturdas Devata Bari Temple etc, President of different Chamber of Commerce and Industries, are requested to circulate the aforementioned statutory guidelines through their officials for wide compliance.

4. In case of violation of the aforementioned guidelines, the District Magistrate and Collector or the Chairman or the Member Secretary of the Tripura State Pollution Control Board or any other officer authorized in this behalf by it, shall in accordance with the procedure and powers conferred under Section 19 of the

Environment (Protection) Act, 1986 and/or Section 49 of the Water (Prevention and Control of Pollution) Act, 1974, as the case may be, shall initiate legal action.

5. This order shall take immediate effect.

By the order of the Governor,

Chalaré 19/5/17
(C Murti)
Special Secretary
to the Government of Tripura

Copy to :-

1. The Principal Secretary to the Governor, Tripura, Agartala.
2. The Principal Secretary to the Chief Minister, Tripura.
3. The P.S/P.A to all the Ministers, Tripura, Agartala.
4. The Chairman, Tripura State Pollution Control Board, Agartala.
5. All Municipal Corporations, Municipal Councils, Nagar Panchayat, Panchayet Samities, Block Advisory Committees, Zilla Parishad, Tripura.

.....
...

6. The Principal Secretaries/Commissioners/Secretaries/Special Secretaries to the Govt. of Tripura, Agartala.
7. The Member Secretary, Tripura State Pollution Control Board, Agt.
8. All Heads of Department/PSU/Organization/Board/Agency, Tripura.

.....

9. All DM & Collectors / SDMs / BDOs, Tripura.....
10. The Sabiet of Matabari Tample/ Kasba Kalibari Tample/ Chaturdash Devatabari Tample, Tripura.
11. The Manager, Government Press for publication of this notification in the next issue of official gazette.
12. Sri S. Banik, Scientific Officer, DSTE, Agartala for information & requests to publish the same in Official Website of this Department.

TRIPURA STATE POLLUTION CONTROL BOARD
RECEIVED
24 MAY 2017
No. 1828
AGARTALA

Chalaré 19/5/17
(C Murti)
Special Secretary
to the Government of Tripura

Appendix 15: GRM and Sample Grievance Registration Form

AGARTALA SMART CITY LIMITED
(CIN: U74999TR2016SGC013499)
1ST FLOOR, UD BHABAN, SHAKUNTALA ROAD
AGARTALA, WEST TRIPURA- 799001

No.F. 4(98)/ASCL/2020/ 2150 - 2151 Dated. 16/04/2021

NOTIFICATION

In pursuance of Asian Development Bank (ADB) Guideline and as approved by the board of Directors in the 17th BOD meeting held on 27.12.2019, an independent Grievance Redressal Mechanism (GRM) is hereby established under Agartala Smart City Limited (ASCL) to address the grievance of persons affected due to implementation of sub- projects under ADB assisted Agartala City Urban Development Project. A three tier Redressal structure is planned to address any complaints in the Project.

The composition of the Grievance Redressal Committees (GRC) for ADB assisted projects:-

First Tier/ Site Level GRC	Second Tier/ Central GRC	Third Tier/ Apex GRC
• Executive Engineer • Site Engineer of ASCL • EHS officer of Contractor • Contractor's site engineer • Representative of Affected People(AP)	• CEO, ASCL • E&S Nodal Officer • PEPO • Executive Engineer • Asst. Engineer • Team Leader, PMC • E&S Officer, PMC	• Members of Executive committee of ASCL

The time limit of grievance redress will be as follows:-

- Site level: 7 days
- Central GRC: 15 days
- Apex GRC:15 days

The terms of reference of Grievance Redressal Committee (GRC) are as follows:

- Providing support to the affected persons in solving their problems;
- Prioritize grievances and resolve them at the earliest;
- Coordinate with the complainant/affected person to get accurate and timely information on the complaint to find a solution; and
- Study the common grievances relevant to the issue and advise PMU, and other relevant committees on remedial actions to avoid future occurrences.

16/04/2021

(Dr. Shailesh Kumar Yadav, IAS)
Chief Executive Officer
Agartala Smart City Limited
&
District Magistrate & Collector,
West Tripura District.

Copy to:-

1. PS to the Secretary, UDD for kind information of the Secretary, UD Department..
2. Team Leader, PMC,ASCL.

Sample Grievance Registration Form
(To be available in English or local language)

The ASCL welcomes complaints, suggestions, queries and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.
Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name. Thank you.

Date	**Place of registration**				
Contact Information/Personal Details					
Name		**Gender**	**Male Female**	**Age**	
Home Address					
Village / Town					
District					
Phone no.					
E-mail					
Complaint/Suggestion/Comment/Question Please provide the details (who, what, where and how) of your grievance below: **If included as attachment/note/letter, please tick here:**					
How do you want us to reach you for feedback or update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of official registering grievance)	
If – then mode: **Note/Letter** **E-mail** **Verbal/ Telephonic**	
Reviewed by: (Names/Positions of Official(s) reviewing grievance)	
Action Taken:	
Whether Action Taken Disclosed:	**Yes** **No**
Means of Disclosure:	

GRIVENCES RECORD AND ACTION TAKEN

Sr. No.	Date	Name and Contact No. of Complainer	Type of Complain	Place	Status of Redress	Remarks

Appendix 16 : Monitoring and Reporting Formats

SAMPLE MONTHLY REPORTING FORMAT FOR CONSTRUCTION SUPERVISION SPECIALIST

This template must be included as an appendix in the updated IEE that will be prepared for the project. Itcan be adapted to specific project as necessary.

a. Introduction

- Overall project description and objectives
- Description of sub Projects
- Environmental Category of the sub projects.
- Details of site personnel and I or consultants responsible for environmentalmonitoring Overall project and sub project progress and status.

No.	Sub Project Name	Status of the Sub Project			List of works	Progress of works
		Pre- Construction	Construction	Operational Phase		

b. Compliance Status with National I State I Local Statutory Environmental Requirements

No	Sub Project Name	Statutory Environmental Requirements	Status of Compliance	Action Required

c. Compliance Status with Environmental Loan Covenants

No (List schedule and Paragraph Number of Loan Agreement)	Covenant	Status of Compliance	Action Required

d. Compliance Status with the Environmental Management and Monitoring Plan

- Provide the monitoring results as per the parameters outlined in the EMP. Append supporting documents where applicable, including Environmental Site Inspection Reports.
- There should be reporting on the following items which can be incorporated in the checklist of routine Environmental Site Inspection Report followed with a summaryin the semi -annual report send to ADB. Visual assessment and review of relevant site documentation during the routine site inspection needs to note and record thefollowing
- What are the dust suppression techniques followed for site and if any dust was noted to escape the site boundaries?
- If muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads
- Adequacy of type of erosion and sediment control measures installed on site, condition of erosion and sediment control measures including if these were intactfollowing heavy rain.
- Are their designated areas for concrete works and refueling?

- Are their spill kits on site and if there are site procedure for handing emergencies?
- Is there any chemical stored on site and what is the storage condition?
- Is there any dewatering activities, if yes, where is the water being discharged?
- How are the stockpiles being managed?
- How is solid and liquid waste being handled on site?
- Review of the complaint management system
- Checking if there are any activities being under taken out of working hours andhow that is being managed.

Summary Monitoring Table

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
Design Phase						
Pre-Construction Phase						
Construction Phase						
Operational Phase						

Overall Compliance with CEMP/ EMP

No.	Sub-Project Name	EMP/ CEMP Part of Contract Documents (Y/N)	CEMP/ EMP Being Implemented (Y/N)	Status of Implementation Excellent/ Satisfactory/ Partially satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required

Approach and methodology for environmental monitoring of the project

- Brief description on the approach and methodology used for environmental monitoring ofeach sub- project

Monitoring of environmental IMPACTS on PROJECT SURROUNDINGS (ambient air, waterquality and noise levels)

- Brief discussion on the basis for monitoring
- Indicate type and location of environmental parameters to be monitored

- Indicate the method of monitoring and equipment to be used
- Provide monitoring results and an analysis of results in relation to baseline data andstatutory requirements

As a minimum the results should be presented as per the tables below.

Air Quality Results

Site	Date of Testing	Site Location	Parameters (Government Standards)		
			PM_{10} µg/m3	$S0_2$ µg/m3	$N0_2$ µg/m3
Site	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM_{10} µg/m3	$S0_2$ µg/m3	$N0_2$ µg/m3

Noise Quality Results

Site No.	Date of Testing	Site Location	LAeq (dbA) (Government Standard)	
			Day Time	Night Time
Site No.	Date of Testing	Site Location	LAeq (dbA) (Monitoring Results)	
			Day Time	Night Time

SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

- Summary of follow up time-bound actions to be taken within a set timeframe.
- APPENDIXES
  - Photos
  - Summary of consultations
  - Copies of environmental clearances and permits
  - Sample of environmental site inspection report

Appendix 17: Semi-Annual Environmental Monitoring Report Template

INTRODUCTION

- Overall project description and objectives
- Environmental category as per ADB Safeguard Policy Statement, 2009
- Environmental category of each subproject as per national laws and regulations
- Project Safeguards Team

Name	Designation/Office	Email Address	Contact Number
1. PMU			
2. PIUs			
3. Consultants			

- Overall project and sub-project progress and status
- Description of subprojects (package-wise) and status of implementation (preliminary, detailed design, on-going construction, completed, and/or O&M stage)

Package Number	Components /List of Works	Status of Implementation (Preliminary Design/Detailed Design/On-going Construction/Completed/O&M)[a]	Contract Status (specify if under bidding or contract awarded)	If On-going Construction	
				%Physical Progress	Expected Completion Date

[a] If on-going construction, include %physical progress and expected date of completion.

II. COMPLIANCE STATUS WITH NATIONAL/STATE/LOCAL STAT UTORYENVIRONMENTAL REQUIREMENTS[a]

Package No.	Subproject Name	Statutory Environmental Requirementsb	Status of Compliancec	Validity if obtained	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent/Permit to Establishd

[a] All statutory clearance/s, no-objection certificates, permit/s, etc. should be obtained prior to award of contract/s. Attach as appendix all clearance obtained during the reporting period. If already reported, specify in the "remarks" column.
[b] Specify (environmental clearance? Permit/consent to establish? Forest clearance? Etc.)
[c] Specify if obtained, submitted and awaiting approval, application not yet submitted.
[d] *Example: Environmental Clearance requires ambient air quality monitoring, Forest Clearance/Tree-cutting Permit requires 2 trees for every tree, etc.*

III. COMPLIANCE STATUS WITH ENVIRONMENTAL LOAN COVENANTS

No. (List schedule and paragraph number of Loan Agreement)	Covenant	Status of Compliance	Action Required

IV. COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT PLAN (REFER TO EMPTABLES IN APPROVED IEE/S)

- Confirm if IEE/s require contractors to submit site-specific EMP/construction EMPs. If not, describe the methodology of monitoring each package under implementation.

Package-wise Implementation Status

Package Number	Components	Design Status (Preliminary Design Stage/Detailed Design Completed)	Final IEE based on Detailed Design				Site-specific EMP (or Construction EMP) approved by Project Director? (Yes/No)	Remarks
			Not yet due (detailed design not yet completed)	Submitted to ADB (Provide Date of Submission)	Disclosed on project website (Provide Link)	Final IEE provided to Contractor/s (Yes/No)		

- Identify the role/s of Safeguards Team including schedule of on-site verification of reportssubmitted by consultants and contractors.
- For each package, provide name/s and contact details of contractor/s' nodal person/s forenvironmental safeguards.
- Include as appendix all supporting documents including **signed** monthly environmentalsite inspection reports prepared by consultants and/or contractors.
- With reference to approved EMP/site-specific EMP/construction EMP, complete the tablebelow
- Provide the monitoring results as per the parameters outlined in the approved EMP (orsite-specific EMP/construction EMP when applicable).
- In addition to the table on EMP implementation, the main text of the report should discussin details the following items:

(i) **Grievance Redress Mechanism.** Provide information on establishment of grievance redress mechanism and capacity of grievance redress committee to address project-related issues/complaints. Include as appendix Notification of the GRM (town-wise if applicable).

(ii) **Complaints Received during the Reporting Period.** Provide information on number, nature, and resolution of complaints received during reporting period. Attach records as per GRMin the approved IEE. Identify safeguards team member/s involved in the GRM process. Attach minutes of meetings (ensure English translation is provided).

- Confirm if any dust was noted to escape the site boundaries and identify dust suppressiontechniques followed for site/s.
- Identify muddy water was escaping site boundaries or muddy tracks were seen onadjacent roads.
- Identify type of erosion and sediment control measures installed on site/s, condition oferosion and sediment control measures including if these were intact

following heavy rain;

- Identify designated areas for concrete works, chemical storage, construction materials,and refueling. Attach photographs of each area.
- Confirm spill kits on site and site procedure for handling emergencies.
- Identify any chemical stored on site and provide information on storage condition. Attachphotograph.
- Describe management of stockpiles (construction materials, excavated soils, spoils, etc.).Provide photographs.
- Describe management of solid and liquid wastes on-site (quantity generated, transport,storage and disposal). Provide photographs.
- Provide information on barricades, signages, and on-site boards. Provide photographs.
- Provide information on
- Checking if there are any activities being under taken out of working hours and how thatis being managed.

Summary of Environmental Monitoring Activities (for the Reporting Period)[a]

Impacts (Listfrom IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
Design Phase						
Pre-Construction Phase						
Construction Phase						
Operational Phase						

[a] Attach Laboratory Results and Sampling Map/Locations.

Overall Compliance with CEMP/EMP

No.	Sub-Project Name	EMP/ CEMP Part of Contract Documents (Y/N)	CEMP/ EMP Being Implemented (Y/N)	Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required

V. APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THEPROJECT

- Brief description on the approach and methodology used for environmental monitoring of eachsubproject

VI. MONITORING OF ENVIRONMENTAL IMPACTS ON PROJECT SURROUNDINGS(ambient air, water quality and noise levels)

- Brief discussion on the basis for monitoring
- Indicate type and location of environmental parameters to be monitored
- Indicate the method of monitoring and equipment to be used
- Provide monitoring results and an analysis of results in relation to baseline data and statutoryrequirements.

As a minimum the results should be presented as per the tables below.

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)			
			PM10 $\mu g/m^3$	PM2.5 $\mu g/m^3$	SO2 $\mu g/m^3$	NO2 $\mu g/m^3$

Surface Water Quality Results

S. No.	Parameters	Results		
		Location-1 (Name)	Location-2 (Name)	Location-3 (Name)
1.	pH			
2.	Turbidity			
3.	Total Hardness			
4.	DO			
5.	BOD			
6.	COD			

S. No.	Parameters	Results		
		Location-1 (Name)	Location-2 (Name)	Location-3 (Name)
7.	Chloride			
8.	Iron			
9.	TSS			
10.	Arsenic			
11.	Cadmium			
12.	Fluoride			
13.	Potassium			
14.	Sodium			
15.	Calcium			
16.	Zn			
17.	Cr^{+6}			
18.	Magnesium			
19.	Copper			
20.	Manganese			
21.	Sulphate			
22.	Cyanide			
23.	Nitrate			
24.	Lead			
25.	Boron			
26.	Selenium			
27.	Aluminium			
28.	Total residual Chlorine			

Ground water Quality Results

S.No.	Parameters	Results		
		Location-1 (Name)	Location-2 (Name)	Location-3 (Name)
1.	pH			
2.	Total Alkalinity			
3.	Total Hardness			
4.	Chloride			
5.	Iron			
6.	TDS			
7.	Arsenic			
8.	Fluoride			
9.	Zn			

S.No.	Parameters	Results		
		Location-1 (Name)	Location-2 (Name)	Location-3 (Name)
10.	Cr+6			
11.	Copper			
12.	Manganese			
13.	Sulphate			
14.	Phosphate			
15.	Nitrate			
16.	Lead			
17.	Phenolic Compound			

Noise Quality Results

Site No.	Date of Testing	Site Location	LA_{eq} (dBA) (Monitoring Results)	
			Day Time	Night Time

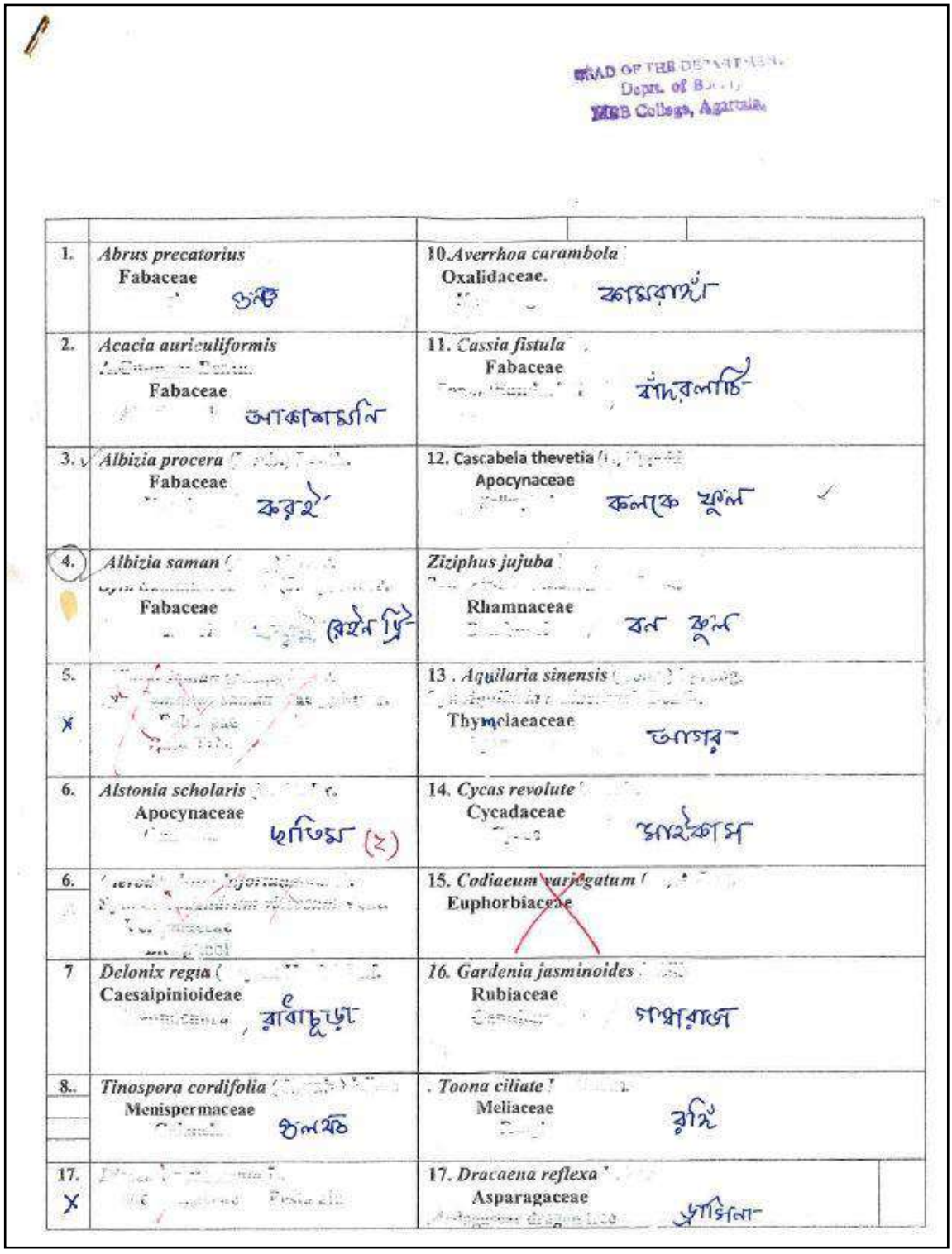
VII. SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS

- Summary of follow up time-bound actions to be taken within a set timeframe.

APPENDIXES

- Photos
- Summary of consultations
- Copies of environmental clearances and permits
- Sample of environmental site inspection report
- Other

Appendix 18: List of Plants in MBB College Area



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MBB College, Agartala.

1.	*Abrus precatorius* Fabaceae	10. *Averrhoa carambola* Oxalidaceae.
2.	*Acacia auriculiformis* Fabaceae	11. *Cassia fistula* Fabaceae
3.	*Albizia procera* Fabaceae	12. Cascabela thevetia Apocynaceae
4.	*Albizia saman* Fabaceae	*Ziziphus jujuba* Rhamnaceae
5.		13. *Aquilaria sinensis* Thymelaeaceae
6.	*Alstonia scholaris* Apocynaceae	14. *Cycas revolute* Cycadaceae
6.		15. *Codiaeum variegatum* Euphorbiaceae
7	*Delonix regia* Caesalpinioideae	16. *Gardenia jasminoides* Rubiaceae
8.	*Tinospora cordifolia* Menispermaceae	*Toona ciliate* Meliaceae
17.		17. *Dracaena reflexa* Asparagaceae

18.	*Thuja occidentalis* Cupressaceae সুজো	*27.Trema orientalis* Cannabaceae Bon Naicya	
19.	*Duranta erecta* Verbenaceae চরন্ত	*28. Eucalyptus globules* Myrtaceae ইউক্যালিপটাস (2)	
20.	*Elaeocarpus floribundus* Elaeocarpaceae জলপাই (2)	*29. Euphorbia tithymaloides* L. Euphorbiaceae	
21.	*Erythrina variegata* Fabaceae Indian Coral Tree	*30. Firmiana colorata* Sterculiaceae Samarri pisi	
22.	*Ficus hispida* Moraceae ডুমুর	*31.Ficus religiosa* L. Moraceae অশ্বত্থ	
23.	*Ficus benjamina* Moraceae জিরি বট	*32. Ficus elastic* Moraceae ভারতীয় রবার	
33.	*Holarrhena pubescens* Apocynaceae কুরচি	41.Hemidesmus indicus Apocynaceae অনন্তমূল	
34.	*Lagerstroemia speciosa* Lythraceae জারুল	42. Ixora coccinea Rubiaceae রক্তন	

35.	*Litchi chinensis* ... Sapindaceae লিচু (01)	43. ~~Aa~~ Araucaria excelsa ... Araucariaceae আরোকেরিয়া (01)
36.	*Magnolia champaca* ... Magnoliaceae চাঁপা (02)	44. *Magnolia grandiflora* L. Magnoliacea বিগ চাঁপা (01)
37	*Mangifera indica* ... Anacardiaceae আম (1)	45. *Manihot esculenta* ... Euphorbiaceae Sago
38.	*Melaleuca linearis* ... Myrtaceae বোতলব্রাশ (1)	46. *Merremia umbellate* ... Convolvulaceae কাঠলালপ
39.	Melia azedarach ... Meliaceae ঘোড়া নিম	47. *Mesua ferrea* ... Calophyllaceae নাগেশ্বর (02)
40.	...	48. *Murraya koenigii* (L.) Sprengel Rutaceae কারি
41.	*Neolamarckia cadamba* ... Rubiaceae কদম (02)	49. *Hyophorbe lagenicaulis* ... Arecaceae তরমুজ পাম
42.	*Phoenix sylvestris* ... Arecaceae খেজুর (01)	50. *Ravenala madagascariensis* ... (03) Strelitziaceae পাখা পাম

	51. *Peltophorum pterocarpum* Fabaceae	
52	*Polyalthia longifolia* Annonaceae (৪)	59. *Pongamia pinnata* Fabaceae
53.	*Psidium guajava* Myrtaceae	60 *Spathodea campanulata* Bignoniaceae
54	*Aquilaria sinensis* Thymelaeaceae (২)	61. *Syzygium fruticosum* Myrtaceae
55.		62. *Senna siamea* Fabaceae
56.	*Streblus asper* Moraceae	63. *Syzygium cumini* Myrtaceae
57.	*Thespesia populnea* Malvaceae	64. *Tabernaemontana divaricata* Apocynaceae
58.	*Tectona grandis* Verbenaceae	65. *Terminalia arjuna* Combretaceae

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MBB College, Agartala.

Appendix 19: Forest Department Letter on Tree Cutting and Compensatory Plantation

No.F.11-13/WFD/Deptt.Oprnt/2018-19/ 1595-597
Government of Tripura
Office of the District Forest Officer
West Tripura, Agartala

Dated 27/01/2020

To
The chief executive officer
Agartala Smart City Ltd
UD Bhavan, Agartala

Sub: - request for providing details on compensatory plantation and provisional cost for felling of trees along designated urban roads regarding.
Ref: - No F.4(34)/ASCL/2018/917 dated 19/02/2020

Sir,

With reference to subject cited above, the tentative preliminary estimate for extraction of trees would be 3696000 (thirty six lakh ninty thousand only) as submitted by sdfo sadar.(copy enclosed).

The compensatory plantation must be raised twice the amount of tree felled so in this case minimum one hectare artificial regeneration plantation must be raised the suitable land for which may be identified at nearby degraded forest land at later stage .The cost of raising one hectare plantation will be 324662(three lakh twenty four thousand six hundred and sixty six only) as per government of Tripura notification vide noF.6-273/FC/For-2004/Pt-I/2599-627 dated 24/09/2019 (copy enclosed)

This is for favour of your kind information and doing the need full

Yours faithfully,

(Shakti Kant Singh, IFS)
District Forest Officer
West Tripura District

Copy to:
1. SDFO Sadar for information and necessary action
2. Range officer Sadar for information and necessary action

27/02

District Forest Officer
West Tripura District

Appendix 20: Sample Chance Find Protocol

Introduction

Project city being a heritage city, there are possibility of any chance finds (artefacts) recovery during excavations. Contractors working at heritage towns must take additional care not to destroyor damage historic features during excavations. There may be many buried historic features in heritage city's such as – idols, toys, wells, ancient drains, remains of buildings, other walls, grainpits, etc. Every care must be made not to destroy these during excavations.

Excavator drivers need to be instructed to be aware of hitting buried features and that they must be investigated before continuing work. When features are encountered during mechanical excavation, work should stop and the PIU/Consultants engineers must be informed immediately so that they can be inspected at the first opportunity.

When historic features such as walls, brick constructions and other features are encountered during excavation the excavation must be stopped immediately and the PIU/Consultants must beinformed immediately.

1.1 ***Contractors' instruction****:* As soon as contractor recovers any chance find during any excavation works for pipe laying, they should immediately inform PIU/Consultant presentin town about the chance find recovery. Immediately stop the excavation activity near pointof recovery. After PIU/consultants engineers come at site, contractor should follow cleaning and photography in supervision of PIU/Consultant engineers.

1.2 ***Cleaning*** - When a feature/chance find is discovered it must be defined by careful cleaning. Roots must be removed and dirt must be carefully cleaned away. The section ortrench base should also be cleaned back for a little distance around the feature.

1.3 ***Record photography*** – When the feature is clean good photography should be taken – vertical and face-on shots and a few general shots of the feature, also showing its position in relation to surrounding features, buildings, etc. The photographed should be catalogued(date, location, direction of shot)

1.4 ***Drawn record -***When features/chance finds are revealed a drawn record should also be made.

a. General location record – measuring its position and orientation within the protected site / in relation to surrounding structures
b. Record drawings – detail drawings made in plan and section/profile. The extent (edges) of the feature should be drawn and the level of the existing ground surface and the top and base of the feature should be recorded. These levels should be marked on the drawings. The drawings should include detail of the construction of thefeature. Perspective sketches could also be made if necessary. Explanatory notes canalso be put on the drawings.

1.5 ***Reporting finds -*** When finds are made these should be reported to PIU/Consultants. Photographs and record drawings should be sent.

1.6 ***Discovery of historic objects -*** When clearance and excavation takes place artifacts andhistoric objects are sometimes found. These should be recovered and kept in a safe place.The place of discovery should be recorded and each find given a number and tag tied to the find with the same number on it. A list of the finds should be kept (with the find No.

And place of discovery and date of discovery recorded).

1.7 ***PIU/Consultants responsibility-*** PIU/Consultants should inform in written to the State Archaeological Department at the earliest with photographs and request to Archaeology Department to visit the site and hand over the chance finds to them.

Appendix 21: WHO Interim Guidance on Water, Sanitation, Hygiene and WasteManagement for the COVID19 virus

World Health Organization

unicef

Water, sanitation, hygiene, and waste management for the COVID-19 virus

Interim guidance
19 March 2020

Background

This interim guidance supplements the infection prevention and control (IPC) documents by summarizing WHO guidance on water, sanitation and health care waste relevant to viruses, including coronaviruses. It is intended for water and sanitation practitioners and providers and health care providers who want to know more about water, sanitation and hygiene (WASH) risks and practices.

The provision of safe water, sanitation, and hygienic conditions is essential to protecting human health during all infectious disease outbreaks, including the COVID-19 outbreak. Ensuring good and consistently applied WASH and waste management practices in communities, homes, schools, marketplaces, and health care facilities will help prevent human-to-human transmission of the COVID-19 virus.

The most important information concerning WASH and the COVID-19 virus is summarized here.

- Frequent and proper hand hygiene is one of the most important measures that can be used to prevent infection with the COVID-19 virus. WASH practitioners should work to enable more frequent and regular hand hygiene by improving facilities and using proven behavior-change techniques.
- WHO guidance on the safe management of drinking-water and sanitation services applies to the COVID-19 outbreak. Extra measures are not needed. Disinfection will facilitate more rapid die-off of the COVID-19 virus.
- Many co-benefits will be realized by safely managing water and sanitation services and applying good hygiene practices.

Currently, there is no evidence about the survival of the COVID-19 virus in drinking-water or sewage. The morphology and chemical structure of the COVID-19 virus are similar to those of other human coronaviruses for which there are data about both survival in the environment and effective inactivation measures. This document draws upon the evidence base and WHO guidance on how to protect against viruses in sewage and drinking-water. This document will be updated as new information becomes available.

1. COVID-19 transmission

There are two main routes of transmission of the COVID-19 virus: respiratory and contact. Respiratory droplets are generated when an infected person coughs or sneezes. Any person who is in close contact with someone who has respiratory symptoms (sneezing, coughing) is at risk of being exposed to potentially infective respiratory droplets.[1] Droplets may also land on surfaces where the virus could remain viable; thus, the immediate environment of an infected individual can serve as a source of transmission (contact transmission).

Approximately 2–10% of cases of confirmed COVID-19 disease present with diarrhoea,[2-4] and two studies detected COVID-19 viral RNA fragments in the faecal matter of COVID-19 patients.[5,6] However, only one study has cultured the COVID-19 virus from a single stool specimen.[7] There have been no reports of faecal–oral transmission of the COVID-19 virus.

2. Persistence of the COVID-19 virus in drinking-water, faeces and sewage and on surfaces.

Although persistence in drinking-water is possible, there is no evidence from surrogate human coronaviruses that they are present in surface or groundwater sources or transmitted through contaminated drinking water. The COVID-19 virus is an enveloped virus, with a fragile outer membrane. Generally, enveloped viruses are less stable in the environment and are more susceptible to oxidants, such as chlorine. While there is no evidence to date about survival of the COVID-19 virus in water or sewage, the virus is likely to become inactivated significantly faster than non-enveloped human enteric viruses with known waterborne transmission (such as adenoviruses, norovirus, rotavirus and hepatitis A). For example, one study found that a surrogate human coronavirus survived only 2 days in dechlorinated tap water and in hospital wastewater at 20°C.[8] Other studies concur, noting that the human coronaviruses transmissible gastroenteritis coronavirus and mouse hepatitis virus demonstrated a 99.9% die-off in from 2 days[9] at 23°C to 2 weeks[10] at 25°C. Heat, high or low pH, sunlight, and common disinfectants (such as chlorine) all facilitate die off.

It is not certain how long the virus that causes COVID-19 survives on surfaces, but it seems likely to behave like other coronaviruses. A recent review of the survival of human

coronaviruses on surfaces found large variability, ranging from 2 hours to 9 days.[11] The survival time depends on a number of factors, including the type of surface, temperature, relative humidity, and specific strain of the virus. The same review also found that effective inactivation could be achieved within 1 minute using common disinfectants, such as 70% ethanol or sodium hypochlorite (for details, see Cleaning practices).

3. Keeping water supplies safe

The COVID-19 virus has not been detected in drinking-water supplies, and based on current evidence, the risk to water supplies is low.[12] Laboratory studies of surrogate coronaviruses that took place in well-controlled environments indicated that the virus could remain infectious in water contaminated with faeces for days to weeks.[10] A number of measures can be taken to improve water safety, starting with protecting the source water; treating water at the point of distribution, collection, or consumption; and ensuring that treated water is safely stored at home in regularly cleaned and covered containers.

Conventional, centralized water treatment methods that use filtration and disinfection should inactivate the COVID-19 virus. Other human coronaviruses have been shown to be sensitive to chlorination and disinfection with ultraviolet (UV) light.[13] As enveloped viruses are surrounded by a lipid host cell membrane, which is not robust, the COVID-19 virus is likely to be more sensitive to chlorine and other oxidant disinfection processes than many other viruses, such as coxsackieviruses, which have a protein coat. For effective centralized disinfection, there should be a residual concentration of free chlorine of $\geq$0.5 mg/L after at least 30 minutes of contact time at pH <8.0.[12] A chlorine residual should be maintained throughout the distribution system.

In places where centralized water treatment and safe piped water supplies are not available, a number of household water treatment technologies are effective in removing or destroying viruses, including boiling or using high-performing ultrafiltration or nanomembrane filters, solar irradiation and, in non-turbid waters, UV irradiation and appropriately dosed free chlorine.

4. Safely managing wastewater and faecal waste

There is no evidence that the COVID-19 virus has been transmitted via sewerage systems with or without wastewater treatment. Further, there is no evidence that sewage or wastewater treatment workers contracted the severe acute respiratory syndrome (SARS), which is caused by another type of coronavirus that caused a large outbreak of acute respiratory illness in 2003. As part of an integrated public health policy, wastewater carried in sewerage systems should be treated in well-designed and well-managed centralized wastewater treatment works. Each stage of treatment (as well as retention time and dilution) results in a further reduction of the potential risk. A waste stabilization pond (an oxidation pond or lagoon) is generally considered a practical and simple wastewater treatment technology particularly well suited to destroying pathogens, as relatively long retention times (20 days or longer) combined with sunlight, elevated pH levels, biological activity, and other factors serve to accelerate pathogen destruction. A final disinfection step may be considered if existing wastewater treatment plants are not optimized to remove viruses. Best practices for protecting the health of workers at sanitation treatment facilities should be followed. Workers should wear appropriate personal protective equipment (PPE), which includes protective outerwear, gloves, boots, goggles or a face shield, and a mask; they should perform hand hygiene frequently; and they should avoid touching eyes, nose, and mouth with unwashed hands.

WASH in health care settings

Existing recommendations for water, sanitation and hygiene measures in health care settings are important for providing adequate care for patients and protecting patients, staff, and caregivers from infection risks.[14] The following actions are particularly important: (i) managing excreta (faeces and urine) safely, including ensuring that no one comes into contact with it and that it is treated and disposed of correctly; (ii) engaging in frequent hand hygiene using appropriate techniques; (iii) implementing regular cleaning and disinfection practices; and (iv) safely managing health care waste. Other important measures include providing sufficient safe drinking-water to staff, caregivers, and patients; ensuring that personal hygiene can be maintained, including hand hygiene, for patients, staff and caregivers; regularly laundering bedsheets and patients' clothing; providing adequate and accessible toilets (including separate facilities for confirmed and suspected cases of COVID-19 infection); and segregating and safely disposing of health care waste. For details on these recommendations, please refer to Essential environmental health standards in health care.[14]

1. Hand hygiene practices

Hand hygiene is extremely important. Cleaning hands with soap and water or an alcohol-based hand rub should be performed according to the instructions known as "My 5 moments for hand hygiene".[15] If hands are not visibly dirty, the preferred method is to perform hand hygiene with an alcohol-based hand rub for 20–30 seconds using the appropriate technique.[16] When hands are visibly dirty, they should be washed with soap and water for 40–60 seconds using the appropriate technique.[17] Hand hygiene should be performed at all five moments, including before putting on PPE and after removing it, when changing gloves, after any contact with a patient with suspected or confirmed COVID-19 infection or their waste, after contact with any respiratory secretions, before eating, and after using the toilet.[18] If an alcohol-based hand rub and soap are not available, then using chlorinated water (0.05%) for handwashing is an option, but it is not ideal because frequent use may lead to dermatitis, which could increase the risk of infection and asthma and because prepared dilutions might be inaccurate.[19] However, if other options are not available or feasible, using chlorinated water for handwashing is an option.

Functional hand hygiene facilities should be present for all health care workers at all points of care and in areas where PPE is put on or taken off. In addition, functional hand hygiene facilities should be available for all patients, family members, and visitors, and should be available within 5 m of toilets, as well as in waiting and dining rooms and other public areas.

2. Sanitation and plumbing

People with suspected or confirmed COVID-19 disease should be provided with their own flush toilet or latrine that has a door that closes to separate it from the patient's room. Flush toilets should operate properly and have functioning drain traps. When possible, the toilet should be flushed with the lid down to prevent droplet splatter and aerosol clouds. If it is not possible to provide separate toilets, the toilet should be cleaned and disinfected at least twice daily by a trained cleaner wearing PPE (gown, gloves, boots, mask, and a face shield or goggles). Further, and consistent with existing guidance, staff and health care workers should have toilet facilities that are separate from those used by all patients.

WHO recommends the use of standard, well-maintained plumbing, such as sealed bathroom drains, and backflow valves on sprayers and faucets to prevent aerosolized faecal matter from entering the plumbing or ventilation system,[20] together with standard wastewater treatment.[21] Faulty plumbing and a poorly designed air ventilation system were implicated as contributing factors to the spread of the aerosolized SARS coronavirus in a high-rise apartment building in Hong Kong in 2003.[22] Similar concerns have been raised about the spread of the COVID-19 virus from faulty toilets in high-rise apartment buildings.[23] If health care facilities are connected to sewers, a risk assessment should be conducted to confirm that wastewater is contained within the system (that is, the system does not leak) before its arrival at a functioning treatment or disposal site, or both. Risks pertaining to the adequacy of the collection system or to treatment and disposal methods should be assessed following a safety planning approach,[24] with critical control points prioritized for mitigation.

For smaller health care facilities in low-resource settings, if space and local conditions allow, pit latrines may be the preferred option. Standard precautions should be taken to prevent contamination of the environment by excreta. These precautions include ensuring that at least 1.5 m exists between the bottom of the pit and the groundwater table (more space should be allowed in coarse sands, gravels, and fissured formations) and that the latrines are located at least 30 m horizontally from any groundwater source (including both shallow wells and boreholes).[21] If there is a high groundwater table or a lack of space to dig pits, excreta should be retained in impermeable storage containers and left for as long as feasible to allow for a reduction in virus levels before moving it off-site for additional treatment or safe disposal, or both. A two-tank system with parallel tanks would help facilitate inactivation by maximizing retention times, as one tank could be used until full, then allowed to sit while the next tank is being filled. Particular care should be taken to avoid splashing and the release of droplets while cleaning or emptying tanks.

3. Toilets and the handling of faeces

It is critical to conduct hand hygiene when there is suspected or direct contact with faeces (if hands are dirty, then soap and water are preferred to the use of an alcohol-based hand rub). If the patient is unable to use a latrine, excreta should be collected in either a diaper or a clean bedpan and immediately and carefully disposed of into a separate toilet or latrine used only by suspected or confirmed cases of COVID-19. In all health care settings, including those with suspected or confirmed COVID-19 cases, faeces must be treated as a biohazard and handled as little as possible. Anyone handling faeces should follow WHO contact and droplet precautions[18] and use PPE to prevent exposure, including long-sleeved gowns, gloves, boots, masks, and goggles or a face shield. If diapers are used, they should be disposed of as infectious waste as they would be in all situations. Workers should be properly trained in how to put on, use, and remove PPE so that these protective barriers are not breached.[25] If PPE is not available or the supply is limited, hand hygiene should be regularly practiced, and workers should keep at least 1 m distance from any suspected or confirmed cases.

If a bedpan is used, after disposing of excreta from it, the bedpan should be cleaned with a neutral detergent and water, disinfected with a 0.5% chlorine solution, and then rinsed with clean water; the rinse water should be disposed of in a drain or a toilet or latrine. Other effective disinfectants include commercially available quaternary ammonium compounds, such as cetylpyridinium chloride, used according to manufacturer's instructions, and peracetic or peroxyacetic acid at concentrations of 500–2000 mg/L.[26]

Chlorine is ineffective for disinfecting media containing large amounts of solid and dissolved organic matter. Therefore, there is limited benefit to adding chlorine solution to fresh excreta and it is possible that this may introduce risks associated with splashing.

4. Emptying latrines and holding tanks, and transporting excreta off-site.

There is no reason to empty latrines and holding tanks of excreta from suspected or confirmed COVID-19 cases unless they are at capacity. In general, the best practices for safely managing excreta should be followed. Latrines or holding tanks should be designed to meet patient demand, considering potential sudden increases in cases, and there should be a regular schedule for emptying them based on the wastewater volumes generated. PPE (long-sleeved gown, gloves, boots, masks, and goggles or a face shield) should be worn at all times when handling or transporting excreta offsite, and great care should be taken to avoid splashing. For crews, this includes pumping out tanks or unloading pumper trucks. After handling the waste and once there is no risk of further exposure, individuals should safely remove their PPE and perform hand hygiene before entering the transport vehicle. Soiled PPE should be put in a sealed bag for later safe laundering (see Cleaning practices). Where there is no off-site treatment, in-situ treatment can be done using lime. Such treatment involves using a 10% lime slurry added at 1-part lime slurry per 10 parts of waste.

5. Cleaning practices

Recommended cleaning and disinfection procedures for health care facilities should be followed consistently and correctly.[19] Laundry should be done and surfaces in all environments in which COVID-19 patients receive care (treatment units, community care centres) should be cleaned at least once a day and when a patient is discharged.[27] Many disinfectants are active against enveloped viruses, such as the COVID-19 virus, including commonly used hospital disinfectants. Currently, WHO recommends using:

- 70% ethyl alcohol to disinfect small areas between uses, such as reusable dedicated equipment (for example, thermometers);
- sodium hypochlorite at 0.5% (equivalent to 5000 ppm) for disinfecting surfaces.

All individuals dealing with soiled bedding, towels, and clothes from patients with COVID-19 infection should wear appropriate PPE before touching soiled items, including heavy duty gloves, a mask, eye protection (goggles or a face shield), a long-sleeved gown, an apron if the gown is not fluid resistant, and boots or closed shoes. They should perform hand hygiene after exposure to blood or body fluids and after removing PPE. Soiled linen should be placed in clearly labelled, leak-proof bags or containers, after carefully removing any solid excrement and putting it in a covered bucket to be disposed of in a toilet or latrine. Machine washing with warm water at 60–90°C (140–194°F) with laundry detergent is recommended. The laundry can then be dried according to routine procedures. If machine washing is not possible, linens can be soaked in hot water and soap in a large drum using a stick to stir and being careful to avoid splashing. The drum should then be emptied, and the linens soaked in 0.05% chlorine for approximately 30 minutes. Finally, the laundry should be rinsed with clean water and the linens allowed to dry fully in sunlight.

If excreta are on surfaces (such as linens or the floor), the excreta should be carefully removed with towels and immediately safely disposed of in a toilet or latrine. If the towels are single use, they should be treated as infectious waste; if they are reusable, they should be treated as soiled linens. The area should then be cleaned and disinfected (with, for example, 0.5% free chlorine solution), following published guidance on cleaning and disinfection procedures for spilled body fluids.[27]

6. Safely disposing of greywater or water from washing PPE, surfaces and floors.

Current WHO recommendations are to clean utility gloves or heavy duty, reusable plastic aprons with soap and water and then decontaminate them with 0.5% sodium hypochlorite solution after each use. Single-use gloves (nitrile or latex) and gowns should be discarded after each use and not reused; hand hygiene should be performed after PPE is removed. If greywater includes disinfectant used in prior cleaning, it does not need to be chlorinated or treated again. However, it is important that such water is disposed of in drains connected to a septic system or sewer or in a soakaway pit. If greywater is disposed of in a soakaway pit, the pit should be fenced off within the health facility grounds to prevent tampering and to avoid possible exposure in the case of overflow.

7. Safe management of health care waste

Best practices for safely managing health care waste should be followed, including assigning responsibility and sufficient human and material resources to dispose of such waste safely. There is no evidence that direct, unprotected human contact during the handling of health care waste has resulted in the transmission of the COVID-19 virus. All health care waste produced during the care of COVID 19 patients should be collected safely in designated containers and bags, treated, and then safely disposed of or treated, or both, preferably on-site. If waste is moved off-site, it is critical to understand where and how it will be treated and destroyed. All who handle health care waste should wear appropriate PPE (boots, apron, long-sleeved gown, thick gloves, mask, and goggles or a face shield) and perform hand hygiene after removing it. For more information refer to the WHO guidance, Safe management of wastes from health-care activities.[28]

Considerations for WASH practices in homes and communities.

Upholding best WASH practices in the home and community is also important for preventing the spread of COVID-19 and when caring for patients at home. Regular and correct hand hygiene is of particular importance.

1. Hand hygiene

Hand hygiene in non–health care settings is one of the most important measures that can prevent COVID 19 infection. In homes, schools and crowded public spaces – such as markets, places of worship, and train or bus stations – regular handwashing should occur before preparing food, before and after eating, after using the toilet or changing a child's diaper, and after touching animals. Functioning handwashing facilities with water and soap should be available within 5 m of toilets.

2. Treatment and handling requirements for excreta.

Best WASH practices, particularly handwashing with soap and clean water, should be strictly applied and maintained because these provide an important additional barrier to COVID-19 transmission and to the transmission of infectious diseases in general.[17] Consideration should be given to safely managing human excreta throughout the entire sanitation chain, starting with ensuring access to regularly cleaned, accessible, and functioning toilets or latrines and to the safe containment, conveyance, treatment, and eventual disposal of sewage.

When there are suspected or confirmed cases of COVID-19 in the home setting, immediate action must be taken to protect caregivers and other family members from the risk of contact with respiratory secretions and excreta that may contain the COVID-19 virus. Frequently touched surfaces throughout the patient's care area should be cleaned regularly, such as beside tables, bed frames and other bedroom furniture. Bathrooms should be cleaned and disinfected at least once a day. Regular household soap or detergent should be used for cleaning first and then, after rinsing, regular household disinfectant containing 0.5% sodium hypochlorite (that is, equivalent to 5000 ppm or 1-part household bleach with 5% sodium hypochlorite to 9 parts water) should be applied. PPE should be worn while cleaning, including mask, goggles, a fluid-resistant apron, and gloves,[29] and hand hygiene with an alcohol-based hand rub or soap and water should be performed after removing PPE.

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WHO continues to monitor the situation closely for any changes that may affect this interim guidance. Should any factors change, WHO will issue a further update. Otherwise, this interim guidance document will expire 2 years after the date of publication.

WHO reference number: WHO/2019-nCoV/IPC_WASH/2020.2

Appendix 22: ADB's Interim Advisory Note on COVID19

INTERIM ADVISORY NOTE

Protecting the Safety and Well-Being of Workers and Communities from COVID-19

Health and safety risks from the coronavirus disease (COVID-19) pandemic can cause an additional burden on workers, local communities, and employers. To support its developing member countries in managing these risks, the Asian Development Bank (ADB) has prepared the following advisory note on publicly available international good practice. These preventive measures can be adapted for a variety of workplaces and country-specific contexts.[1]

Transmission, spread, and infection are the greatest health and safety risks to projects and local communities. If left unmanaged, rising infection rates can result in project delays and job losses as well as overwhelm health care systems.

What can governments and companies (including enterprises of all sizes) do to prevent and manage COVID-19 risks?

To protect the health and safety of workers, as well as surrounding communities, it is recommended to conduct a workplace review and risk assessment for exposure to COVID-19. The nature of works, stage of implementation, location of the project activities, and status of the project (whether it is ongoing or under development) must be taken into consideration. In addition, vulnerable groups such as migrant workers as well as women, older workers, at-risk workers including those with underlying health conditions, or those with combined vulnerability factors (e.g., migrant women workers with underlying health conditions) who will also be disproportionately impacted, should be taken into account.[2]

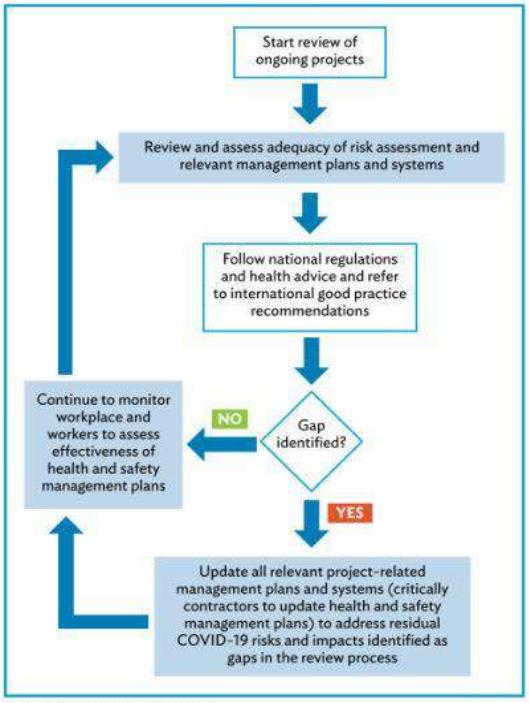
The decision tree (Figure 1) outlines how to review and assess the adequacy of management plans and systems to prevent the spread of COVID-19 in the workplace.

Which sectors are more at risk from COVID-19?

COVID-19 may be more easily transferred among workers or service users and local communities in the following sectors and associated workplace activities:[3]

- Projects and businesses where there are a **large number of workers in close proximity with one another**, particularly where remote work is not feasible.
- Projects that involve **worker accommodation camps**, where physical distancing and robust hygiene measures may be more difficult to implement.
- **Health care providers** including hospitals, laboratories, clinics, dentists, ambulances, and pharmacies.

Figure 1: COVID-19 Decision Tree



Source: Asian Development Bank.

[1] This advisory note may not cover all circumstances. It will remain a living document and will be updated regularly to reflect updates to international good practice in preventing and managing the COVID-19 pandemic at the workplace as listed in Annex.
[2] Migrant workers are faced with multiple impacts including the challenge of returning home, accessing food and medical assistance, and experiencing potential loss of income.
[3] The list represents a selection and is not exhaustive.

- **Food and agriculture** including food processing plants and those handling live animals and animal products.
- **Education**, after lockdowns are lifted and schools reopen in affected countries.
- Consumer-centric businesses where workers may come into **regular contact with customers** including **hotels, retail, and other tourism- related sectors**.
- **Logistics and transport**, where **workers come into contact with a large number of people** across potentially a large geographic region.
- Businesses where **workers come into contact with suppliers and supply chains** operating in affected areas.

How can governments and companies apply a risk-based approach to assess exposure risks to COVID-19 in the workplace?

1. DETERMINE LEVEL OF EXPOSURE RISK

The risk of work-related exposure to COVID-19 depends on the probability of coming into close or frequent contact with people who may be infected and through contact with contaminated surfaces and objects. According to guidance from the World Health Organization (WHO), the risk levels (Figure 2) may be useful in carrying out a workplace risk assessment for exposure risk to COVID-19 and planning for preventive measures in non-health care workplaces.[4]

Figure 2: COVID-19 Risk Categories

LOW EXPOSURE RISK

Jobs or work tasks **without frequent, close contact with the general public and other co-workers,** visitors, clients or customers, or contractors, and that do not require contact with people known to be or suspected of being infected with COVID-19.

MEDIUM EXPOSURE RISK

Jobs or work tasks **with close (less than 1 meter) frequent contact with the general public, or other co-workers,** visitors, clients or customers, or contractors, that do not require contact with people known to be or suspected of being infected with COVID-19.

HIGH EXPOSURE RISK

Jobs or work tasks with high potential for **close contact with people who are known or suspected of having COVID-19** as well as contact with objects and surfaces possibly contaminated with the virus.

Source: World Health Organization.

2. DETERMINE ADDITIONAL EXPOSURE RISK FACTORS

Work-related exposure can occur anytime in the workplace, during work-related travel to an area with local community transmission, as well as on the way to and from the workplace.

In the same work setting, there may be jobs with different levels of risk, and different jobs or work tasks may have similar levels of exposure. Therefore, risk assessment should be carried out for each specific work setting and for each job or group of jobs. For each risk assessment, it is important to consider the environment; the task; the threat, if any (e.g., for frontline staff); and resources available such as personal protective equipment.

Some workers may be at higher risk of developing severe COVID-19 illness because of age or pre-existing medical conditions; this should be considered in the risk assessment for individuals. Essential public services, such as security and police, food retail, accommodation, public transport, deliveries, water and sanitation, and frontline workers may be at an increased risk of exposure.

3. CONSULT WITH WORKERS

Employers and managers, in consultation with workers, are encouraged to carry out and regularly update the risk assessment for work-related exposure to COVID-19, preferably with support from occupational health services and local primary health care facilities.

4. UPDATE OR DEVELOP NEW HEALTH AND SAFETY MANAGEMENT PLANS

Following completion of the review and risk assessment process, health and safety plans in the workplace may require updates or may have to be developed for ongoing projects that did not require one previously. Relevant approvals of the health and safety plan should be obtained.

5. REVIEW INTERNATIONAL GOOD PRACTICES

ADB recommends that employers review WHO-issued key guidance to manage the spread of COVID-19 in the workplace (Table).

[4] WHO. 2020. Considerations in adjusting public health and social measures in the context of COVID-19: interim guidance, 15 April. https://www.who.int/publications/i/item/considerations-in-adjusting-public-health-and-social-measures-in-the-context-of-covid-19-interim-guidance.

Table: Guidelines on Preventive Measures at the Workplace

MEASURES FOR ALL WORKPLACES	
Hand hygiene	• Regular and thorough handwashing with soap and water or hand hygiene with alcohol-based hand-rub before starting work; before eating; frequently during the work shift, especially after contact with co-workers or customers; after using the bathroom; after contact with secretions, excretions, and body fluids; after contact with potentially contaminated objects (gloves, clothing, masks, used tissues, waste); and immediately after removing gloves and other protective equipment but before touching eyes, nose, or mouth. • Hand hygiene stations, such as handwashing and hand rub dispensers, should be put in prominent places around the workplace and be made accessible to all staff, contractors, clients or customers, and visitors along with communication materials to promote hand hygiene.
Respiratory hygiene	• Promote respiratory etiquette by all people at the workplace. Ensure that medical face masks and paper tissues are available, for those who develop a runny nose or cough at work, along with bins with lids for hygienic disposal. • Develop a policy on wearing a face mask or cover in line with national or local guidance. Masks may carry some risks if not used properly. If a worker is sick, they should not come to work. If a worker feels unwell while at work, provide a medical mask so that they may get home safely. Where masks are used, whether in line with government policy or by personal choice, it is very important to ensure safe and proper use, care, and disposal.
Physical distancing	• Introduce measures to keep a distance of at least 1 meter between people and avoid direct physical contact i.e., hugging, touching, shaking hands), strict control over external access, queue management (marking on the floor, barriers). • Reduce density of people in the building (no more than one person per 10 square meters), physical spacing at least 1 meter apart for workstations and common spaces, such as entrances/exits, lifts, pantries/canteens, stairs, and other areas congregation or queuing of employees or visitors/clients might occur. • Minimize the need for physical meetings, e.g., by using teleconferencing facilities. • Avoid crowding by staggering working hours to reduce congregation of employees at common spaces such as entrances or exits. • Implement or enhance shift or split-team arrangements, or teleworking. • Defer or suspend workplace events that involve close and prolonged contact among participants, including social gatherings.
Reduce and manage work-related travels	• Cancel or postpone non-essential travel to areas with community transmission of coronavirus disease (COVID-19), provide hand sanitizer to workers who must travel, advise workers to comply with instructions from local authorities where they are traveling as well as information on whom to contact if they feel ill while traveling. • Workers returning from an area where COVID-19 transmission is occurring should monitor themselves for symptoms for 14 days and take their temperature twice a day; if they are feeling unwell, they should stay at home, self-isolate, and contact a medical professional.

Source: World Health Organization.

Regular environmental cleaning and disinfection	• Clean surfaces by brushing or scrubbing thoroughly using soap or a neutral detergent to remove dirt, debris, and other materials.. After the cleaning process is completed, disinfection is used to kill pathogens and other microorganisms on surfaces. • Selection of disinfectants should align with the local authorities' requirements for market approval, including any regulations applicable to specific sectors. • Identify "high-touch" surfaces for priority disinfection (e.g., commonly used areas, door and window handles, light switches, kitchen and food preparation areas, bathroom surfaces, toilets and taps, touchscreen personal devices, personal computer keyboards, and work surfaces). • Prepare and use disinfectant solutions according to the manufacturer's instructions, including instructions on how to protect the safety and health of disinfection workers and how to use personal protective equipment (PPE); avoid mixing different chemical disinfectants. • In indoor workplaces, routine application of disinfectants to environmental surfaces via spraying or fogging is generally not recommended because it is ineffective at removing contaminants outside of direct spray zones and can cause eye, respiratory, and skin irritation and other toxic effects. • In outdoor workplaces, there is currently insufficient evidence to support recommendations for large-scale spraying or fumigation. • Spraying of people with disinfectants (such as in a tunnel, cabinet, or chamber) is not recommended under any circumstances.
Risk communication, training, and education	• Provide posters, videos, and electronic message boards to increase awareness of COVID-19 among workers, and promote safe individual practices at the workplace and engage workers in providing feedback on the preventive measures and their effectiveness. • Provide regular information about the risk of COVID-19 using official sources such as government agencies and the World Health Organization, and emphasize the effectiveness of adopting protective measures and counteracting rumors and misinformation. • Special attention should be given to reaching out to and engaging vulnerable and marginalized groups of workers, such as those in the informal economy as well as migrant workers, domestic workers, subcontracted and self-employed workers, and those working under digital labor platforms.
Management of people with suspected COVID-19 or their contacts	• Urge workers who are unwell or who develop symptoms consistent with COVID-19 to stay at home, self-isolate, and contact a medical professional or the local COVID-19 information line for advice on testing and referral. • Where local community transmission is high, and work continues, allow for a telemedicine consultation where available, or consider waiving the requirement for a medical note for workers who are sick so that they may stay home. • Urge all workers to self-monitor their health, possibly with the use of questionnaires, and take their body temperature regularly.

SPECIFIC MEASURES FOR WORKPLACES AND JOBS AT MEDIUM RISK	
In addition to the measures for all sites	• Enhance cleaning and disinfection of objects and surfaces that are touched regularly, including all shared rooms, surfaces, floors, bathrooms, and changing rooms. • Where the physical distancing of at least 1 meter cannot be implemented to a particular activity, workplaces should consider whether that activity needs to continue; if so, take all the mitigating actions possible to reduce the risk of transmission between workers, clients or customers, contractors, and visitors such as scheduling staggered activities, minimizing face-to-face and skin-to-skin contacts, placing workers side-by-side or facing away from each other rather than face-to-face, assigning staff to the same shift teams to limit social interaction, and installing plexiglass barriers at all points of regular interaction and cleaning them regularly. • Enhance hand hygiene—regular handwashing with soap and water or use of alcohol-based hand rub—before entering and after leaving enclosed machinery, vehicles, confined spaces, and before putting on and after taking off PPE.. • Provide PPE and training on its proper use—e.g., masks, disposable gowns, and disposable gloves or heavy-duty gloves that can be disinfected. Provide face or eye protection (medical mask) during cleaning procedures that generate splashes (e.g., washing surfaces). • Increase ventilation rate, through natural aeration or artificial ventilation, preferably without re-circulation of the air.
SPECIFIC MEASURES FOR WORKPLACES AND JOBS AT HIGH RISK	
In addition to the measures for all sites	• Assess the possibility of suspending the activity. • Adhere to hygiene before and after contact with any known or suspected case of COVID-19, before and after using PPE. • Require use of medical mask, disposable gown, gloves, and eye protection for workers who must work in the homes of people who are suspected or known to have COVID-19. Use the protective equipment when in contact with the sick person, or respiratory secretions, body fluids, and potentially contaminated waste. • Train workers on infection prevention and control practices and use of PPE. • Avoid assigning tasks with high risk to workers who have pre-existing medical conditions, are pregnant, or older than 60 years of age.

Source: World Health Organization.

The application of the international good practice within job-specific method statements/schedules and environments should be informed by a job-specific risk assessment.

How do governments and companies ensure effective implementation?

Cooperation between workplace managers, workers and their representatives, surrounding communities, and primary health care facilities is an essential element of workplace-related preventive measures in line with international good practice. To assess the effectiveness of implementation of the workplace health and safety management plan, regular monitoring of site conditions and those of surrounding communities is recommended. It is also important for management of workplaces to keep abreast with the latest updates to the international good practice guidance referenced in this advisory note including government issued health advice in relation to COVID-19 to ensure effective implementation. A select list is provided in Annex.

Risks communication, training, awareness campaigns, and the development of an emergency action plan are also recommended to address suspected cases of COVID-19 in the workplace.

The decision to close or reopen workplaces, and suspend or downscale individual work activities at the workplace should be made in light of the risk assessment, the capacity of contractors to implement proposed preventive measures within the Health and Safety Management Plan, and also the recommendations of national authorities for adjusting public health and social measures at the workplace in the context of COVID-19.

Further Assistance

ADB may be able to provide assistance to our developing member countries in emergency planning, emergency assistance, and continuous sharing of international best practice. Please contact ADB resident missions and offices to request assistance.

The Pandemic Sub-National Reference Laboratory at the Jose B. Lingad Memorial Regional Hospital in San Fernando City, Pampanga on 9 May 2020. The laboratory financed by the $3 million grant from the Asia Pacific Disaster Response Fund, can perform up to 3,000 COVID-19 tests daily, significantly increasing the country's testing capacity (photo by Eric Sales/ADB).

Annex: Publicly Available Sources and Useful Links

Asian Development Bank

Managing Infectious Medical Waste during the COVID-19 Pandemic, April 2020. An outline of key considerations for governments to understand their country's capacity to manage an anticipated surge in infectious medical waste. Also includes practical recommendations to improve disposal of household and hospital waste—as well as municipal solid waste—with the aim of reducing the further spread of the coronavirus disease (COVID-19) and other diseases. Links to important technical resources and guidance materials are also provided.

Belgian Investment Company for Developing Countries

COVID-19: ESG Guidance Note for Employers, March 2020. General Environmental, Social and Governance guidance to employers on how to minimize business disruptions and take the most adequate actions.

Canadian Construction Association

Standardized Protocols for All Canadian Construction Sites

Centre for Disease Control

Centre for Disease Control (CDC) Group COVID-19 Guidance for Employers, March 2020. Summary of publicly available guidance and examples of practice adopted by some CDC Group investees and fund managers. Aims to provide a framework that can be applied to many companies and situations, but guidance is not able to cover all circumstances and not every company will be able to benefit from all of the guidance, in particular if employees are not able to work from home or practice social distancing.

European Bank for Reconstruction and Development Workers Accommodation

Worker accommodation and COVID-19, April 2020. Note on key issues relating to workers living in accommodation camps and considerations on how to address certain risks. In alignment with good international industry practice and international lenders' standards. Developed by Mott MacDonald's social, labor, and health specialists based on their experience, drawing on the guidance of the World Health Organization (WHO).

Her Majesty's Government, United Kingdom

Her Majesty's Government. Working safely during COVID-19 in construction and other outdoor work, 2020. Guidance for employers, employees, and the self-employed.

Inter-American Development Bank

Corporate Governance: COVID-19 and the board of directors, March 2020. Indicative guidance for the Board of Directors in identifying, prioritizing, and implementing a governance framework to deal with the strategy and oversight challenges that COVID-19 may present, and a list of questions that can be asked by investors and that Board of Directors should consider to build an effective response to the COVID-19 crisis.

COVID-19 Guidance for Infrastructure Projects, March 2020. Guidance for clients to identify project performance and capacity gaps, along with context and project-related risks, that could contribute to COVID-19 transmission.

International Federation of Consulting Engineers

COVID-19 guidance memorandum for users of International Federation of Consulting Engineers (FIDIC) standard forms of works contract. An outline of the provisions in FIDIC's various general conditions of contract for works which may be relevant with regard to likely scenarios that are arising as a consequence of COVID-19. Guidance memorandum to help parties to a FIDIC contract to consider mutually satisfactory solutions and avoid disputes arising between them.

Coronavirus (COVID-19): FIDIC Guidance for Global Consulting Engineering Businesses, March 2020.

International Finance Corporation

Interim Advice for International Finance Corporation (IFC) Clients on Preventing and Managing Health Risks of COVID-19 in the Workplace, April 2020. A selection of publicly available advice from internationally recognized sources to help IFC clients rapidly identify measures for preventing and managing outbreaks of COVID-19 in the workplace, and for responding to community COVID-19 infection. Not exhaustive, and provides generic rather than sector-specific advice. Companies in high-risk sectors should refer to sector-specific procedures and standards.

Interim Advice for IFC Clients on Supporting Workers in the Context of COVID-19, April 2020. Tip sheet of useful information to support decision making in response to the impacts of COVID-19 on workers and employment. Focus areas include:

(i) Health and safety, including actions to prevent transmission.
(ii) Job protection, including supporting workers through difficult times and building resilience for businesses to operate during and after the immediate crisis.
(iii) Responsible retrenchment as an option only if there is no other alternative, and how to re-employ those workers, when possible, once the situation has improved.

Corporate Governance Tip-Sheet for Company Leadership on Crisis Response, Facing the COVID-19 Pandemic, April 2020. Generally applicable to any type of business, some tips may not be relevant based on the nature or size of business, shareholding structure, or other factors.