

Temple, dense vegetation 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 in the 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 or any 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 documents to 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 environment 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 stage of 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	Consequence and value			
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	<ul style="list-style-type: none"> 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 in industrial/construction safety. The ESH staff shall have practical experience in industrial/construction projects for 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 to the environment, workers, and community	1	5	5	<ul style="list-style-type: none"> Project manager and all key workers will be required 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 baseline environmental conditions	1	5	5	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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
					<ul style="list-style-type: none"> Clearance area should be marked with highly visible marking. Initially Only 7 trees identified under the project shall be 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	<ul style="list-style-type: none"> The topsoil removed from around 13905 m² 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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
					<ul style="list-style-type: none"> Use tarpaulins to cover sand and other loose material when transported by vehicles; 			
	Runoff from stockpiles contaminating water	5	3	15	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Regular Water spraying on surfaces and demolition stockpile. Vehicles carrying demolition debris from site 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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://trpenvs.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	<ul style="list-style-type: none"> Water sprinkling on surface of stockpiles 	Stock pile area	Construction Contractor	Environmental Specialist of PIU
	Runoff from stockpiles contaminating water	2	3	6	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> During night time permissible noise limit activity allowed. 	Stock pile area	Construction Contractor	Environmental Specialist of PIU
	Siltation of MBB lake	3	3	9	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 MBB lake construction on 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	<ul style="list-style-type: none"> 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 generation due to operation of vehicles and equipment	5	3	15	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 activity shall 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
					<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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
					<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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
					<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 to reduce 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
					<ul style="list-style-type: none"> The vehicles carrying wastes shall be checked for their PUC certificate and its fitness. 			
	Land contamination and water pollution	3	3	9	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 and other Unsafe acts and conditions	3	5	15	<ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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
					<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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

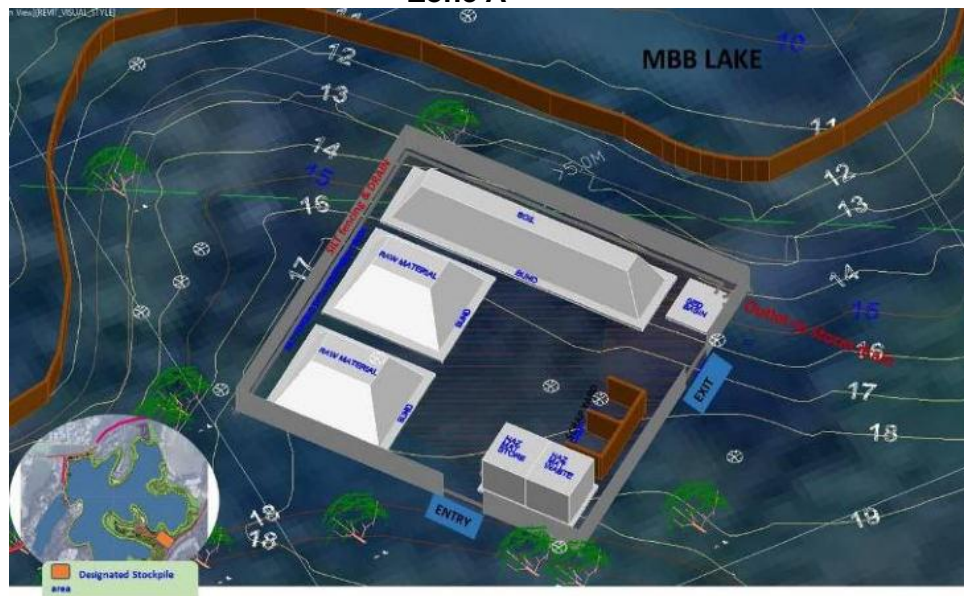


Figure 27: Designated Surface Water Activity Zone



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 PMU²⁰ is responsible for implementing the Project, while the PIUs²¹ 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 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. 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 is 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.

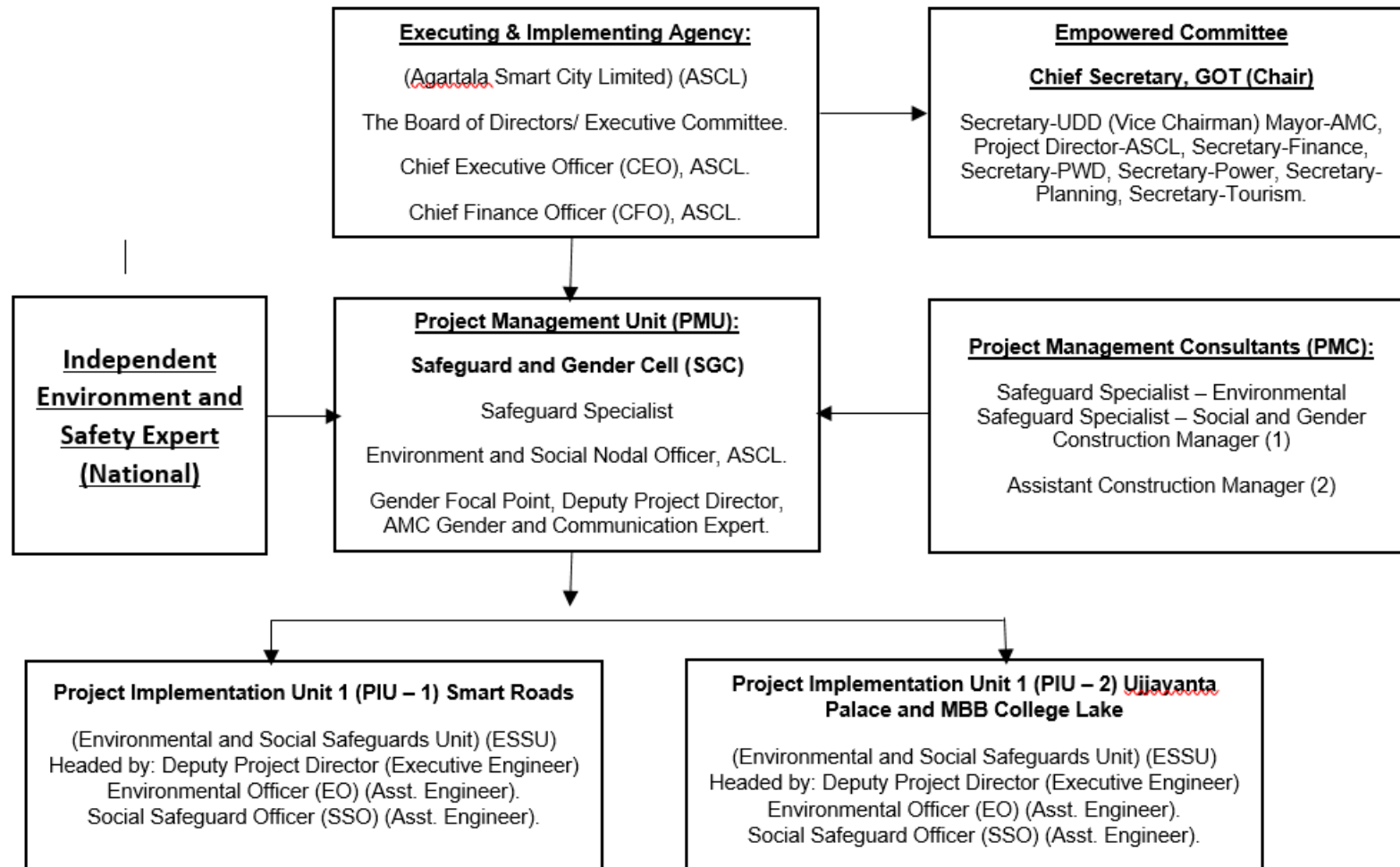
287. The institutional roles and responsibilities for environmental safeguards implementation at PMU, PIUs and Contractors level is described below:

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 and report 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 criteria and 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 identify the 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 contractors and 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 gender action plan will be incorporated in bidding documents and approved by ADB prior to 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 address unanticipated 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 social safeguards and gender.

292. PMC engage services of the following specialists as and when required to address site-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 requirement on 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 mitigation measures; 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 outlined in 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 Safeguards Implementation

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	<ul style="list-style-type: none"> • 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
	<p>congested areas, public relations and ongoing consultations, grievance redress, etc.</p> <p>(vii) Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner as per the IEEs.</p> <p>(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.</p> <p>(ix) Ensure compliance with all government rules and regulations regarding site and environmental clearances as well as any other environmental requirements.</p> <p>(x) Assist PMU, PIUs, and contractor to document and develop good practice construction guidelines to assist the contractors in implementing the provisions of IEE.</p> <p>(xi) Assist in the review of the contractors' implementation plans to ensure compliance with the IEE.</p>	<p>building programs on environmental safeguards.</p> <ul style="list-style-type: none"> • Coordinate with national and state level government agencies • Assist in addressing any grievances brought about through the Grievance Redress Mechanism in a timely manner 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	<p>(i) Ensure IEE is included in bid documents and contract agreements. Ensure cost of EMP implementation is provided.</p> <p>(ii) Disclose of approved EIAs/ IEEs.</p> <p>(iii) Obtain all necessary clearances, permits, consents, NOCs, etc. Ensure compliance to the provisions and conditions.</p> <p>(iv) EMP implementation regarding sites for disposal of wastes, camps, storage areas, quarry sites, etc.</p> <p>(v) Organize an induction course for the training of contractors, preparing them on EMP implementation, environmental monitoring requirements related to mitigation measures, and on taking immediate action to remedy unexpected adverse impacts or</p>	<ul style="list-style-type: none"> • 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 	<p>Conducting environmental monitoring, as specified in the EMP. Issuance of clearance for contractor's post-construction activities as specified in the EMP.</p>

Responsible Agency	Responsibility		
	Pre-Construction Stage	Construction Stage	Post-Construction
	ineffective mitigation measures found during the course of implementation.	<ul style="list-style-type: none"> 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 by PIU and revise report to submit to PMU. (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	<ul style="list-style-type: none"> 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
	<p>EMP implementation cost is included in the methodology.</p> <p>(iii) Undergo EMP implementation orientation by E&S Nodal Officer of PMU prior to start of works</p> <p>(iv) Provide EMP implementation orientation to all workers prior to deployment to worksites</p> <p>(v) Seek approval for camp sites and sources of materials.</p> <p>(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.</p>	<p>(iv) Comply with all applicable legislation, is conversant with the requirements of the EMP;</p> <p>(v) Brief his staff, employees, and labourer about the requirements of the EMP and provide environmental awareness training to staff, employees, and labourers;</p> <p>(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;</p> <p>(vii) Bear the costs of any damages/ compensation resulting from non- adherence to the EMP or written site instructions;</p> <p>(viii) Ensure that PIU are timely informed of any foreseeable activities related to EMP implementation.</p>	

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 orientation of 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 will be part of EMP implementation cost during construction) to be covered by the project's capacity building program. The detailed cost and specific modules will be customized for the available 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) <ul style="list-style-type: none"> • 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) <ul style="list-style-type: none"> • 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) <ul style="list-style-type: none"> • 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 mobilization stage.	Rs. 50,000.00 Rs. 75,000.00	PMU cost
4. Experiences and best practices sharing <ul style="list-style-type: none"> • 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 contractors All 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 PM₁₀, PM_{2.5}, SO₂, NO_x, CO in the ambient air will be monitored at regular intervals. Any abnormal rise will be investigated to identify the causes, and appropriate action will be initiated. Green belt shall be developed for minimizing dust propagation. The ambient air quality data should be transferred and processed in a centralized 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, which should 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 of their 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 worksite and 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 , NO _x , CO. Each monitoring schedule shall be over a duration of 24 hours (in 8-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-Construct ion	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-Construct ion	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 , NO _x , CO. Each monitoring schedule shall be over a duration of 24 hours (in 8-hour shifts), once in quarter except for monsoon for 5 quarters for 18 months.	Construct ion	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	Construct ion	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	Construct ion	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.	Construct ion	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 , NO _x , 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	Lump sum			50,000	PMU
2	EMP implementation.	Construction	Lump sum			100,000	PMU
3	Plans and Protocols	Construction	Lump sum			50,000	PMU
			Lump sum			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	Lump sum			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 Supply Facility 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)	Construct ion	Nos.	3	1964	5,892	Civil works contract
9	First Aid Boxes for the workers camp (Market Rate)	Construct ion	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)	Construct ion	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 post 75 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).	Construct ion	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),	Construct ion	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 avoid any 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 Development Department
- (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:
Sector:

India/ Agartala City Urban Development Project - Revitalization of MBB College lake campus

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- Sepahijala 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 generation to 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 and low-income groups, and their exposure to increased health hazards and risks due to pollutive industries?		No	
Water resource problems (e.g. depletion/ degradation of 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., changes in 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 all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which 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 impacts are very marginal and the construction activity does not impose any threat to the existing climatic conditions.

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	<p>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: -</p> <ul style="list-style-type: none"> • 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. 	<p>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.</p>

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?
			<ul style="list-style-type: none"> Zone 6- Commercial Zone. Development of deck and ticket counter for managing 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. <p>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 m².</p>	
1.2	Clearance of existing land, vegetation and buildings?	Yes	<p>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 m² area.</p> <p>Project will involve cutting of 7 number of trees. The proposed trees to be felled are common species of <i>Saraca asoca</i> (2), <i>Eucalyptus globulus</i> (1), <i>Mangifera indica</i> (1), <i>Artocarpus heterophyllus</i> (1), <i>lagerstroemia speciose</i> (2).</p> <p>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'</p>	<p>Yes</p> <p>The significant impact will be due to dust generation from the clearance activity and stockpiles and from the runoff from stockpile which may contaminate the MBB College lake if not managed properly.</p> <p>Other impacts will be:</p> <ul style="list-style-type: none"> 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: - <ul style="list-style-type: none"> • Refurbishment of the existing pathway (1450 m²), Foot Bridge (12 m²) and pontoon bridge (140 m²). • Renovation of existing gazebos, 14 in no, 10 m² each. • Construction of new decks with ticket counter 91100 m²). • Construction of play area (200 m²), Amphitheatre (225 m²) and food court (160 m²). • Installation of fountain plaza spread in 350 m². • Construction of public toilets, 3 in no, with 120 m² each. • Construction of ghatin 60 m². • Up gradation of Boundary wall, 860 running meter and 2.4 m height. • Construction of 2 watch towers Of 7.765 m height and 112 m² 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: <ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • 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?
			<p>This construction work will involve:</p> <p>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.,</p> <p>7872 cum of excavation for retaining walls, boundary walls, gazebo, viewing point, machan footing, public zone, ponton bridge, saucer drain, culverts etc.,</p> <p>6696 cum Filling of excavated earth in roads, public zone, viewing point, boundary wall, probishti urban platform, saucer drain, as barrier for retaining water before construction etc.,</p>	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Demolition of 2910 m² 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 m² of existing bituminous surface to a depth of 150 mm. • Dismantling old plaster from existing structures of 3242 m² area, • Demolishing brickwork of 32 cum. • Dismantling of tile work for 504 m² area. 	<p>Yes</p> <p>Demolition works will contribute to noise generation creating significant impact in the neighborhood of MBB College lake.</p> <p>Other impacts that are linked to demolition works are:</p> <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Dust generation from stockpiles. • Dangers due to deep excavation and chances of accidents. Other impacts could be: <ul style="list-style-type: none"> • 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 is not 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: <ul style="list-style-type: none"> • 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 shrubs 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 of native species of genetic diversity.
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.
2.4	Aggregates?	Yes	Aggregate of quantity 3078 cu.m will be required for construction.	Transportation of aggregate will also cause air pollution.
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 changes in 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 generate 50 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: <ul style="list-style-type: none"> • 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 and may also cause land contamination if not managed 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 construction will 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 limits of 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)

<p>Question 1 - Are there features of the local environment on or around the Project location which could be affected by the Project?</p> <ul style="list-style-type: none"> • 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? • Other areas which are important or sensitive for reasons of their ecology e.g. <ul style="list-style-type: none"> • Wetlands, • Watercourses or other waterbodies, • the coastal zone, • mountains, • forests or woodlands • 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? • Inland, coastal, marine or underground waters? • 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? 	<p>No</p> <p>No</p> <p>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.</p> <p>No</p> <p>No</p> <p>Yes, The movement of construction material by vehicle may lead to traffic congestion for temporary period of time.</p>
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: <ul style="list-style-type: none"> • 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? <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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?	<p>Yes</p> <p>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.</p> <p>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.</p>
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. temperature inversions, 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? <ul style="list-style-type: none"> • 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? <ul style="list-style-type: none"> • 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? <ul style="list-style-type: none"> • 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? <ul style="list-style-type: none"> • 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? 	<p>Yes.</p> <p>Proper project implementation will promote public health, active community and social interaction among the residents/ users.</p> <p>It will also assist in Rainwater harvesting and protection of biological resource, enhancement of ground water quality and watershed management.</p>

<ul style="list-style-type: none"> • Minority rights? • Housing conditions? • Employment and quality of employment? • Economic conditions? • Social institutions? 	
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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)
(la) 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.


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

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

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	<pre> graph TD A[Solid Waste from Agartala City] --> B[Receiving Platform] B --> C[C&D Waste] B --> D[Organic waste] C --> E[Eco Brick Unit] E --> F[Bricks for reuse] D --> G[Presorting & Manual Segregation] G --> H[Dry waste] H --> I[Bailing & RDF] G --> J[90 mm screening] J --> K[42 mm screening] K --> L[16 mm screening] L --> M[4 mm screening] M --> N[Compost] </pre> <p>Chinmay Chakraborty, Asst. Engineer, Mechanical Division</p>
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	
		<i>Y = compliant (if applicable, specify expiration date of permit/clearance)</i> <i>N = non-compliant²³</i> <i>N/A = not applicable (state justification)</i>
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 but less 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 Safety and 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 obtained from State Environmental Impact Assessment Authority (SEIAA).
- (ii) Regular Environmental Monitoring to be carried out by Agartala Municipal Corporation (AMC).

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



TRIPURA STATE POLLUTION CONTROL BOARD

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

Certificate Sl. No. 1568

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
ii) Our NOC Register Sl. No.11678

Dated : 05-12-2019
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 (Meeh.), 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, 1981 situated 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.

Signature
10.02.2020

(Aparajita Das)

Asst. Environmental Engineer
Tripura State Pollution Control Board

Signature
To
The Executive Engineer(Meeh.)
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.

Signature
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 bury 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 be given to decentralized processing to minimize transportation cost and environmental impacts such as <ul style="list-style-type: none"> 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 waste based 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 30 th 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 31 st 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 <ul style="list-style-type: none"> 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

[भाग III—खण्ड 4]

भारत का राजपत्र : असाधारण

3

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), µg/m ³	Annual* 24 hours**	50 80	20 80	- Improved West and Gaeke -Ultraviolet fluorescence
2	Nitrogen Dioxide (NO ₂), µg/m ³	Annual* 24 hours**	40 80	30 80	- Modified Jacob & Hochheiser (Na-Arsenite) - Chemiluminescence
3	Particulate Matter (size less than 10µm) or PM ₁₀ µg/m ³	Annual* 24 hours**	60 100	60 100	- Gravimetric - TOEM - Beta attenuation
4	Particulate Matter (size less than 2.5µm) or PM _{2.5} µg/m ³	Annual* 24 hours**	40 60	40 60	- Gravimetric - TOEM - Beta attenuation
5	Ozone (O ₃) µg/m ³	8 hours** 1 hour**	100 180	100 180	- UV photometric - Chemiluminescence - Chemical Method
6	Lead (Pb) µg/m ³	Annual* 24 hours**	0.50 1.0	0.50 1.0	- AAS/ICP method after sampling on EPM 2000 or equivalent filter paper - ED-XRF using Teflon filter
7	Carbon Monoxide (CO) mg/m ³	8 hours** 1 hour**	02 04	02 04	- Non Dispersive Infra Red (NDIR) spectroscopy
8	Ammonia (NH ₃) µg/m ³	Annual* 24 hours**	100 400	100 400	-Chemiluminescence -Indophenol blue method

(1)	(2)	(3)	(4)	(5)	(6)
9	Benzene (C ₆ H ₆) µg/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.

NATIONAL AMBIENT AIR QUALITY STANDARDS

Parameter	Location ^a	India Ambient Air Quality Standard ($\mu\text{g}/\text{m}^3$) ^b	WHO Air Quality Guidelines ($\mu\text{g}/\text{m}^3$)		
			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 _{2.5}	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 ₆ H ₆)	Industrial Residential, Rural and Other Areas	5 (Annual)			
	Sensitive Area	5 (Annual)			
Benzo(a)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 ($\mu\text{g}/\text{m}^3$) ^b	WHO Air Quality Guidelines ($\mu\text{g}/\text{m}^3$)		
			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 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.

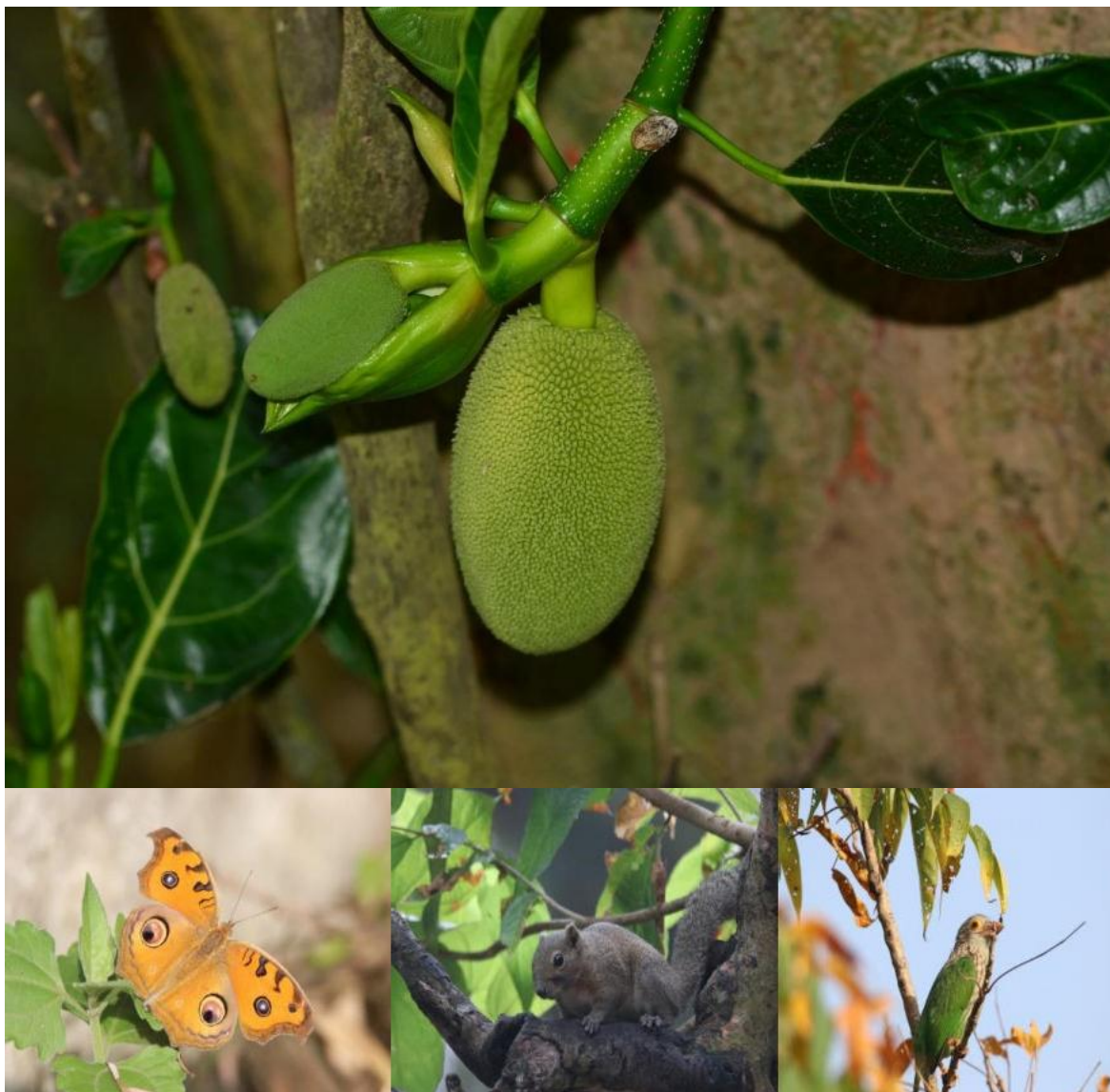
^b Guidelines for Community Noise. WHO. 1999

^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 BIOLOGICAL STUDIES OF MBB LAKE, AGARTALA



Submitted by


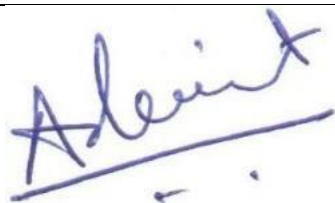

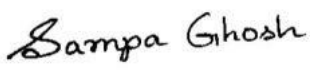



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List of Experts:

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 of evolution 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 under increasing 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, and soils, 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. They include 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 that ever existed, evolved and then gradually went extinct. Species go extinct because of natural shifts in 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 species are 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 the development 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 selected around the Lake, google earth imagery of which is given in Fig. 1.

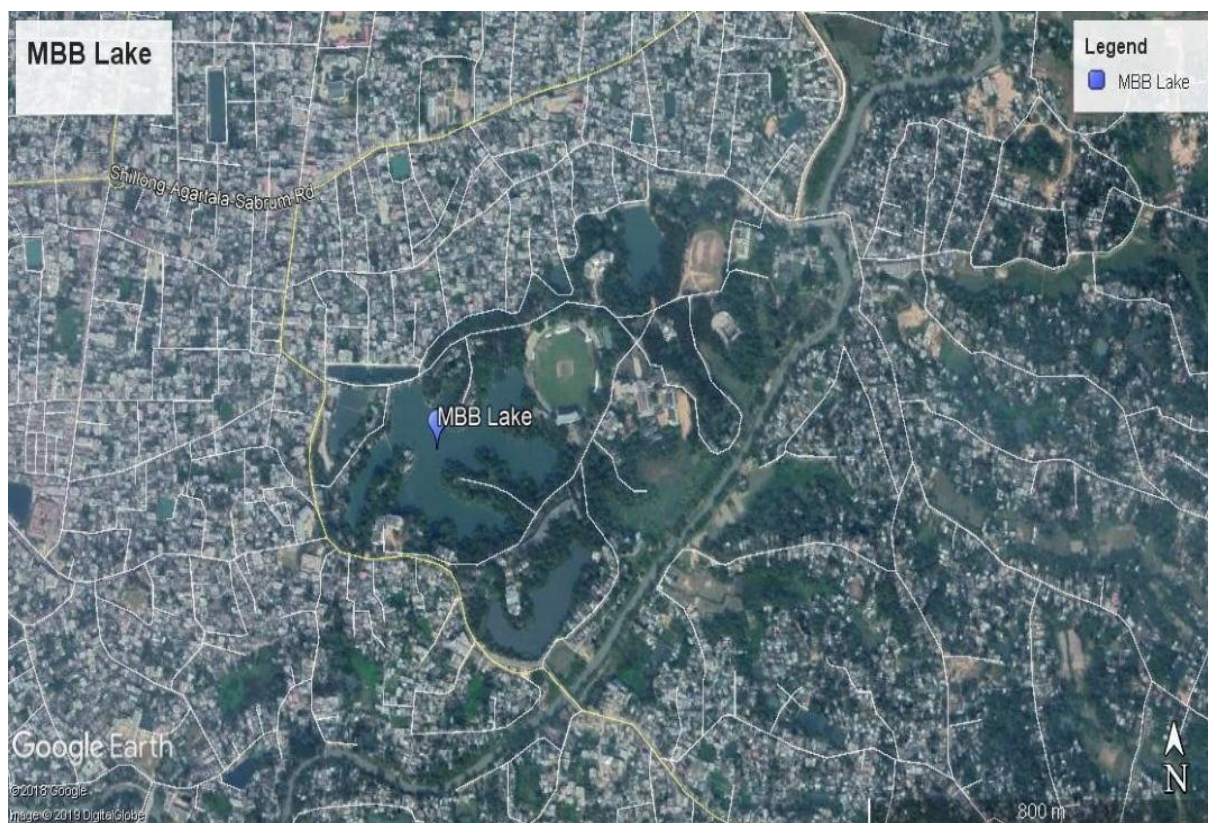
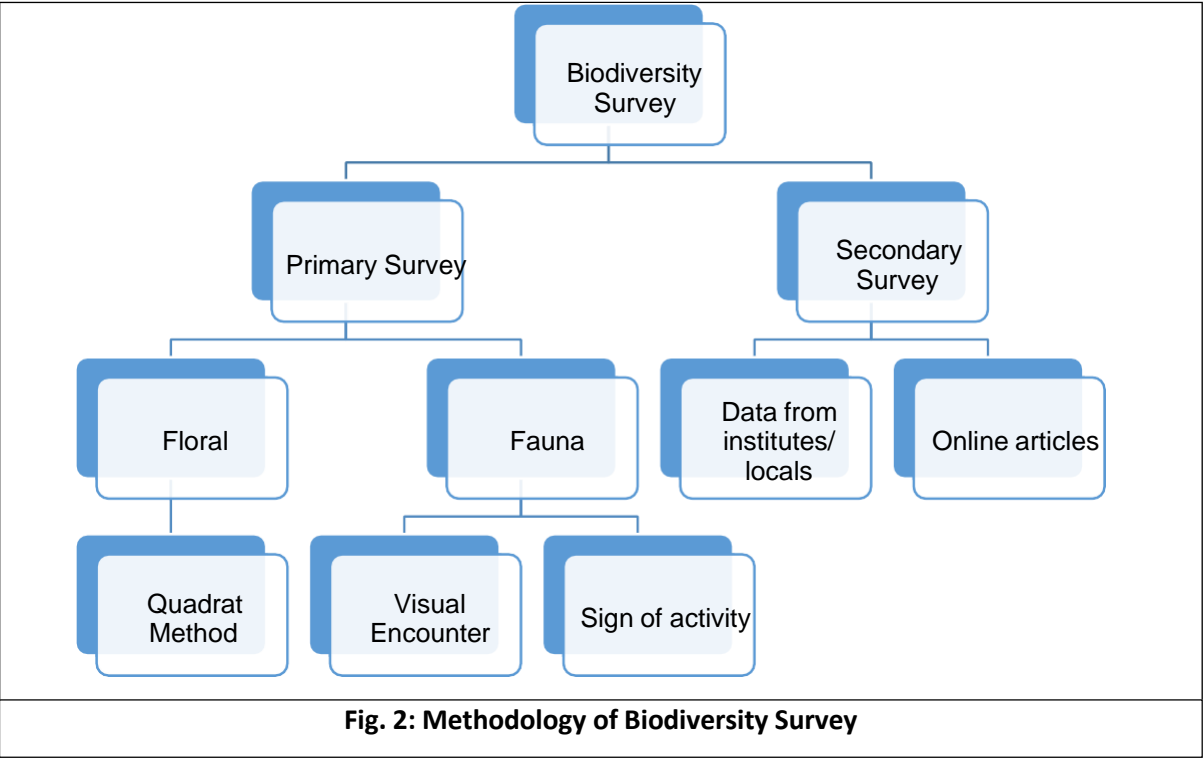


Fig.1: Google Earth Imagery of MBB Lake

METHODOLOGY



A rapid biodiversity survey was conducted for a single season in December 2018.

Following is the methodology:

- 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 for the 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 way to become extinct. A 5 km buffer study area was selected 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 published documents, such as project 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 types 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 it assumes all species are represented in a sample and that they are randomly sampled.

$$H' = - \sum_{i=1}^S \frac{n_i}{N} \ln \frac{n_i}{N}$$

n_i = number of individuals
 N = Total number of species

$$D = 1 - \frac{\sum_{i=1}^S n_i(n_i - 1)}{N(N - 1)}$$

✚ **Margalef's index:** The Margalef diversity index (Margalef, 1958) expressed as 'd' can be calculated by using the formula: $d = \frac{(S - 1) \ln N}{N}$

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 among the different species.

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

Where $\ln S = H'_{\max}$ (the maximum value of Shannon diversity) is what H' would be if all the species 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 trying to 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 ascertain these 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 know what exactly and how much of our biodiversity resources will be lost, so that we can attempt to compensate accordingly.

Phytosociology Indicators:

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

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

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

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

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

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

(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 the site 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 are evidence 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 unique songs 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 of nature) 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 of point 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 during the 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	<i>Chromolaena odorata</i>	Asteraceae
2	<i>Acmella radicans</i>	Asteraceae
3	<i>Mimosa pudica</i>	Mimosaceae
4	<i>Alternanthera ficoidea</i>	Amaranthaceae
5	<i>Cassia tora</i>	Caesalpiniaceae
6	<i>Synedrella nodiflora</i>	Asteraceae

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

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

Sr. no.	Scientific Name	Family
1	<i>Lantana camara</i>	Verbenaceae
2	<i>Clerodendrum infortunatum</i>	Verbenaceae
3	<i>Ludwigia</i> sp	Onagraceae
4	<i>Microcos paniculata</i>	Tiliaceae
5	<i>Macaranga peltata</i>	Euphorbiaceae
6	<i>Melastoma malbathricum</i>	Melastomataceae
7	<i>Ipomoea carnea</i>	Convolvulaceae

List of Trees		
Sr. no.	Scientific Name	Family
1	<i>Artocarpus heterophyllus</i>	Moraceae
2	<i>Carica papaya</i>	Caricaceae
3	<i>Trema orientalis</i>	Cannabaceae
4	<i>Bambusa</i> sp	Poaceae
5	<i>Terminalia arjuna</i>	Combretaceae
6	<i>Ficus religiosa</i>	Moraceae
7	<i>Washingtonia</i> sp	Arecaceae
8	<i>Dillenia indica</i>	Dilleniaceae
9	<i>Delonix regia</i>	Caesalpiniaceae
10	<i>Albizia saman</i>	Mimosaceae
11	<i>Syzygium cumini</i>	Myrtaceae

List of Climbers		
Sr. no.	Scientific name	Family
1	<i>Mikania micrantha</i>	Asteraceae
2	<i>Cissampelos pareira</i>	Menispermaceae
3	<i>Ipomoea</i> sp.	Convolvulaceae
4	<i>Ipomoea aquatica</i>	Convolvulaceae
5	<i>Lablab purpureus</i>	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. Among woody species *Clerodendrum infortunatum*, *Microcos paniculata*, *Lantana camara*, *Trema orientalis*, *Melastoma malbathricum* were found to be dominant. Non-woody species such as *Mikania micrantha*, *Chromolaena odorata*, *Acmella radicans*, *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	<i>Chromolaena odorata</i>	0.956041224	20.37243602	9.05366794	30.38214518
2	<i>Acmella radicans</i>	0.38241649	7.74617339	8.606148232	16.73473811

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

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

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

Woody Species:					
Sr. no.	Name of Species	RF	RD	RA	IVI
8	<i>Washingtonia sp</i>	1.103022281	6.734006734	6.87994496	14.71697398
9	<i>Dillenia indica</i>	0.367674094	3.367003367	10.31991744	14.0545949
10	<i>Delonix regia</i>	0.367674094	3.367003367	10.31991744	14.0545949
11	<i>Albizia saman</i>	0.367674094	3.367003367	10.31991744	14.0545949
12	<i>Syzygium cumini</i>	1.470696375	3.367003367	2.57997936	7.417679102
13	<i>Lantana camara</i>	15.44231193	3.367003367	0.24571232	19.05502762
14	<i>Clerodendrum infortunatum</i>	41.54717259	16.83501684	0.456633515	58.83882294
15	<i>Ludwigia sp</i>	3.676740937	3.367003367	1.031991744	8.075736048
16	<i>Microcos paniculata</i>	9.191852342	10.1010101	1.238390093	20.53125254
17	<i>Macaranga peltata</i>	1.103022281	3.367003367	3.43997248	7.909998128
18	<i>Melastoma malbathricum</i>	9.559526436	6.734006734	0.793839803	17.08737297
19	<i>Ipomoea carnea</i>	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	<i>Parus major</i>	Paridae	LC	Schedule IV
2	Lesser Whistling Duck	<i>Dendrocygna javanica</i>	Anatidae	LC	Schedule IV
3	Little Cormorant	<i>Microcarbo niger</i>	Phalacrocoracidae	LC	Schedule IV
4	House Crow	<i>Corvus splendens</i>	Corvidae	LC	Schedule V
5	Asian Koel	<i>Eudynamis scolopacea</i>	Cuculidae	LC	-
6	White-Breastedwaterhen	<i>Amaurornis phoenicurus</i>	Rallidae	LC	
7	Common kingfisher	<i>Alcedo atthis</i>	Alcedinidae	LC	Schedule IV

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

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

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