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# 1 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

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The present chapter details the Environmental and Social Management Plan for the project section of State Highway-42 starting from Km 2.060 near Hamirpur to Km 76.500 at Rath. The Environmental and Social Plan is based on the Environmental Impact Assessment study carried out for the project.

The Environmental and Social Management Plan (ESMP) consists of the set of mitigation, monitoring and institutional measures to be taken during the design, construction and operation stages of the project to eliminate adverse environmental and social impacts, to offset them, or to reduce them to acceptable levels. The plan also includes the actions needed for the implementation of these measures. The ESMP will be integrated with the bid document for contractor for construction and the implementation of ESMP will become contractual obligation for the contractor.

The major components of the Environmental and Social Management Plan are

- Mitigation of potentially adverse impacts
- Monitoring during project implementation and operation
- Institutional Capacity Building and Training
- Implementation Schedule and Environmental and Social Cost Estimates
- Integration of ESMP with Project planning, design, construction and operation.

## 1.1 Objectives of the EMP

Road strengthening and widening projects generally produce adverse impacts of lower magnitude, which can be prevented or mitigated through proper engineering design and by following environmental and social friendly construction practices. Environmental and social management plan is developed for ensuring the most efficient and cost effective way to mitigate the points of environmental concern in the construction contract provisions.

The main aim of the Environmental and Social Management Plan is to ensure that the various adverse impacts are mitigated and the positive impacts are enhanced. The management practices are developed for all the stages of project, i.e., Pre-construction/Design, Construction and Operational stages. The objectives of the ESMP at various stages of the project planning and implementation can be summarized as follows:

### Design Stage

- To have minimum impact on road side trees,
- To keep land acquisition and building demolition at a minimum
- To provide maximum safety to the highway users and road side communities
- To develop a design that incorporates environmental and Social safeguards and
- To provide mitigation measures to all expected environmental degradation

### Construction Stage

- To prevent and reduce the negative environmental and social impacts of the project by implementable mitigation measures, to be carried out by the Contractor.
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- To ensure that the provisions of the ESMP are strictly followed and implemented by strengthening implementation arrangements.

### Operation Stage

- To prevent deterioration of environment components of air, water, soil, noise etc.
- To improve the safety of the highway users and road side communities

## 1.2 Critical Environmental and Social Issues

The critical environmental and social components along the project corridor were identified on the basis of the assessment of the potential impacts. These issues need to be addressed carefully in the Environmental and social Management Plan. The most critical issues identified at various locations along the project corridor are described in the following **Table 1.1**.

**Table 1.1: Critical Environmental and Social Issues to be Addressed**

S. No.	Critical Environmental and Social Issues	Location
1	Resettlement and Rehabilitation Issue	For squatters/Encroachers within ROW throughout the project stretch in built-up sections
2	Removal of trees	Throughout the project stretch
3.	Diversion of Protected Forest area	Throughout the project stretch as roadside trees declared as Protected Forest.
4.	Impact on Water bodies	9 Ponds located within and adjacent to ROW
5.	Impact of Common resource properties/ religious features	10 No. of religious structure located in 20 meter road corridor within existing ROW. Others include 46 hand pumps, 4 well, 5 water tap and 1 water tank. 13 bus stops are also impacted.
6.	Ambient Air Quality	Throughout the corridor
7.	Traffic Safety	More pronounced in major settlements
8.	Noise Pollution	In habitation area during construction
9.	Solid Waste	Throughout the project stretch

## 1.3 Environmental and Social Management Action Plan

This section describes the Environmental and Social Management Action Plan during different stages of project. The Environmental and Social mitigation measures have been incorporated at all the stages of the project right from Designing phase to Construction and Operational Phase. All care has been taken to provide mitigation measures for all expected environmental and Social degradation at different stages. The Environmental and Social Management action plan has been formulated for the present project for mitigation/management/avoidance of potential adverse impacts and the enhancement of the various environmental and social components along with its location, timeframe of implementation, and overseeing/supervising responsibilities. The safeguard measures identified for different phases are tabulated in **Table 1.2**.

**Table 1.2: Environmental and Social Management Plan**

Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>A. PRE-CONSTRUCTION STAGE</b>					
<b>PC.1.1 Loss of Properties</b>	<ul style="list-style-type: none"> <li>The acquisition of private properties will be carried out in accordance with the RAP and entitlement framework for the project.</li> <li>Early identification of entitlement for Compensation and Advance planning of Resettlement and Rehabilitation Action Plan to Compensate the Losses.</li> <li>All the affected people will be compensated as per R &amp; R Policy of the Project before commencement of Construction works</li> <li>PIU has to ascertain that any additional environmental and social impacts resulting from acquisition of land are addressed and integrated into the ESMP and other relevant documents.</li> </ul>	Throughout the project stretch	Pre-Construction Stage	PIU-UPPWD, NGOs	PMC/PIU-UPPWD
<b>PC.1.2 Roadside Trees Cutting</b>	<ul style="list-style-type: none"> <li>A total number of 8476 trees will be affected for which statutory permission for diversion of protected forest and tree felling will be obtained prior to cutting of trees</li> <li>The statutory permission for diversion of protected forest and tree felling will be obtained prior to cutting of trees.</li> <li>All efforts will be made to preserve trees by restricting tree cutting within the formation width.</li> <li>The tree plantation will be carried out the ratio of 1:2 within the ROW along the project highway as compensatory plantation by following Guidelines for Landscaping and Tree Plantation (<b>IRC:SP:21-2009</b>).</li> <li>A general compensatory plantation scheme should be followed by the contractor presented in <b>ANNEXURE 1.1</b></li> </ul>	Through the Project Stretch	Pre-Construction Stage	<ul style="list-style-type: none"> <li>PIU-UPPWD - for statutory permission for diversion of protected forest and tree felling</li> <li>Forest Department-Felling and plantation as per CA scheme in accordance to regulatory need</li> <li>Contractor-Planation in incidental areas as a good environmental practice</li> </ul>	PMC/PIU-UPPWD

Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>PC.1.3 Relocation of Community Utilities and Common Property Resources</b>	<ul style="list-style-type: none"> <li>All community utilities and properties i.e., water supply lines, hand pumps will be relocated before start of construction.</li> <li>The PIU will relocate these properties in consultation and written agreement with the agency/ owner/community.</li> <li>Environmental considerations with suitable/required actions including health and hygiene aspects will be kept in mind while relocating all community utilities and resources.</li> </ul>	Throughout Corridor wherever these features are located	Pre-Construction Stage	PIU-UPPWD, NGOs and R&R unit	PMC/PIU-UPPWD, Line Department
<b>PC.1.4 Relocation of Religious/Cultural Properties</b>	<ul style="list-style-type: none"> <li>Alignment selected to minimize loss of cultural property.</li> <li>Public consultation will be carried out for obtaining opinion for shifting of religious structures.</li> <li>Relocation of religious structures will be ensured. The relocation site will be decided with the consultation with local population and the related community users.</li> <li>The PIU/NGO will relocate these properties in consultation and written agreement with the agency/ owner/community.</li> <li>Preference of the local community using the structure will be addressed during relocation/ renovation of such affected features.</li> </ul>	Throughout Corridor wherever these features are located	Pre-Construction Stage	PIU-UPPWD, NGOs and R&R unit	PIU-UPPWD, PMC
<b>PC-1.5 Arrangements for pedestrian safety in design</b>	<ul style="list-style-type: none"> <li>Traffic calming measures have been proposed in major built-up areas. The provision includes providing Table tops with pedestrian markings and road studs at start (from both end) of traffic calming zone and then subsequently at 250m within the traffic calming/ built-up zone. These measures will reduce the speed of vehicles enhancing safety of pedestrians in built-up areas. Elsewhere along the road, at all potential safety hazard locations like school etc, table tops with pedestrian markings have been proposed. The necessary road signs and road studs to improve night time visibility have also been proposed at these locations.</li> </ul>	Built-up areas	Design Stage	Contractor	PIU-UPPWD
<b>PC-1.6 Arrangements for temporary land for Establishing Camps/Plants/ Temporary diversions, etc.</b>	<ul style="list-style-type: none"> <li>The Contractor as per prevalent rules will carry out negotiations with the landowners for obtaining their consent for temporary use of lands for workers camp, construction sites/hot mix plants/traffic detours etc.</li> <li>The Contractor will submit the legal agreement/ written Consent letter from the owner of the land for using for specific purpose along with its rehabilitation plan as agreed by the owner.</li> <li>The Contractor will ensure that the site is properly restored to the satisfaction of the land owner prior to handing over to the owner and shall submit satisfactory certificate from the Land Owner.</li> </ul>	At temporary camp site, temporary diversion and plant sites	Pre-Construction Stage and Post utilization of the land	Contractor	PMC/PIU-UPPWD

Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>PC. 1.7 Establishment of Construction/ Workers Camp</b>	<ul style="list-style-type: none"> <li>• The locations of construction camp to be identified by the Contractor.</li> <li>• Construction camps will not be proposed within 500 m from the nearest settlements to avoid conflicts and stress over the infrastructure facilities with the local community.</li> <li>• Location for stockyards for construction materials will be identified at least 1000m from water sources / and 10 Km from Wildlife Sanctuary boundary.</li> <li>• The Contractor will submit the legal agreement/ written Consent letter from the owner of the land for using fir specific purpose along with its rehabilitation plan as agreed by the owner.</li> <li>• The Camp site will be provided with all the necessary facilities as per norms.</li> <li>• the contractor after identifying site for establishment of construction camp and plant site shall conduct a joint inspection for verification and to obtain approval of Environmental Specialist of PMC before starting any construction activity.</li> </ul>	At temporary camp site, temporary diversion and plant sites	Pre-Construction Stage and Post utilization of the land	Contractor	PMC/PIU-UPPWD





Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<p><b>PC 1.8 Establishment of Stone crushers, hot-mix plants, WMM Plant, Concrete Batching plants etc.</b></p>	<ul style="list-style-type: none"> <li>Stone crushers, Hot mix plants, WMM Plants and Concrete Batching plants will be sited sufficiently away from settlements, agricultural operations and any commercial establishments. Such plants will be located at least 1000m away from the boundary of the nearest village/settlement and forests towards downwind direction.</li> <li>The Contractor will conform to the siting and operation requirements of stone crusher unit, Hotmix plants, Batchmix plant, WMM Plants as per Environmental (Protection) Rules, 1986.</li> <li>The Contractor shall submit a detailed layout plan for all such sites and approval of the Environmental and Social Expert of PMC shall be necessary prior to their establishment.</li> <li>All plants will be fitted with adequate dust suppression and emission control equipments and facilities.</li> <li>the contractor will construct temporary devices like sedimentation/settling tank at concrete batching plant for reusing of water or before discharging to surrounding area</li> <li>Specifications of crushers and hot mix plants will comply with the requirements of the relevant current emission control legislations and Consent/NOC for all such plants shall be obtained from the State Pollution Control Board.</li> <li>The Contractor shall not operate the plants till the required legal clearance are obtained and submitted.</li> <li>A general guideline given in <b>ANNEXURE-1.2</b> will be followed for establishing the plants sites, operation and pollution control measures to be adopted at site.</li> </ul>	Plant Site	Pre-Construction Stage	Contractor	PMC/PIU-UPPWD

Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<p><b>PC.1.9 Borrow Area</b></p>	<ul style="list-style-type: none"> <li>Finalizing borrow areas for borrowing earth and all logistic arrangements are well as compliance to environmental and social requirements, as applicable, will be the sole responsibility of the Contractor.</li> <li>The Contractor will not start borrowing earth from select borrow area until the formal agreement is signed between the land owner and the Contractor and a copy is submitted to the PMC/PIU-UPPWD.</li> <li>the contractor will assess quantity of excavated earth generated from roadway cutting and drain excavation and check conformity with technical specification requirement before reusing in the project</li> <li>All the borrow areas will be approved by the Engineer based on both material and environmental and social considerations.</li> <li>The Contractor will obtain environmental clearance for the borrow area as per MoEFCC circular and the conditions stipulated under the environmental clearance will be binding on the contractor. The Contractor will submit the copy of clearance letter to the Engineer and PIU before commencement of material extraction.</li> <li>All the borrow area will be operated in accordance with IRC specification and MoEFCC guidelines. . Top soil shall be preserved for re-use.</li> <li>No earth will be borrowed from within the RoW.</li> <li>Non-productive, barren lands, raised lands, river beds, waste lands are recommended for borrowing earth.</li> <li>The unpaved surfaces used for the haulage of borrow materials will be maintained properly</li> <li>To avoid any embankment slippages, the borrow areas will not be dug continuously, and the size and shape of borrow pits will be decided by the Engineer.</li> <li>Each borrow area should be rehabilitated within one month after completion of extraction of materials to the satisfactions of the land owner and the Engineer.</li> <li>A general guideline for Borrow area operation and rehabilitation given in <b>ANNEXURE 1.3</b> will be followed.</li> </ul>	Identified Borrow area	Pre-Construction and Construction Stage	Contractor	PMC/PIU-UPPWD

Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>PC.1.10 Quarry Area</b>	<ul style="list-style-type: none"> <li>The quarry material will be obtained from licensed sites only, which operate with proper environmental clearances, including clearances under the Air Act.</li> <li>If the Contractor wants to open a new Quarry, then he has to obtain necessary environmental clearance from MoEFCC and lease license from Directorate of Geology and Mines.</li> <li>The Contractor will obtain environmental clearance for the Quarry area as per MoEFCC circular and the conditions stipulated under the environmental clearance will be binding on the contractor. The Contractor will submit the copy of clearance letter to the Engineer and PIU before commencement of material extraction.</li> <li>All the quarries will be approved by the Engineer based on both material and environmental and social considerations.</li> <li>The quarry operations will be undertaken within the rules and regulations in force. All safety and environmental and social concerns will be addresses adequately during quarry operations and transportation of materials as per prevailing rules.</li> <li>A general guideline for Quarry area operation and rehabilitation given in <b>ANNEXURE 1.4</b> will be followed.</li> <li>Only controlled blasting shall be carried out, if necessary for extraction of stone materials in strict compliance with the statutory norms and specification</li> <li>The restoration of Quarry will be done as per the conditions of the owner before handing over the site back to the owner.</li> </ul>	Quarry sites recommended	During construction	Contractor	PMC/ PIU-UPPWD
<b>PC-1.11 Contractor's Environmental, Social and Safety Officers</b>	The Contractor has to appoint one Environmental, Social and Safety Officers having requisite qualification and has sufficient experience in implementation of Environmental and social safeguards in road projects.	-	During construction	Contractor	PMC/ PIU, UPPWD
<b>B. CONSTRUCTION STAGE</b>					
<b>C.1. Impact on Land and Soil</b>					

Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>C.1.1. Soil Erosion</b>	<ul style="list-style-type: none"> <li>High embankments will be provided with chutes and drains to minimize soil erosion</li> <li>Stone pitching and retaining walls will be made at high embankments in critical areas</li> <li>Turfing of low embankments and plantation of grasses and shrubs will be done in slope stabilisation</li> <li>In borrow pits, the depth of the pit will be regulated that the sides of the excavation will have a slope not steeper than 1: 2, from the edge of the final section of bank.</li> <li>Soil erosion checking measures as the formation of sediment basins, slope drains, etc, will be carried out.</li> </ul>	At all embankment locations, bridge locations and borrow pits	During construction	Contractor	PMC/PIU-UPPWD
<b>C.1.2. Loss of topsoil</b>	<ul style="list-style-type: none"> <li>Agricultural areas will be avoided for borrowing of materials, unless requested by the land owner.</li> <li>The topsoil from all areas of cutting and all areas to be permanently covered will be stripped to a specified depth of 150 mm and stored in stockpiles of height not exceeding 2m.</li> <li>The stored topsoil will be spread back to maintain the soil physico-chemical and biological activity. The preserved top soil will be used for restoration of sites, in landscaping and avenue plantation</li> </ul>	Throughout project corridor	During construction	Contractor	PMC/PIU-UPPWD
<b>C.1.3. Compaction of soil</b>	<ul style="list-style-type: none"> <li>Construction vehicles, machinery and equipment will move, or be stationed in the designated area, to avoid compaction of soil.</li> <li>If operating from temporarily hired land, it will be ensured that the topsoil for agriculture remains preserved &amp; not destroyed by storage, material handling or any other construction related activities.</li> </ul>	Throughout Project Corridor	During construction	Contractor	PMC/PIU-UPPWD
<b>C.1.4. Contamination of land from fuel and lubricants</b>	<ul style="list-style-type: none"> <li>Impervious platform and oil and grease trap for collection of spillage from construction equipment vehicle maintenance platform will be appropriately provided at construction camp, servicing area and liquid fuel and lubes at storage areas.</li> </ul>	Construction Camp, Vehicle and Equipment Servicing Centre and Construction site	During Construction	Contractor	PMC/PIU-UPPWD
<b>C.1.5. Contamination of land from construction wastes and spoils</b>	<ul style="list-style-type: none"> <li>All spoils will be disposed off as desired and the site will be fully cleaned before handing over. The non-usable bitumen spoils will be disposed off in a deep trench providing clay lining at the bottom and filled with soil at the top (for at least 0.5m)</li> </ul>	All construction sites, borrow pits camps Throughout Project Corridor	During construction	Contractor	PMC/PIU-UPPWD
<b>C. 2. Impact on Water Resources</b>					

Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>C.2.1. Drainage and run-off</b>	<ul style="list-style-type: none"> <li>The Contractor will always clear all the cross drainage structures and natural drainage before onset of monsoon in order to keep all drainage unblocked Earth, stones, wastes and spoils will be properly disposed off, to avoid blockage of any drainage channel.</li> <li>All necessary precautions will be taken to construct temporary or permanent devices to prevent inundation or ponding.</li> </ul>	At locations of CD structures	During construction	Contractor	PMC/PIU-UPPWD
<b>C.2.2 Rainwater Harvesting &amp; Removal of Oil &amp; Grease from Runoff water</b>	<ul style="list-style-type: none"> <li>The Contractor will construct Rain water harvesting pits connected with longitudinal drains</li> <li>The pits should be at least 5 m above the highest ground water table.</li> <li>The Contractor shall submit a detailed layout plan for all such sites in consultation with Central Ground Water Board and approval of the PMC shall be necessary prior to their establishment.</li> <li>The schematic diagram of Rain water harvesting pit is presented as <b>Annexure 1.5</b>.</li> <li>The Contractor will provide oil receptors connected with longitudinal drains in a manner that can regulate the runoff water as well as extract the oil and grease from the runoff water before entering the rainwater harvesting pits or nearby water bodies or agriculture fields. A typical schematic plan may be followed for construction oil receptors at strategic locations as per <b>Annexure 1.6</b></li> </ul>	Throughout the stretch	Construction Stage	Contractor in consultation with Ground Water Board	PMC/PIU-UPPWD

Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>C.2.3. Contamination of water from construction and allied activities</b>	<ul style="list-style-type: none"> <li>All necessary precautions will be taken to construct temporary or permanent devices to prevent water pollution due to increased siltation and turbidity.</li> <li>The Contractor will take all precautionary measures to prevent the wastewater generated during construction from entering into canals, water bodies or the irrigation system and avoid construction works close to canals or water bodies during monsoon.</li> <li>All wastes arising from the project will be disposed off, as per SPCB norms, so as not to block the flow of water.</li> <li>No construction materials/ spoils will be stored along the water bodies and adequate provision will be made for preventing spillage of materials into these water bodies.</li> <li>Wastes must be collected, stored and taken to approved disposal site.</li> <li>Water quality to be monitored periodically as per Environmental Monitoring Plan.</li> </ul>	Throughout Project Corridor where the Water Bodies located	During construction and after	Contractor	PMC/PIU-UPPWD
<b>C.2.4. Contamination of water from fuel and lubricants</b>	<ul style="list-style-type: none"> <li>The Contractor will ensure that all construction vehicle parking location, fuels/lubricants storage sites, vehicles, machinery and equipment maintenance sites are located at least 100m away from any water body. The Contractor will also ensure that spillage of fuels and lubricants do not contaminate the ground.</li> <li>The slopes of embankment leading to water bodies will be modified and re channelised so that contaminants do not enter the water body.</li> <li>Oil and grease traps will be provided at fuelling locations, to prevent contamination of water.</li> <li>The Contractor will arrange for collection, storage and disposal of oily wastes to the pre-identified disposal sites (list to be submitted to PMC/PIU-UPPWD) and approved by the Environmental Expert. All spills and collected petroleum products will be disposed off in accordance with statutory guidelines.</li> </ul>	Throughout Project Corridor and at all locations of water bodies	During construction	Contractor	PMC/PIU-UPPWD
<b>C.2.5. Sanitation and waste disposal in construction camps</b>	<ul style="list-style-type: none"> <li>Garbage tanks and sanitation facilities will be provided at camps.</li> <li>The construction camps will be located away from water sources.</li> <li>Efforts will be made to provide good sanitary conditions at camp to avoid epidemics.</li> <li>The workplace will have proper medical approval by local medical, health or municipal authorities.</li> </ul>	At Construction camp locations, wherever located along the Project corridor	During construction	Contractor	PMC/PIU-UPPWD

Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>C.2.6. Use of water for construction</b>	<ul style="list-style-type: none"> <li>The Contractor will use ground water/surface water as a source of water for the construction after taking prior permission from Competent Authority.</li> <li>The Contractor will provide a list of locations and type of sources from where water for construction will be used.</li> <li>To avoid disruption/disturbance to other water users, the Contractor will extract water from fixed locations. The Contractor will not be allowed to pump water from any irrigation canal and surface water bodies used by the community.</li> <li>The Contractor is required to comply with the requirements of the State Ground Water Department and seek its approval for doing so and submit copies of the permission to Environmental of PMC/PIU-UPPWD.</li> <li>Wastage of water during the construction will be minimized.</li> </ul>	Throughout Project Corridor	During construction	Contractor	PMC/PIU-UPPWD
<b>C.2.7 Community water Source</b>	<ul style="list-style-type: none"> <li>Damage to any community water source such as wells, tube-wells, water supply pipelines etc., due to construction activities in a particular area, will be replaced immediately by the Contractor at their own cost.</li> </ul>	Throughout the Stretch	During construction	Contractor	PMC/PIU-UPPWD
<b>C.3. Impact on Air Environment</b>					
<b>C.3.1. Emission from Construction Vehicles, Equipment and Machineries</b>	<ul style="list-style-type: none"> <li>All vehicles, equipment and machinery used for construction will be regularly maintained to ensure that the pollution emission levels conform to the SPCB norms.</li> <li>The Contractor will submit PUC certificates for all vehicles/equipment/machinery used for the project. Monitoring results will also be submitted to 'PIU' through the 'Engineer'.</li> <li>The asphalt plants, crushers and the batching plants will be sited at least 1000 m in the downwind direction from the nearest human settlement (Boundary of town/village).</li> <li>Vehicles transporting earth materials will be covered</li> <li>Mixing equipment will be well sealed and equipped as per PCB norms.</li> <li>Periodical monitoring of fine Particulate Matters (PM<sub>10</sub> and PM<sub>2.5</sub>) will be carried out as per Environmental Monitoring Plan.</li> <li>Workers at mixing sites will be provided with good quality personal protective equipments (PPE) reduce the chances of ill effect of dust.</li> </ul>	Throughout Project Corridor at construction sites, hot mix plant, concrete batching plant and the equipments and vehicles at sites	During construction and after	Contractor	PMC/PIU-UPPWD

Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>C.3.2 Dust Pollution</b>	<ul style="list-style-type: none"> <li>The Contractor will take every precaution to control dust nuisance at all the construction zones and allied sites where works are under progress.</li> <li>Every equipments and machinery will be fitted with dust suppression devices such as water sprinklers, dust bags, cyclone etc. As appropriate.</li> <li>The Contractor will provide necessary certificates to confirm that all crushers used in construction conform to relevant dust emission control legislation.</li> <li>At all the construction zones and unpaved lead roads, earthen temporary diversions and plant premises periodical water sprinkling will be carried out to suppress dust.</li> <li>Transportation of loose earth, sand will be done in covered vehicles.</li> <li>All equipments and machineries will be maintained properly.</li> <li>Periodical monitoring of fine Particulate Matters (PM<sub>10</sub> and PM<sub>2.5</sub>) will be carried out as per Environmental and social Monitoring Plan.</li> <li>Workers at mixing sites will wear masks to reduce the chances of exposure to fugitive dusts.</li> </ul>	Throughout the Construction zones, plant sites, borrow area/quarry sites, camp site	During construction	Contractor	PMC/PIU-UPPWD
				Contractor through Approved Monitoring Agency	





Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>C.3.3 Fly ash Handling and utilization</b>	<ul style="list-style-type: none"> <li>Following Thermal Power Plants are falling within 300 Km radius of project site. As per principal Fly Ash Notification, S.O. 763(E), dated 14th September, 1999 of MoEFCC and its subsequent amendment vide S.O. 254(E) dated 25<sup>th</sup> January, 2016, it is mandatory to use fly ash in construction in projects located within a radius of 300 kilometres of Thermal Power Plant: <ul style="list-style-type: none"> <li>(1) Panki Power House, Panki, Kanpur District</li> <li>(2) Parichha Thermal Power Station, Parichha, Jhansi District</li> <li>(3) Feroz Gandhi Unchahar Thermal Power Plant, Unchahar</li> <li>(4) Rosa Thermal Power Plant, Rosa Village, Shahjahanpur</li> </ul> </li> <li>The contractor has to check availability and suitability of the fly ash and submit their plan for use in embankment in compliance to the Fly Ash Notification, 1999 and its subsequent amendments till date for approval from PMC prior to using fly ash for construction work.</li> <li>The Contractor has to ensure that Memorandum of Understanding or any other arrangement for using fly ash or fly ash based products is made between the thermal power plants and the construction agency or contractors and submit the copy to the PMC and PIU-UPPWD.</li> <li>The handling and transportation of fly ash will be done as per section 4.6 of IRC: SP: 58-2001.</li> <li>Fly ash from hoppers or silos must be conditioned with water at power plant to prevent dusting enroute.</li> <li>Fly ash will be transported to the site in covered dump truck to minimize loss of moisture and dust generation.</li> <li>The quantity of fly ash will be transported based on utilization as per work plan to avoid stockpiling of exceeds quantity. However if stockpiling is required then Adequate precautions will be taken to prevent dust generation by spraying water on stockpiles at regular intervals.</li> <li>The stockpile of flyash will be covered with tarpaulins or a thin layer of soil or other granular material to avoid dust generation.</li> </ul>	Construction zones and stockyards	During Construction	Contractor	PMC/PIU-UPPWD

Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>C.4. Impact on Noise Pollution</b>					
<b>C.4.1. Noise from vehicles, asphalt plants and equipments</b>	<p>The Contractor will conform with the following measures:</p> <ul style="list-style-type: none"> <li>• All plants and equipments used in construction shall strictly conform to the MoEFCC/CPCB/UPPCB noise standards.</li> <li>• All vehicles and equipment used in construction will be fitted with exhaust silencers.</li> <li>• Servicing of all construction vehicles and machinery will be done for exhaust silences and will be checked and if found defective will be replaced.</li> <li>• All the construction sites within 150m of the nearest habitation, noisy construction work such as crushing, concrete mixing will be stopped during the night time between 10.00 pm to 6.00 am.</li> <li>• No noisy construction activities will be permitted around educational institutions/health centers (silence zones) up to a distance of 100 m from the sensitive receptors.</li> <li>• Monitoring shall be carried out at the construction sites as per the monitoring schedule and results will be submitted to PMC/PIU-UPPWD.</li> <li>• Environmental Expert will be required to inspect regularly to ensure the compliance of ESMP.</li> </ul>	Throughout Project Corridor and at all construction sites, hot mix plant concrete batching plants	During the construction, till the closure of such sites	Contractor	PMC/PIU-UPPWD
<b>C.5. Impact on Flora</b>					
<b>C.5.1. Loss or damage to vegetation</b>	<ul style="list-style-type: none"> <li>• Vegetation will be removed from the construction zone before commencement of construction. All works will be carried out such that the damage or disruption to flora other than those identified for cutting is minimum.</li> <li>• Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works will be removed with prior approval from the Environmental Expert.</li> <li>• The Contractor, under any circumstances will not cut or damage trees.</li> <li>• Trees identified under the project will be cut only after receiving clearance from the Forest Department</li> <li>• Vegetation only with girth of over 30 cm measured at a height of 1.0 m above the ground will be considered as trees and shall be compensated.</li> </ul>	Throughout Project Corridor	Just after completion of construction activities	Contractor	PMC/PIU-UPPWD

Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>C.5.2. Compaction of vegetation</b>	<ul style="list-style-type: none"> <li>Construction vehicles, machinery and equipment will move or be stationed in the designated area only (RoW or Col, as applicable), to prevent compaction of vegetation outside the RoW.</li> <li>While operating on temporarily acquired land for traffic detours, storage, material handling or any other construction related or incidental activities, it will be ensured that the trampling of soil and damage to naturally occurring herbs and grasses will be avoided.</li> </ul>	Throughout Project Corridor	Just before commencement of construction	Contractor	PMC/PIU-UPPWD
<b>C.6. Impact on Fauna</b>					
<b>C.6.1. Loss, damage or disruption to fauna</b>	<ul style="list-style-type: none"> <li>Construction workers will be directed not to disrupt or damage the fauna.</li> <li>State rules for hunting (wild life protection) will be adhered and rules for Bird catching (wild life protection) will be adhered</li> <li>Construction vehicles will run along specified access to avoid accidents to cattle.</li> </ul>	Throughout Project Corridor	During construction	Contractor	PMC/PIU-UPPWD

Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>C.7. Safety And Accident Risks</b>					
<b>C.7.1.</b> <b>Accident risks from construction activities</b>	<ul style="list-style-type: none"> <li>To ensure safe construction in the temporary accesses during construction, lighting devices and safety sign boards will be installed.</li> <li>Traffic rules and regulations will be strictly adhered to.</li> <li>Safety of workers undertaking various operations during construction will be ensured by providing helmets, masks, safety goggles, etc</li> <li>The electrical equipment will be checked regularly</li> <li>At every camp site, a readily available first aid unit including an adequate supply of dressing materials, a mode of transport (ambulance), para medical staff and an attending doctor will be provided.</li> <li>Road safety education will be imparted to drivers running construction vehicles. In case of negligent driving, suitable action will be taken.</li> <li>Adequate signage, barriers and persons with flags during construction to control the traffic will be provided.</li> <li>Communications through newspaper/announcements/radio/TV about the time frame of the project and the activities causing disruptions on road access and the temporary arrangement made to give relief to the public will be undertaken.</li> <li>The contractor shall sequence their earthwork schedule, specifically near residential/build-up/school/hospital areas, taking into account monsoon season and shall avoid opening continuous work fronts. All work fronts open at such locations shall be completed within targeted time agreed in work plan</li> </ul>	Throughout Project Corridor	During construction	Contractor	PMC/PIU-UPPWD



Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>C.7.2 Occupational Health &amp; Safety of Workers</b>	<ul style="list-style-type: none"> <li>The Contractor will comply with the requirements of the Environmental, social, Health, and Safety (EHS), Guidelines of the World Bank, April, 2007<sup>1</sup> and the statutory norms of safety during construction.</li> <li>The Contractor will provide adequate good quality Personal Protective Equipments (PPE) to all the workers working at construction zones and Plant sites and will ensure that these PPEs are used by workers at all time during works.</li> <li>Adequate drainage, sanitation and waste disposal will be provided at workplaces.</li> <li>Proper drainage will be maintained around sites to avoid water logging leading to various diseases</li> <li>Adequate sanitation and waste disposal facilities will be provided at construction camps by means of septic tanks, soakage pits etc.</li> <li>A health care system will be maintained at construction camp for routine checkup of workers and avoidance of spread of any communicable disease</li> <li>Readily available First Aid kit bearing all necessary first aid items will be proved at all the work sites and should be regularly maintained.</li> <li>The Contractor will organize awareness program on occupational health and safety aspects as well as on HIV/AIDS and sexually transmitted diseases ( STDs) for workers on periodic basis (once in a quarter).</li> </ul>	Workers Camp Site and Construction Zones	During construction	Contractor	PMC/PIU-UPPWD

<sup>1</sup> Reference: <http://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES> and <http://www.ifc.org/wps/wcm/connect/7e4c7f80488554d5b45cf66a6515bb18/Final%2B-%2BToll%2BRoads.pdf?MOD=AJPERES&id=1323162564158> ]

Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>C.7.3 Accessibility</b>	<ul style="list-style-type: none"> <li>The Contractor will all time provide safe and convenient passage for vehicles, pedestrians and livestock to and from roadsides and property access as connecting the project road. The Contractor will also ensure that the existing accesses are not blocked without providing adequate provisions and to the prior satisfaction of Engineer.</li> <li>The Contractor will take care that the cross roads are constructed in such a sequence so that traffic movement on any given area does not get affected.</li> </ul>	At all Construction Zones Along settlement stretches and at major intersections	During construction	Contractor	PMC/PIU-UPPWD
<b>C.7.4 Planning for Traffic diversion</b>	<ul style="list-style-type: none"> <li>Detailed Traffic Control Plans will be prepared and submitted to the Engineer and PMC/PIU-UPPWD for approval, five days prior to commencement of works on any section of road. The traffic control plans shall contain details of temporary diversions, traffic safety arrangements for construction under traffic, details of traffic arrangement after cessation hazardous materials and arrangement of flagmen.</li> <li>The Contractor will provide specific measures for safety of pedestrians and workers at night as a part of traffic control plans. The Contractor will ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. The Contractor will also inform local community of changes to traffic routes, conditions and pedestrian access arrangements with assistance from PMC/PIU-UPPWD.</li> </ul>	All the Construction Zones	During Construction	Contractor	PMC/PIU-UPPWD
<b>C.8. Impact Cultural Properties</b>					
<b>C.8.1. Damage or loss of cultural properties</b>	<ul style="list-style-type: none"> <li>Relocation of adversely impacted cultural properties</li> <li>If any valuable or invaluable articles such as fabrics, coins, artefacts, structures, or other archaeological relics are discovered, the excavation will be stopped and Archaeology Department, UP. will be intimated.</li> <li>Construction camps blasting sites and all allied construction activities will be located at least 500 m away from the cultural property</li> </ul>	Throughout Project Corridor at all locations of Cultural Properties	<p>Before construction starts</p> <p>During construction</p>	Contractor and Archaeology Department UP.	PMC/PIU-UPPWD

Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>C.8.2 Chance finding of Archaeological/historical Properties</b>	<ul style="list-style-type: none"> <li>All fossils, coins, articles of value of antiquity, structures and other remains of archaeological interests discovered on the site shall be the property of the Government and shall be dealt with as per permissions of the relevant legislation.</li> <li>The Contractor shall take reasonable precautions to prevent his workmen or any other persons from removing and damaging such articles or things.</li> <li>The Contractor will immediately stop the work at site upon discovery of such articles or things or archaeological importance during construction.</li> <li>The Contractor shall, immediately upon discovery thereof and before removal, acquaint the Engineer of such discovery and carry out the Engineer's instructions for dealing with the same.</li> <li>The Engineer/PWD will seek direction from the respective Archaeology Department before instructing the Contractor to recommend the work in the site.</li> </ul>	Along the project stretch and allied sites of excavation	Construction Stage	Contractor	PMC/PIU-UPPWD
<b>C.9 Camp Site Management</b>					
<b>C.9.1 Labour Camp facility</b>	<ul style="list-style-type: none"> <li>Contractor will follow all relevant provisions of the Factories Act, 1948 and the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labour camp.</li> <li>The location, layout and basic facility provision of each labour camp will be submitted to</li> <li>The Engineer and PIU prior to their construction.</li> <li>The construction will commence only upon the written approval of the Engineer.</li> <li>The contractor will maintain necessary living accommodation and ancillary facilities in</li> <li>Functional and hygienic manner and as approved by the Engineer.</li> <li>Periodical medical checkup will be ensured for all the workers at least once in 3 month.</li> </ul>	Camp Site	Construction Stage	Contractor	PMC/PIU-UPPWD

Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>C.9.2 Potable Water</b>	<ul style="list-style-type: none"> <li>The Contractor will provide potable water facilities within the precincts of every workplace in an accessible place.</li> <li>The Contractor will also guarantee the following:</li> <li>Supply of sufficient quantity of potable water (as per IS) in every workplace/labour camp at suitable and easily accessible places and regular maintenance of such facilities.</li> <li>If any water storage tank is provided, the bottom of the tank will be kept at least 1mt. above from the surrounding ground level.</li> <li>If water is drawn from any existing well, which is within 30mt. proximity of any toilet, drain or other source of pollution, the well will be disinfected before water is used for drinking.</li> <li>All such wells will be entirely covered and provided with a trap door, which will be dust proof and waterproof.</li> <li>A reliable pump will be fitted to each covered well. The trap door will be kept locked and opened only for cleaning or inspection, which will be done at least once in a month.</li> </ul>	Camp site and work zones	Construction Stage	Contractor	PMC/PIU-UPPWD
<b>C.9.3 Sanitation and Sewage system</b>	<ul style="list-style-type: none"> <li>The Contractor will ensure that- The sewage system for the camp will be designed, built and operated in such a fashion that it should not pollute the ground water or nearby surface water.</li> <li>Separate toilets/bathrooms, will be arranged for men and women</li> <li>Adequate water supply is to be provided in all toilets and urinals</li> <li>All toilets in workplaces are with dry-earth system (receptacles) which are to be cleaned and kept in a strict sanitary condition</li> <li>Night soil (human excreta) is to be disposed off by putting layer of it at the bottom of a permanent tank prepared for the purpose and covered with 15cm, layer of waste or refuse and then covered with a layer of earth for a fortnight.</li> </ul>	Camp Site	Construction Stage	Contractor	PMC/PIU-UPPWD
<b>C.9.4 Waste disposal</b>	<ul style="list-style-type: none"> <li>The Contractor will provide segregated garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner as per the Comprehensive Solid Waste Management Plan approved by the Environmental Expert of PMC/PIU-UPPWD.</li> <li>Unless otherwise arranged by local municipal authority, arrangements for disposal of night soils (human excreta) suitably approved by the local municipal authority or as directed by the Engineer, will be arranged by the Contractor.</li> </ul>	Camp site	Construction Stage	Contractor	PMC/PIU-UPPWD
<b>C.10 Monitoring of Pollution</b>					



Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>C.10.1 Monitoring of Air, Water &amp; Noise Quality Pollution Monitoring</b>	<ul style="list-style-type: none"> <li>The periodic monitoring of the ambient air quality, noise level, water (both ground and surface water) quality, soil pollution/contamination in the selected locations as suggested in environmental and social monitoring plan will be the responsibility of Contractor.</li> <li>Contractor will appoint MOEFCC/UPPCB approved pollution monitoring agency for this purpose.</li> </ul>	As per Environmental Monitoring Plan (Construction Zones and Plant/Camp Sites)	During Construction	Contractor through approved laboratory	PMC/PIU-UPPWD
<b>C,11 Site Restoration and Rehabilitation</b>					
<b>C.11.1 Clean-up Operations, Restoration and Rehabilitation</b>	<ul style="list-style-type: none"> <li>Contractor will prepare site restoration plans, which will be approved by the Engineer.</li> <li>The cleanup and restoration operations are to be implemented by the Contractor prior to demobilization.</li> <li>The contractor will clear all the debris material at site, temporary structures; dispose all garbage, night soils and POL waste as per Comprehensive Waste Management Plan and as approved by the Engineer (PMC).</li> <li>All disposal pits or trenches will be filled in and effectively sealed off. Residual topsoil, if any will be distributed on adjoining/ proximate barren land or areas identified by the PMC in a layer of thickness of 75 mm-150 mm.</li> <li>All construction zones including river-beds, culverts, road-side areas, camps, hot mix plant sites, crushers, batching plant sites and any other area used/affected by the project will be left clean and tidy, at the contractor's expense, to the entire satisfaction of the Engineer (PMC).</li> </ul>	Construction zones, Camp and other allied sites	After Completion of Construction and before demobilization of Construction Team	Contractor	PMC/PIU-UPPWD
<b>C. OPERATION STAGE</b>					
<b>O-1: Monitoring of Operation Performance</b>	<ul style="list-style-type: none"> <li>The PIU-UPPWD will monitor the operational performance of the various mitigation/enhancement measures carried out as a part of the project.</li> <li>The indicators selected for monitoring include the survival rate of trees; utility of enhancement provision for relocated utilities, hand pumps and other relocated structures if any; status of rehabilitation of borrow areas; and noise barriers, which are proposed at different locations.</li> </ul>	Throughout the project Stretch	Operation stage/	Contractor till defect liability period/ PIU-UPPWD	PMC/PIU-UPPWD

Environmental and Social issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
<b>O-2: Maintenance of Drainage</b>	<ul style="list-style-type: none"> <li>PIU-UPPWD will ensure that all drains (side drains, cross drains etc.) are periodically cleared especially before monsoon season to facilitate the quick passage of rainwater and avoid flooding.</li> <li>PIU-UPPWD will ensure that all the sediment and oil and grease traps set up at the water bodies are cleared once in every three months.</li> </ul>	Throughout the project Stretch	Operation stage/	Contractor till defect liability period/ PIU-UPPWD	PMC/PIU-UPPWD
<b>O-3: Pollution Monitoring</b>	<ul style="list-style-type: none"> <li>The periodic monitoring of the ambient air quality, noise level, water (both ground and surface water) quality, soil pollution/contamination in the selected locations as suggested in environmental and social monitoring plan will be the responsibility of Contractor.</li> <li>PIU-UPPWD will appoint MOEFCC/UPPCB approved pollution monitoring agency/Laboratory for this purpose.</li> </ul>	As per Environmental and social Monitoring Plan	Operation stage	Contractor through approved laboratory	PMC/PIU-UPPWD
<b>O-4: Contamination of Surface Water due to Traffic Movement &amp; Accidents</b>	<ul style="list-style-type: none"> <li>Contingency Plans will be developed for cleanup of oil spills, fuel and toxic chemicals.</li> </ul>	Throughout the project stretch	Operation stage	Contractor/ PIU-UPPWD	PIU-UPPWD
<b>O.5: Noise Pollution</b>	<ul style="list-style-type: none"> <li>Noise pollution will be monitored as per monitoring plan at different zones.</li> <li>Noise attenuating Tree Species to be planted along the road</li> <li>Noise control programs are to be enforced strictly. Monitoring the effectiveness of the pollution attenuation barriers, if there is any, will be taken up.</li> </ul>	Specially inhabitant location	Operation stage	Contractor through approved laboratory	PIU-UPPWD
<b>O.6: Accident Hazard and Safety</b>	<ul style="list-style-type: none"> <li>Provision of elaborate system of sign boards and road markings along the whole stretch</li> <li>Provision of suitable lighting arrangement at required locations</li> <li>Development of Emergency Response and Contingency Plan for accidents</li> <li>Regular highway patrolling</li> </ul>	Thought the project stretch	Operation Stage	Contractor, PMC/PIU-UPPWD	PMC/PIU-UPPWD

#### **1.4 Environmental and Social Enhancement**

Enhancement measures for community properties located adjacent to the road has been proposed in consultation with the local population. The locations identified for enhancement is at Kalauli Teer at Km 5.300 at primary school, Ponds at Km 5.800 and Km 7.700. The details of enhancement measures is presented in **Annexure 1.11**.

#### **1.5 Environmental and Social Monitoring Programme**

Environmental and Social monitoring provides an essential tool to make necessary recommendations and adopt suitable control strategies so that menace of rising environmental and social degradation could be minimized and a relief be extended to the people including labours in case of any damage caused under occupational health hazards. The monitoring is necessary for the following reasons:

- To see what impacts have occurred;
- To evaluate the performance of mitigation measures proposed in the ESMP;
- To ensure that the conditions of approval are adhered to;
- To suggest improvements in management plan, if required;
- To see that benefits expected from the EA are achieved as the project proceeds; and
- To satisfy the legal and community obligations.

##### **1.5.1 Performance Indicators (PIS)**

The physical, biological and social components, which are significant in affecting the environment at critical locations, have been suggested as Performance Indicators. The following specific environmental parameters can be qualitatively measured and compared over a period of time and therefore selected as Performance Indicators for monitoring due to their regulatory importance and the availability of standardized procedures and relevant expertise.

- Soil contamination & Erosion indices
- Air quality
- Water quality
- Noise levels around sensitive locations
- Re-plantation success /survival rate
- Restoration of borrow pits
- Construction camp management
- Debris Clearance and disposal
- Safety Aspects
- Employment of local population
- Labour standards at camp
- HIV/AIDS awareness Programme
- Gender Issues (Women participation and wage)

##### **1.5.2 Monitoring of Performance Indicators**

###### **Ambient Air Quality (AAQ) Monitoring**

Ambient air quality parameters which are recommended for monitoring of widening and strengthening of state highway are PM10 (Particulate Matter having less than 10 micron size) or



PM2.5 (Particulate Matter having less than 2.5 micron size), Sulphur Dioxide (SO<sub>2</sub>), Oxides of Nitrogen (NO<sub>x</sub>) and Carbon Monoxide (CO) and Hydrocarbon (HC). These parameters are to be monitored at selected locations such as plant and machinery sites, crusher sites, excavation works, etc. starting from the commencement of construction activity. Data should be generated once in a season at the selected monitoring locations in accordance with National Ambient Air Quality (NAAQ) Standards 2009 (**ANNEXURE-1.7**).

### **Ambient Noise Monitoring**

The measurement for monitoring the noise levels to be carried out at sensitive locations and at construction sites along the project road in accordance to the Ambient Noise Standards formulated by Central Pollution Control Board (CPCB) (**ANNEXURE 1.8**). Sound pressure level would be monitored on twenty-four hourly basis. Noise shall be recorded at "A" weighted frequency using digitized noise monitoring instrument.

### **Water Quality**

Water quality of local water resources that is used by local community shall be monitored. The physical and chemical parameters recommended for analysis of water quality relevant to road project are pH, total solids, total suspended solids, total dissolved solids, COD, BOD, DO, Oil and Grease, Chloride, Iron, etc. The monitoring of the water quality will be carried out at all locations identified along the project road during construction and operation phase. Monitoring parameters will be as per IS-10500 (**ANNEXURE-1.9**) for ground water quality and for surface water quality as per CPCB Guidelines for used based surface water classification (**ANNEXURE-1.10**).

### **Soil Quality**

The soil quality of the surround fields close to the construction site and plant site will be monitored to understand the impact of soil quality. The physic-chemical parameters recommended for analysis are physical Parameter: Texture, Grain Size, Gravel, Sand, Silt and Clay and Chemical Parameter: pH, Conductivity, Calcium, Magnesium, Sodium, Nitrogen and Absorption Ratio.

### **Tree Survival Rate**

Roadside plantation of trees and their management will be an important environmental activity for the management group. These activities will include selection of plant, development of nurseries, protection of plant, interaction with roadside communities for plantation management and their maintenance, etc.

The widening and up gradation of the project requires felling of roadside trees. This lost will be compensated by compensatory afforestation. The compensatory afforestation will be done as per Forest (Conservation) Act and policy of Uttar Pradesh Forest Department.

To ensure the proper maintenance and monitoring of the compensatory afforestation, a regular maintenance and monitoring of the survival rate of the planted trees is being proposed up to a period of 3 years from the operation of the project. This will be monitored by implementing agency with the help of Forest Department.

### **Traffic Safety Arrangements:**

The traffic safety arrangements should be maintained regularly and the maintenance of the traffic safety equipments along construction zones required to be reviewed every month.



### **Employment of Local Population**

Temporary employment in the project construction work to project affected persons with particular attention to vulnerable groups may be given by the project contractor during construction to the extent possible.

### **Labour Standards at Camp**

Contractor will follow all relevant provisions of the Factories Act, 1948 and the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labour camp. The contractor will maintain necessary living accommodation and ancillary facilities in Functional and hygienic manner.

### **HIV/AIDS Awareness Programme**

To increase the level of awareness about prevention and control of HIV/AIDS among the different communities abutting project road, workers. The Contractor will organize awareness program on HIV AIDS and sexually transmitted diseases (STDs) for workers, communities abutting project road on periodic basis (Once in a quarter). The Contractor has to arrange such awareness programme. The Contractor shall conduct an HIV-AIDS awareness programme via an approved service provider. The HIV/AIDS awareness programme shall include a talk on the issues on HIV/AIDS, poster displays and distribution of condoms to the participants, etc. The Contractor has to ensure minimum 90% participation of their workers in training/awareness programme.

### **Gender Issues (Women Participation and Wage)**

Acceptable participation of women workers and fair compensation to be ensured by the contractor. It is to be ensured that all the workers are paid the wages as per Minimum Wages Act and there is no discrepancy in wages of male and female workers for the similar works. The Contractor has to maintain monthly record of Muster roll & Wages Register and Labour Statement and the same will be periodically reviewed by the PMC.

#### **1.5.3 Environmental and Social Monitoring Action Plan**

The monitoring action plan covering various performance indicators, frequency and institutional arrangements of the project in the construction and operation stages is given in **Table 1.3**.

#### **1.5.4 Environmental and Social Reporting System**

Monitoring and evaluation are important activities in implementation of all projects. Monitoring involves periodic checking to ascertain whether activities are going according to the plans. It provides the necessary feedback for project management to keep the programme on schedule.

The reporting system will operate linearly with the Contractor, who will report to Project Management Consultant (PMC), who will in turn report to the Project Implementation Unit (PIU). All reporting by the Contractor and PMC shall be on monthly/quarterly/annual basis. The PIU shall be responsible for preparing targets for each of identified ESMP activities.

The compliance monitoring and the progress reports on environmental and social components may be clubbed together and submitted to the PIU regularly during the implementation period. The operation stage monitoring reports may be annual or biannual. The operation stage monitoring reports will have to be prepared as specified in the said project Environmental and Social Completion Report.



### **1.5.5 Environmental and Social Monitoring Cost**

A separate budgetary provision has been made for implementation of Environmental and Social Monitoring Plan. The environmental and social monitoring cost is estimated on the basis of the length and existing environmental and social scenario of the project road. A budget allocation has been made against environmental and social monitoring during construction and operation stages of the project.



**Table 1.3: Environmental and Social Monitoring Plan**

Environment & Social Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	Standards	Locations	Frequency	Duration	Action Plan in case criteria exceeds	Implementation	Supervision
Air	Construction	PM <sub>10</sub> µg/m <sup>3</sup> , PM <sub>2.5</sub> µg/m <sup>3</sup> , SO <sub>2</sub> , NO <sub>x</sub> , CO	National Ambient Air Quality Standard (CPCB, 18 <sup>th</sup> Nov, 2009)	Plant site, HMP and Stone Crusher (1 location)	Once in 3 month for 2 years excluding monsoon period)	Continuous 24 hours	Check and modify control device like bag filter/cyclones of hot mix plant	Contractor through approved NABL monitoring agency	PMC & PIU-UP PWD
		PM <sub>10</sub> µg/m <sup>3</sup> , PM <sub>2.5</sub> µg/m <sup>3</sup> , SO <sub>2</sub> , NO <sub>x</sub> , CO		Along the project road at 2 locations in consultation with PMC.	Once in a season excluding the monsoon for 2 Years	Continuous 24 hours	-	Contractor through approved NABL monitoring agency	PMC & PIU-UP PWD
	Operation	PM <sub>10</sub> µg/m <sup>3</sup> , PM <sub>2.5</sub> µg/m <sup>3</sup> , SO <sub>2</sub> , NO <sub>x</sub> , CO		Along the project road at 2 locations in consultation with PMC	In the interval of 4 months excluding the monsoon for 1 Year	Continuous 24 hours	-	Contractor through approved NABL monitoring agency	PMC & PIU-UP PWD

Environment & Social Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	Standards	Locations	Frequency	Duration	Action Plan in case criteria exceeds	Implementation	Supervision
Surface Water Quality	Construction	pH, Temperature, DO, BOD, COD, Oil & Grease, Total Suspended Solid, turbidity, Total Hardness, Chlorine, Iron, Total Coliform	Surface Water Quality Standard	At identified locations (3 locations)	Once in a season excluding monsoon for 2 Years	Grab Sampling	Check and modify Oil interceptors, silt fencing devices	Contractor through approved NABL monitoring agency	PMC & PIU-UP PWD
	Operation			At identified locations (2 locations)	In the interval of 4 months excluding the monsoon for 1 Year	Grab Sampling	Check and modify petrol interceptors, silt fencing devices	Contractor through approved NABL monitoring agency	PMC & PIU-UP PWD
Ground Water Quality	Construction	pH, Temperature, TSS, Total hardness, Suspended Solid, Chlorine, Iron, Sulphate, Nitrate	Ground Water Quality Standard as per IS: 10500, 1991	Construction site (2 locations)	Once in 3 months for 2 Years	Grab Sampling	Check and modify petrol interceptors, silt fencing devices	Contractor through approved NABL monitoring agency	PMC & PIU-UP PWD



Environment & Social Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	Standards	Locations	Frequency	Duration	Action Plan in case criteria exceeds	Implementation	Supervision
Noise Level	Construction	Leq dB (A) (Day and Night) Average and Peak values	Ambient Noise Standard (CPCB, 2000)	At equipment yards and locations as identified along the project road by PMC (3 locations)	In the interval of 3 months for 2 Years	24 hourly recording of Leq	Check and modify equipment and devices used to protect noise level	Contractor through approved NABL monitoring agency	PMC & PIU-UP PWD
	Operation	Leq dB (A) (Day and Night) Average and Peak values		Locations as identified by PMC (3 locations)	In the interval of 4 months for 1 Year	24 hourly recording of Leq	-	Contractor through approved NABL monitoring agency	PMC & PIU-UP PWD
Soil	Construction	Physical Parameter: Texture, Grain Size, Gravel, Sand, Silt, Clay; Chemical Parameter: pH, Conductivity, Calcium, Magnesium, Sodium, Nitrogen, Absorption Ratio		Near Construction sites along the road as identified by the PMC (3 locations)	In the interval of 3 months for 2 Years	-	-	Contractor through approved NABL monitoring agency	PMC & PIU-UP PWD
	Operation	Physical Parameter: Texture, Grain Size, Gravel, Sand, Silt, Clay; Chemical Parameter: pH, Conductivity, Calcium, Magnesium, Sodium, Nitrogen, Absorption Ratio		Along the road (2 locations)	In the interval of 4 months for 1 Year	1 Year	-	Contractor through approved NABL monitoring agency	PMC & PIU-UP PWD

Environment & Social Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	Standards	Locations	Frequency	Duration	Action Plan in case criteria exceeds	Implementation	Supervision
Tree Plantation/Greenbelt Development	Construction	Tree Survival rate	90% Tree Survival Rate	Throughout the Project in substantially completed section	Once in a month	1 Year	Replacement of dead tree with healthy saplings of same species, repairing of tree guards, fencing etc.	Contractor	PMC, PIU UP PWD
	Operation	Tree Survival rate	80% Tree Survival Rate	Throughout the Project stretch	Once in three months	3 Years	Replacement of dead tree with healthy saplings of same species	Contractor	PMC, PIU UP PWD
Water Bodies	Construction	Turbidity in Storm water Silt load in ponds/Rivers	As specified by the engineer Water quality standards	At the drains, Ponds, Water reservoir and River along the project road	Pre-monsoon and post monsoon seasons for 3 years	3 years	Inspection and modification of silt fencing/ any leakage of drains to these surface water bodies	Contractor	PMC, PIU UP PWD
	Operation	Turbidity in Storm water Silt load in ponds	As specified by the engineer/ Water quality standards	At major water bodies (Pond, within the Proposed ROW and those located at immediate vicinity of the Proposed ROW.	3 Year before onset of monsoon	3 Years	Check and repair catch drains, storm water drains and silt trap	Contractor	PMC till defect liability period, PIU UP PWD

Environment & Social Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	Standards	Locations	Frequency	Duration	Action Plan in case criteria exceeds	Implementation	Supervision
Debris Clearance and disposal	Construction	Debris removal from different construction site	Visual observation	Along the project road	Once in quarter	3 years	Shall be checked in completed section	Contractor	PMC, PIU UP PWD
Traffic Safety Arrangements	Construction	Installation of safety signboard, warning signboards, direction cheverons, barricading, etc	Physical verification of safety equipments installed at site	Along the construction zones and diversions	Monthly	3 years	Restoration of damaged/missing safety equipments	Contractor	PMC, PIU UP PWD
HIV/AIDS Awareness Programme	Construction	HIV/AIDS Awareness Programme, Talk on issues of HIV/AIDS, postal display, condom distribution, etc. via authorized Centre/ NGOs	90% participation of workers. Physical verification of awareness programme, record verification (Attendance sheet, photographic record and report)	At Camp site/ near work sites	Quarterly	3 years	-	Contractor	PMC, PIU UP PWD

Environment & Social Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	Standards	Locations	Frequency	Duration	Action Plan in case criteria exceeds	Implementation	Supervision
Labour & Gender participation	Construction	Engagement of Local labours and Gender Participation in construction activities.	Involvement of local labours and ratio of male and Female workers in construction (checking of Muster roll & Wages Register Labour Statement )	At all the construction and allied sites	Monthly	3 years	-	Contractor	PMC, PIU UP PWD
Labour Standards	Construction	Facility at labour camp and general hygienic conditions	All basic facility at labour camp and maintenance of general hygienic conditions as per labour rules and conditions of labour license	Labour Camp	Monthly	3 years	Maintenance of labour facilities and general hygienic conditions. Replacement of all the damaged facilities	Contractor	PMC, PIU UP PWD

## **1.6 Institutional Arrangement for Implementation of ESMP:**

For successful implementation of Environmental and Social safeguards Institutional setup plays a vital role. The Government of Uttar Pradesh has setup Project Management Unit (PMU) for UPCRNDP to streamline decision-making and provide more autonomy for project execution and delivery. The PMU is headed by Chief Engineer, World Bank (Roads) supported by Superintending Engineer (Planning) and Project Director, UPCRNDP at Head Office. The Project Director will have overall responsibility for implementation of projects.

The Superintending Engineer (Planning) is responsible to assist Chief Engineer in ensuring that overall expenditure under each of the agreed component does not exceed the total cost specified in the project document. S/he will also assist Chief Engineer in monthly plan review and monitoring meeting wherein physical and financial review will be done at the level of Chief Engineer and for budget provision/Allotment/ CCL/Assurance/Rules/Draft Para/Audit Para/PAC Para.

An Environmental and Social Development Cell (ESDC) has been set up at PMU. The cell is headed by an Executive Engineer. He is overall responsible for EIA preparation and ESMP Implementation, coordinating and liasoning with government organization as well as the World Bank with respect to different forest and environmental and social issues. He will also be responsible for progress monitoring of Environmental and Social safeguards during project execution and submission of quarterly/ annual report on ESMP compliance to the funding Agency.

In the field, there is provision of World Bank Circles headed by Superintending Engineers. The Division offices will act as Project Implementation Units (PIUs). Executive Engineers in each World Bank Circle will be responsible to oversee the project progress at site in their respective area. It is proposed to have one Environmental and Social Nodal Officer at Office of each Executive Engineer who will look into the compliance with the safeguards, liasoning with local authorities in connection with different permits and licenses, redressing the public complaints on environmental and social issues, etc.

The PMU has appointed Project Management Consultant to assist with project preparation and support implementation as Engineer in-charge who will supervise the Contractors activities, compliances and monitor the overall progress of work. There is provision of Environmental and Social Specialist in PMC. The PMC's environmental and Social specialist will oversee the implementation of the ESMPs by the Contractor and will also provide technical guidance to the Contractor for implementation of the ESMP and prepare checklists/formats/reports, etc. for implementing each of the activities as per the ESMP. He will prepare periodical monitoring reports on ESMP implementation and compliance with environmental and social clauses of Contract Agreement.

The Contractor team will include Environment, Social and Safety Officers who will be responsible for day-to-day activities that pertain to the works. S/He will ensure compliance of the instructions given by the PMC. S/He will maintain close interaction with PMC and his field representative and seek instructions and guidance from PMC's Environmental and Social Specialist on any issue related to implementation of environment, social and safety measures. He shall be responsible for record keeping, and reporting to the PMC through PM on actions taken. He will also give in-house training to the workers on environment and safety.

The Roles and responsibility of implementation and Supervision Agencies at different levels have been defined in **Table 1.4**. The proposed Institutional structure for ESMP implementation is presented in **Figure 1.1**.

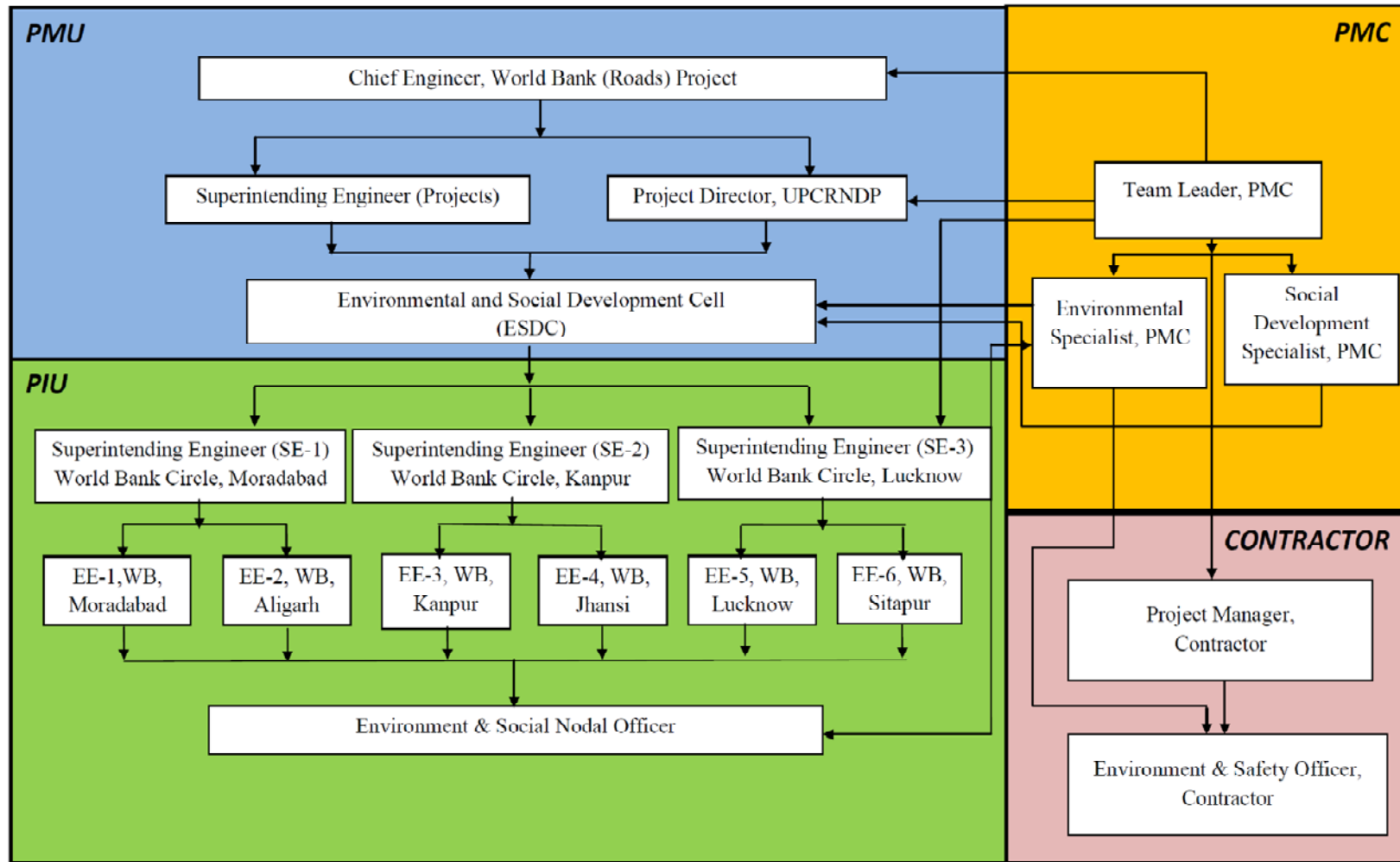
**Table 1.4: Roles and Responsibility of Implementing Agency/Organisations**

<b>PMU-UPCRNDP</b>	<b>PIU, Site Office</b>	<b>PMC</b>	<b>Contractor</b>
<ul style="list-style-type: none"> <li>Obtain statutory clearances.</li> <li>overall project coordination and management through PIU supported by SC</li> <li>Interaction and Reporting to World Bank</li> <li>Effective implementation of ESMP and Monitoring of ESMP</li> <li>Compilation of Data relating to implementation of Environment and Social Management Plan.</li> <li>Advising and suggesting corrective measures to adhere to time schedule for implementation of ESMP.</li> <li>Carry out verification Exercise for implementation of ESMP with respect to modification (if required) for enhancement measures.</li> </ul>	<ul style="list-style-type: none"> <li>Joint verification to be carried out by PMU, PMC, Contractor Env. Officer.</li> <li>Overall Supervision of implementation of ESMP</li> <li>Environmental monitoring through approved Laboratory.</li> <li>Consent for opening of Borrow areas, Quarry areas, and Labour camps and supervising its monitoring.</li> <li>Keeping records of all consents obtained by contractor.</li> <li>Compilation of Data relating to implementation of ESMP.</li> <li>Filling of Summary Sheets and reporting to PMU.</li> <li>Approval of plans prepared by contractor</li> </ul>	<ul style="list-style-type: none"> <li>Assist and advise the PMU/PIU in matters relating to environment and social matters.</li> <li>Part of Joint Verification Exercise to be carried out by PMU, PIU and Contractor for review of ESMP for modification in enhancement measures (if required)</li> <li>Supervise implementation of ESMP by contractor</li> <li>Develop Good Practices construction guidelines to assist contractor in implementation of ESMP</li> <li>Conduct Consultations programs with the stakeholders on regular basis to get first hand information on the inconvenience caused to contractor's activities such as noise, debris disposal etc. <ul style="list-style-type: none"> <li>maintain Environmental and Social reporting system</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Joint Verification Exercise including, PMU/PIU PMC for review of EMP</li> <li>Interaction with ESDC, PIU and PMC</li> <li>Contractor's Env. &amp; Safety officer will be primarily responsible for implementation EMP</li> <li>Filling of Reporting Format and submitting to PMC</li> <li>Monitoring through approved agency.</li> <li>Preparation of various plans for effective implementation of ESMP as detailed out in EMP and submitting it for approval to PMC</li> <li>Identification of Sites for Labour camps, Hot mix Plant, Batch Mix Plant, debris disposal etc</li> <li>Day to day monitoring of implementation of Environmental and Social Safeguards</li> </ul>

The role and responsibilities of Environmental and Social personnel at different levels will be as follows:

<b>Position</b>	<b>Roles &amp; Responsibilities</b>
<b>PMU's Environmental and Social Nodal Officer (ESD Cell)</b>	<ul style="list-style-type: none"> <li>Finalize the EIA and ESMP for individual sub-project with inputs from PMC</li> <li>Confirm integration of EMP provision related to works in the contract documents</li> <li>Provide guidance on environmental and social issues to PIUs Environmental and Social officers as requested</li> <li>Coordinate with regulatory agencies like Forest Departments, and at request of PMC and/or Contractor, UPPCB</li> <li>Prepare regular reports on progress on ESMP implementation across the project with inputs from the PMC's environmental and Social specialist</li> <li>Document experiences of developing and implementing environmental and social mitigation measures and convert it into training material for internal and external capacity building</li> <li>Facilitate interaction between environmental and social teams of different sub-projects to allow cross-fertilization of ideas, successes and learnings</li> </ul>

Position	Roles & Responsibilities
<b>Environmental and Social Nodal Officer at PIU (Division Office)</b>	<ul style="list-style-type: none"> <li>• Coordinate with PMC's environmental specialist to monitor and report on progress on ESMP implementation as part of works contracts</li> <li>• Participate in and facilitate consultations with stakeholders</li> <li>• Participate in project meetings and report on the issues related to environmental and social management to provide for any mid-course corrections that may be required based on situation on the ground</li> <li>• Coordinate on the training and capacity building initiatives</li> </ul>
<b>Environmental Specialist, PMC</b>	<ul style="list-style-type: none"> <li>• Lead the development of the sub-project specific EIA and ESMP for the entire project</li> <li>• Review contract documents to ensure that ESMP provisions related to works are included in the contract documents</li> <li>• Assist the Environmental and social Specialist in the PMU to follow-up with state government departments</li> <li>• Oversee and report to the PMU on implementation of ESMP provisions included in the works contract for each sub-project</li> <li>• Act as a resource person in trainings based on experience on implementing this project and previous relevant work</li> </ul>
<b>Social Specialist, PMC</b>	<ul style="list-style-type: none"> <li>• Lead the development of the sub-project specific SIA, RAP and ESMP for the entire project</li> <li>• Review contract documents to ensure that ESMP provisions related to works are included in the contract documents</li> <li>• Assist the Social Specialist in the PMU to follow-up with state government departments</li> <li>• Review the RAP implementation activities</li> <li>• Oversee and report to the PMU on implementation of social safeguards of ESMP provisions included in the works contract for each sub-project</li> <li>• Act as a resource person in trainings based on experience on implementing this project and previous relevant work</li> </ul>
<b>Contractors' Environmental and Safety Officer</b>	<ul style="list-style-type: none"> <li>• Lead the implementation of ESMP measures included in the Contract</li> <li>• Report on progress and shortcomings of the measures implemented to Environmental and Social Specialist of PMC</li> </ul>





## 1.7 Environmental and Social Training

To enhance the capacity of officials for effective implementation of proposed mitigation measures and monitoring the resultant effect, as well as create awareness amongst workers and supervision staff trainings and awareness programmes have been planned and is given in **Table 1.5**. The institutions/agencies like regional office of MoEF, SPCB/CPCB, Indian Institute of Technologies can be consulted for such trainings. Independent subject"s experts/consultants can also be the resource persons to impart trainings. These experts/agencies shall be appointed based on specific need for the training. A budgetary provision of Rs. 4.0 Lakh has been made for imparting Environmental and social Training.

**Table 1.5: Details of Proposed Training Program on Environmental and Social Issues**

Module	Title	Objectives	Time of Training	Duration (Day)	Level	Participants
1	Concept of Environmental and Social Management Framework	<ul style="list-style-type: none"> <li>Brief up Bank's safeguard policies and requirements</li> <li>Brief up latest on environmental and social legislations</li> <li>Implementation, Supervision and Monitoring Mechanism</li> <li>Provision made in Contract Documents</li> </ul>	Before awarding contracts	1	State	PIU (SE and Executive Engg.) PMU, UP PWD
2	Orientation Workshop on ESMF Implementation	<ul style="list-style-type: none"> <li>ESMF requirements</li> <li>Implementation, Supervision and Monitoring Mechanism</li> <li>Roles and Responsibilities of Contractors and UP, PWD Engineer</li> <li>Identification of social issues</li> <li>Addressing social impacts</li> <li>Preparing mitigation plans</li> </ul>	Pre-construction stage (when contractors are substantially mobilized)	1	State	PIU (Executive Engg. /AEE/AE, PMU, Contractors and Third Party Monitoring Agency
3	Focused Training on Specific Issue/s	<ul style="list-style-type: none"> <li>Analyzing problems, referring stipulations in Contract and GEMP and agreed to feasible solution within specified timeframe</li> <li>Issues relating to wage parity, child labor, etc.</li> </ul>	During construction, as and when needed.	0.5	District	PIU, Contractors and Third Party Monitoring Agency
4	Training on HIV AIDS issues	To increase the level of awareness about prevention and control of HIV/AIDS among the different communities' particularly tribal communities in scheduled areas abutting project road; Social and Psychological support to AIDS Infected	During construction	1 day	District	PIU, NGO Contractors

Module	Title	Objectives	Time of Training	Duration (Day)	Level	Participants
5	Road Safety	To raise road safety consciousness among the road users; train drivers and medical aid to the victims of road accidents particularly for special target groups like drivers of heavy vehicles/goods vehicles, etc.	During and pre-construction	0.5	District	PIU, NGO and contractor
6	ESMP Implementation during construction stage	To understand the requirement of EMP and its implementation during construction stage of the project road. Good and bad practice of ESMP during construction stage of the project	During Construction stage	0.5		Contractor and their staffs.

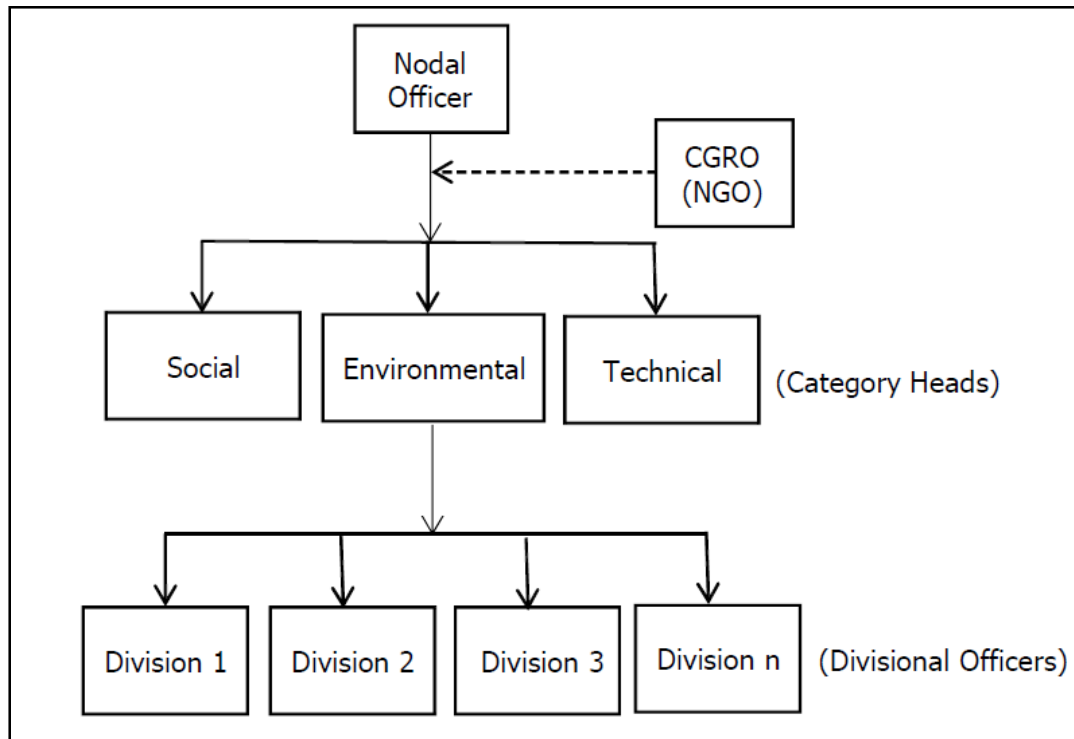
### 1.8 Grievance Redressal Mechanism

An integrated system will be established with Grievance Redressal Cells (GRCs), with necessary officers, officials and systems, at the state as well as sub project levels. Grievances if any, may be submitted through various mediums, including in person, in written form to a noted address, through a toll free phone line or through direct calls to concerned officials, and online. PWD will appoint a person to receive such calls and online messages. The person incharge based on nature of complaint, will forward the same to the concerned official. A ticket or a unique number will be generated for all such call and messages. The complainant will follow up based that unique number. All calls and messages will be responded within two weeks. In response is not received within 15 days, the complaint will be escalated to next level.

All local contact information and options for complaint submission will be available on site on local information boards. Moreover, they will be in addition to the PIO officers to be appointed under the RTI Act. A half yearly report on Grievance Redressal by the project will be prepared. The project will abide by the RTI Act of 2005; it will commit itself for proactive disclosure and sharing of information with the key stakeholders, including the communities/beneficiaries. The project will have a communication strategy focusing on efficient and effective usage of print and electronic media, bill boards, posters, wall writing, and adoption of any other method suiting local context, logistics, human and financial resources.

As part of IGRM, a Grievance Redress Cell (GRC) will be set up at the district level. The staffing of GRC will include Environment and Social Nodal Officer of PMU; E&S Officer of PIU; and two representatives from community / beneficiary / affected persons. The head of the cell will be a person of repute but not continuing in the government service. The GRC will have its own bye laws. The functions of the GRC will include: (i) to redress grievances of community / beneficiaries / project affected persons (PAPs) in all respects; (ii) rehabilitation and resettlement assistance and related activities; (iii) GRC will only deal/hear the issues related to R&R and environmental, social grievance; (iv) GRC will give its decision/verdict within 15 days after hearing the aggrieved person; (v) final verdict of the GRC will be given by the Chairman/Head of GRC in consultation with other members of the GRC and will be binding to all other members.

The Organizational chart for Grievance Redressal System is given in **Figure 1.2**.



**Figure 1.2: Organizational chart for Grievance Redressal System**

### 1.8.1 Stakeholders Roles in GRC:

GRC system should cater the following roles:

S. No.	Roles	Privileges
1.	Nodal Officer	All Privileges
2.	Central Grievance Redressal Officer (NGO)	View and Process specific privileges only
3.	Category Heads (Social, Environmental and Technical)	View and Process specific privileges only
4.	Divisional Grievance Redressal Officer	Should able to access and edit only details relevant to his jurisdiction
5.	Monitoring Officer	Should be able to access monitoring and evaluation details, no editing privileges
6.	Aggrieved person	Should be able to access only details submitted by him and its status.

### 1.9 Environmental and Social Budgeting

A budgetary Provision has been made in the project for the various environmental and social protection measures suggested in the Environmental and social management plan for different stages of the project. This include diversion of forest and compensatory plantation, R&R activities, environmental and social enhancement measures, environmental and social monitoring, environmental and social training, etc. the cost of some of the measures are part of civil cost and R&R cost.

### 1.10 List of Environmental Regulations Applicable to the Project Road

Acts/Rule/ Policy	Regulatory Authority	Objective	Applicability to this project	Responsible Agency
Environmental (Protection) Act, 1986	MOEFCC. GoI; CPCB; UP State Pollution Control Board	To protect and improve the overall environment.	Yes, all environmental legislation is covered in this Umbrella Act	Contractor
Environment Impact Assessment Notification, 2006	State Environmental Impact Assessment Authority (SEIAA)	To provide environmental clearance to new development activities following Environmental Impact Assessment	Not Applicable. Only for State Highways located in Eco-sensitive Zone and hilly terrain above 1000 m AMSL	-
Fly Ash Notification, 2009	MoEFCC	It is mandatory to use fly ash in construction project located within a radius of 300 kilometres of Thermal Power Plant	Applicable since the following Thermal Power Plants are falling within 300 Km radius 1. Panki Power House 2. Paricha Thermal Power Station 3. Unchahar Thermal Power Plant 4. Rosa Thermal Power Plant. Shahjahanpur	Contractor
Indian Forest Act, 1927  The Forest (Conservation) Act, 1980  The Forest (Conservation) Rules, 1981	Forest Department, Govt. of UP, MOEFCC, Regional Office and MOEFCC.	To check deforestation by restricting conversion of forested areas into non forested areas.	Yes, Diversion of Protected Forest is required as Roadside Plantation has been declared as Protected Forest	DPR Consultant/PIU-UPPWD

<b>Acts/Rule/ Policy</b>	<b>Regulatory Authority</b>	<b>Objective</b>	<b>Applicability to this project</b>	<b>Responsible Agency</b>
Wild Life (Protection) Act, 1972	Chief Conservator. Wildlife, Wildlife Wing, Forest Department, Gov. of U.P. and National Board For Wildlife, GoI.	To protect wildlife through certain of National Parks and Sanctuaries.	Not applicable. Only for the project either located inside the boundary of Wildlife Sanctuary or National Park/Tiger reserves. State Highways passing through Eco-sensitive zone outside the boundary of Wildlife Sanctuary/ National Parks will also need recommendation of NBWL.	-
National Forest Policy, 1952 National Forest Policy (Revised), 1988	Forest Department, GoI and Govt. of U.P.	To maintain ecological stability through preservation and restoration of biological diversity.	Yes For clearing of forest/ felling of Trees	Contractor
Water (Prevention and Control of Pollution) Act, 1974	UPPCB	To control water pollution by controlling discharge of pollutants as per the prescribed standards.	Yes. For establishment and operation of Hot Mix/ Stone crusher/ WMM/Batching Plants during construction, etc	Contractor
Air (Prevention and Control of Pollution) Act, 1981	UPPCB & Transport Department.	To control air pollution by controlling emission of air pollutants as per the prescribed standards.	Yes. For establishment and operation of Hot Mix/ Stone Crusher/ WMM/ Batching Plants during construction, etc.	Contractor
Central Motor Vehicle Act, 1988  Central Motor Vehicle Rules, 1989	Motor Vehicle Department,	To check vehicular air and noise pollution.	Yes. For construction vehicles	Contractor
Ancient Monuments and Archaeological Sites and Remains Act, 1958	Archaeological Dept. GOI, Indian Heritage Society and Indian National Trust for Art and Culture Heritage (INTACH).	Conservation of cultural and historical remains found in India.	No. Since the project not located within 300 m from such features	-

<b>Acts/Rule/ Policy</b>	<b>Regulatory Authority</b>	<b>Objective</b>	<b>Applicability to this project</b>	<b>Responsible Agency</b>
Right to fair compensation and transparency in land acquisition, rehabilitation and Resettlement Act, 2013	Revenue Department. Govt. of U.P.	Fair compensation for acquisition of immovable assets; Resettlement of displaced population due to LA and economic rehabilitation of all those who are affected due to land acquisition.	Yes. In case of acquisition of land	PIU-UPPWD
Minor Mineral and concession Rules	District Collector, Sambhal & Amroha Govt. of UP	For opening a new quarry	Construction (Prior to work initiation)	Contractor
Central Motor Vehicle Act 1988 and Central Motor Vehicle Rules 1989	State Transport Authority, Government of Uttar Pradesh	To check vehicular air & noise pollution	Construction stage	Contractor
Quarry lease deeds and license under The Mines Act, 1958, CTE/CTO from UPPCB, Environmental and Clearance (EC) from SEIAA.	Mining and Geology Department of Uttar Pradesh, State Level Environmental Impact Assessment Authority (SEIAA), UPPCB	Quarrying and borrowing operations	Construction (Prior to work initiation)	Contractor
Extraction of sand from rivers	District level Expert Committee under district collector and local Govt. Body	Extraction of Sand from rivers	Construction (Prior to work initiation)	Contractor
Building & Other construction workers (Regulation of Employment and condition of service) Act 1996	Chief Labor Commissioner, Chennai	Labor's Safety, health and welfare measure	Construction (Prior to work initiation)	Contractor

## **TREE PLANTATION STRATEGY**

The sustainable economic development depends on the rational use of environmental and social resources and minimizing, to the extent possible, adverse environmental and social impacts through improved project selection and more responsible project planning and design. Under this strategy the development must be environmentally sound in the broadest sense. In highway development, environmental and social planning is concerned with good blending of improvements of physical, social, and economic parameters. It involves not only the environmental, social (land, water, and air) but is also concerned with integration to local, regional and national socio-economic development.

Road development can have wide ranging environmental and social impacts. This is because roads extend over long distance and by promoting rapid communication they can catalyze dramatic changes in land use patterns. Soil degradation, loss of top soil and reduction of the productive capacity of the soil covered by the road, which is significantly reduced further as a result of compaction with heavy machinery during construction, is one of the most immediate effects. Landscape and aesthetic distortions due to road development leads to modifications in the regional landscape and changes in the natural relief and morphology of the, vegetation, inclusive of avenue trees and recreational areas. But these impacts can often be significantly reduced through environmentally-sound construction and operation management practices. Careful consideration and assessment of the surrounding environment in road construction and improvement will reduce disruption costs and harmful effects while increasing usage and benefits. Therefore a proper landscape plan should be made which will protect the road from soil erosion, sinking and also to maintain the aesthetic beauty. It will also reduce land, water, air and noise pollutions as well.

Aim and Objective of Tree Plantation:

- To create green belt and avenues for meeting aesthetic recreational needs to the people.
- To beautify the areas for scenic beauty.
- To reduce the surface run-off discharge and checking soil erosion along the embankments.
- To reduce the encroachment of road reserve areas.
- To reduce temperature and increase humidity.
- To reduce noise pollution to the neighboring household population.
- To reduce the impacts of air pollution and dust as trees and shrubs are known to be natural sink for air pollutants.
- To provide much needed shade on glaring hot roads during summer.
- Moderating the effect of wind and incoming radiation.
- To define the ROW especially highlight sharp horizontal curves during night.
- To promote road development as eco friendly activity.

### **Tree Plantation Strategy**

Plantation is one of the most important constituents of soft landscaping. Trees, shrubs and climbers have been used to enhance the soft natural ambience against harsh elements in most of the enhancement schemes. The planting species are decided based on the physical growth

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characteristics of trees, like form and shape, foliage pattern, growth rate, branching pattern, soil characteristics etc. While selecting the species of trees for landscaping a great care should be taken to choose the species, which already exist on the project corridor. The tree plantation will be carried out in accordance with the IRC: SP: 21:2009 guidelines and specifications.

### **Plantation Pattern**

Depending on the availability of the ROW, plantation pattern is worked out as follows:-

1. The first row along the highway to be planted with small to medium sized ornamental trees.
2. Subsequent rows depending on the availability of land will comprise of ornamental or shade bearing species of more height than those in the first row. Since the proposed Highway section is passing through the rural sections, the last row will always be of shade bearing tall trees. Five rows of trees are proposed to be planted on either side.
3. Planting of shrubs in the median.
4. Planting of herbaceous species as ground cover in the median, special landscapes on embankment slopes.
5. Turfing with grasses in the median and embankment slopes.
6. The last row to be planted with tall shade bearing trees for better road safety and for enhancing aesthetics.

## **Tree Plantation along the Highway Section**

### **1st Row**

The first row of plantation along the highway section should be worked out by ornamental species. Since the proposed highway section is passing through the rural areas, the following species are recommended for the 1st row of avenue plantation.

**Table 1.0 Species Recommended for 1st Row Plantation**

<b>S.No.</b>	<b>Botanical Name</b>	<b>Local Name</b>
1	<i>Cassia fistula</i>	Amaltas
2	<i>Terminalia arjuna</i>	Arjun
3	<i>Delonix regia</i>	Gulmohar
4	<i>Bauhinia sps</i>	Kachnar
5	<i>Cassia nodosa</i>	Cassia

### **2nd Row**

The 2nd row of plantation along the Project stretch should be worked out by ornamental species of more height i.e. medium height trees, than the first row. The following species are recommended:

**Table 2.0: Species recommended for subsequent row plantation**

<b>S.No.</b>	<b>Botanical Name</b>	<b>Local Name</b>
1	<i>Melia azadiracta</i>	Bakain
2	<i>Pongamia pinnata</i>	Kanji
3	<i>Gravillea robusta</i>	Silver Oak
4	<i>Albizzia lebbek</i>	Kala siris
5	<i>Dalbergia sissoo</i>	Shisham



### Subsequent Rows

The subsequent rows of plantation along the Highway section have been worked out. The tall shade trees like Peepal, Neem, Mango, Shisham etc have high crown and secure better visibility. They have a long gestation period and has rapid growth and capacity to resist disease and pests attack are therefore ideal. These shaded trees should be planted at a spacing of 12m C/C.

The tree species recommended as shade plants for roadside avenues are given the following table:-

**Table 3.0: Species recommended for Subsequent rows**

S.No.	Botanical Name	Local Name
1	<i>Ficus religiosa</i>	Peepal
2	<i>Ficus infectoria</i>	Paker
3	<i>Madhuca indica</i>	Mahua
4	<i>Dalbergia Sissoo</i>	Shisham
5	<i>Azadirachta indica</i>	Neem
6	<i>Mangifera indica</i>	Mango
7	<i>Tamarindus indica</i>	Imli
8	<i>Syzynium cuminij</i>	Jamun

### Shrub plantation for Median

The species to be planted in median would be of low or medium height with ornamental value to enhance the visual experience of the road corridor. It will also act as a screen to prevent glare from the incoming vehicles. Depending on the width of the median, which is 6.0 m, two rows of flowering shrubs will be provided. Some herbaceous species may also be planted as a ground cover on the median.

**Table 4.0: Species recommended for Median**

S.No.	Botanical Name	Local Name
1	<i>Thaventia nerifolia</i>	Kaner
2	<i>Bouganvillea sps.</i>	Bouganvillea
3	<i>Ipomia</i>	

### Plantation along the Embankments

On the embankment slopes, some herbaceous species followed by grasses turf will be provided. The species proposed for the purpose of turfing are Cynodon dactylon, Cythocline perpurea, Solanum Nigrum, Alternanthera, Chlorophytum, Eupatorium, Wedelia, Duranta, Portulacca, Ipomea, Pelia Cadrii, Asparagus, Opheopogon grass etc.

Technical specifications for planting along the Highway section are as follows:

#### **1. Ornamental plants except last row**

- Distance from embankment : 1.0m away from the toe of the embankment
- Spacing between plant to plant : 3m
- Spacing between rows : 3m
- Size of the pits : 60x60x60 cms
- For alkaline soils : By auger

- Water logged areas : mounds with height varying depending on the water level
- Species recommended : Listed in **Table 1.0** and **Table 2.0**.
- No of plants per Km : 333
- Height of plant : 1.5 to 2m

## **2. Shaded plants (Last row)**

- Distance from the preceding row : 3.0m
- Spacing between plant to plant : 12m
- Size of the pits
- Normal size : 60x60x60 cms
- For alkaline soils : By auger
- Water logged areas : mounds
- Species recommended : Listed in **Table 3.0**
- No of plants per Km : 84
- Height of plant : more than 2m

In localities where a really bad patch of USAR occurs recommendations are to be strictly followed for better survival of plants. Deep pits to be dug and soil amender Gypsum 1 Kg to 3 kg with 2 kg compost and sand are to be filled before planting the plants.

For multiple row plantations, five strand barbed wire fencing, with cross strands, stretched on angle iron poles fixed at a distance of 4 meters from one another are to be provided as per recommendations. Live fencing/ bamboo fencing/ thorn fencing may also be used where protection can be ensured through these.

## **3. Shrubs (For Median/ Embankment)**

The surface is to be prepared adequately for shrubs planting or grass sowing. The grasses and shrub planting is done to provide a strong surface cover but needs a well-prepared surface. All masses of loose debris will be removed.

- Size of the pits for planting shrubs : 45x45x45 cms
- Species recommended : Listed in **Table 4.0**
- No of plants per Km : 666 (For two rows in the median)
- Use of compost and manure : 1/3 of volume of pit mixed with soil and refilled

The contractor will be required to water the area in case of insufficient rains after planting.

## **Plantation at Road Junctions/ Intersection and Traffic Islands**

Road intersections are main nodal spaces and are of vital importance in terms of road aesthetics. Proper landscaping of the traffic islands and the surrounding areas shall integrate these features with surrounding landscape. The layout of traffic intersections shall be fixed by the traffic needs of the junction.

## **Plantation at the Sensitive noise receptors**

All along the project corridor were sensitive receptors for noise such as educational institutions, hospitals, religious structure of community importance situated, the trees known for behaving as "noise barrier" will be proposed like- Neem (*Azadirachta indica*), Shisham (*Dalbergia sisso*), Imli (*Tamarindus indica*). Some flowering trees like Amaltas, Gulmohar, Kachnar, Asoka etc. can also be done. Tall trees with thick canopies create a wind screen through which the air can be filtered and noise levels be considerably reduced. Some such trees are *Acacia auriculiformis* and *Greavillea Robusta*. At the sensitive noise receptors, tall shrubs of 1.5 – 3 m height like *Cassia biflora*, *Hamelia Patens* etc. can also be provided for maximum possible screening.

## **PLANT SITE MANAGEMENT**

For the construction purpose the major construction plants such as Hot mix plant, Stone Crusher Plants, batchmixplants, etc. will be required to be established. In case the Contractor establishes their own plan they have to follow all the applicable statutory norms. The objective of this plan is

- To ensure that statutory / regulatory requirements are complied with
- To ensure that safeguard measures are taken to avoid / mitigate / minimize environmental and social impacts.

The present section provides general guidelines for siting of plants and environmental and social safeguard measures based on the statutory requirements:

### **1. Site selection criteria for Hot Mix Plant/ Stone crusher Plant:**

- 1.0 km away from settlement, school, hospital towards downwind directions
- 1.0 km from any archaeological site
- 1.0 km from ecologically sensitive areas i.e. forest, national park, sanctuary etc.
- 1.0 rivers, streams and lakes
- 500 m from ponds
- 500 m from National Highway, 250 m from State Highway, 100 m from District roads and other roads (The distance are to be measured from edge of Road to boundary of site).
- Preference to barren land

### **2. Statutory Requirements:**

- Obtaining NOC [Consent-to-Establish(CtE)and Consent to Operate(CtO)] under Air and Water Acts from the Uttar Pradesh Pollution Control Board (UPPCB) before start of installation.
- Complying with the terms and conditions laid down in the CtE and CtO, which generally include providing Dust containment cum suppression system for the equipment, Construction of wind breaking walls along periphery of plant sites, construction of the metalled roads within the premises, regular cleaning and wetting of the ground plantation, periodic (monthly) pollution monitoring i.e. ambient air, noise and stack emission
- The suspended particulate matter contribution value at a distance of 40 m from a controlled isolated as well as from a unit located in a cluster should be less than  $600\mu\text{g}/\text{m}^3$  or as shall be stipulated by UPPCB.
- Obtain certificates from manufacturer for Type Approval and Conformity of Production for Diesel Generator (DG) set/s.For DG sets of capacity up to 1000 KVA, the noise level at 1m from the enclosure surface shall not exceed 75 dB (A)

### **3. Pollution control measures**

- For HMP, ensure adequate stack height as stipulated in CtE, install emission control devices such as baghouse filters, cyclone separators, water scrubbers etc., as attached with the plant by the manufacturer or stipulated in CtE.
-

- Prefer bulk bitumen storage with mechanized handling facilities that storage in drums with manual operation at HMP to prevent / minimize bitumen spillage and thereby contaminating soil and water.
- Impervious platform for storage of bituminous and other liquid hazardous chemical
- Bag house filter / multi-cone cyclone for emission control. For bag house, cartridge filters reported to be more efficient than fabric filters.
- The stone crusher plants should be installed with operational water sprinklers over jaw crusher, conveyor belts and vibratory screens.
- Pollution control measures for Diesel Generator (DG) set i.e. stack height, acoustic enclosure etc.
- Periodical maintenance of all the plant and equipments to keep the plants in order.
- Damaged bag-house and filters should be immediately replaced.
- All the workers shall use all the time helmets, footwear, earplugs, nasal masks etc. when the plants are operational. During maintenance of plants also the workers involved in maintenance will not enter the plant premises without PPE.
- No workers should be allowed to work in loose clothes near conveyor belts.
- Proper lighting arrangement shall be made around plant site if the plants are operated during dark hours.
- Provision of readily available first aid kit, fire fighting equipments at the plant site at appropriate location to respond in case of accident.
- Periodical monitoring of air quality and noise levels as per conditions stipulated under the statutory clearance from UPPCB. Whenever the emission exceeds the permissible level the plants should be stopped and necessary repairing works of faults will be done to bring down the emission levels.
- The office complex, residential units shall be constructed on upwind direction from the plant site.

**GUIDELINES FOR REDEVELOPMENT OF BORROW AREAS**

**BACKGROUND**

The guidelines provide basic information to the contractor on how to redevelop the borrow areas to ensure compliance with the environmental and social requirements of MoEFCC, MORTH and as specified in IRC: 10-1961. The following section provides the guidelines to the contractor for the identification, siting of borrow areas and also the enhancement measures to redevelop the areas with community participation.

**IDENTIFICATION OF THE BORROW AREAS**

Specific locations of borrow areas will be identified by contractor. The selection and recommendations of borrow areas; will be based on environmental and social as well as civil engineering considerations. Location of source of supply of material for embankment or sub-grade and the procedure for excavation or transport of material shall be in compliance with the environmental and social requirements of MoEFCC, MoRTH and as specified in IRC:SP10-1961.

Certain precautions have to be taken to restrict unauthorized borrowing by the contractor. No borrow area shall be opened without permission of the Engineer. The borrowing shall not be carried out in cultivable lands, unless and until, it shall be agreed upon by the engineer that there is no suitable uncultivable land in the vicinity for borrowing or private landowners are willing to allow borrowing on their fields.

**Borrow Area Identification:**

- Identify areas having present land use as barren land, riverside land.
- Prefer areas of highland with respect to surroundings;
- Avoid locating borrow area close to any road (maintain at least 30m distance from ROW and 10 m from toe of embankment, whichever is higher);
- Should be at least 1.0 km away from inhabited areas;
- Minimum distance of about 1.0 km from ecologically sensitive areas i.e. Reserve Forest, Protected Forest, Sanctuary, wetland etc.;
- Minimum distance of about 1.0 km from school, hospital and any archaeological sites;
- Having adequate approach road with minimum length of earthen road;
- Ensure that unsuitable soft rock is not prominent within the proposed depth of excavation which will render rehabilitation difficult;
- Controlled operation as per agreed / approved plan
- Prior approval of Rehabilitation Plan considering terrain, land use and local need;
- Restricting operation as agreed by landowner and approved by the

**Statutory Clearance for Borrow Area**

Regarding the borrow area for ordinary soil, the Contractor has to obtain environmental and social clearance from State Environmental and Social Impact Assessment Authority (SEIAA) of MoEFCC in compliance to the Supreme Court's order and MoEF conditions vide their circular no. L-11011/47/2011-IA.II(M) dated 20<sup>th</sup> June, 2013. If the area of a borrow area is less than 5 Ha then this will be treated as Category-B-2 Project and will be appraised and approved based on only Form-1. No EIA study will be required for such area. However if the size of the borrow area is more than 5



Ha then it will be categorized as "Category-B1" and therefore will require EIA study, based on which the SEIAA will give clearance for the same.

## **OPERATION**

No borrow area will be operational without written consent of the land owner. To avoid any embankment slippage, the borrow areas will not be dug continuously, and the size and shape of borrow pits will be decided by the engineer. The contractor shall evolve site-specific redevelopment plans for each borrows area location, which shall be implemented after the approval of the Supervision /Independent Consultant.

Precautionary measures as the covering of vehicles will be taken to avoid spillage during transport of borrow materials. To ensure that the spills, which might result from the transport of borrow and quarry materials do not impact the settlements, it will be ensured that the excavation and carrying of earth will be done during day time only. The unpaved surfaces used for the haulage of borrow materials will be maintained properly. A general guidelines will be followed in the line of MoEF conditions as follows:

- The borrowing/excavation activity shall be restricted to a maximum depth of 2 m below general ground level at the site.
- The borrowing/excavation activity shall be restricted to 2 m above the groundwater table at the site.
- The borrowing/excavation activity shall not alter the natural drainage pattern of the area.
- Appropriate fencing will be provided all around the borrowed/excavated pit made to prevent any mishap.
- Measures shall be taken to prevent dust emission by covering of borrowed/excavated earth during transportation.
- Safeguards shall be adopted against health risks on account of breeding of vectors in the water bodies created due to borrowing/excavation of earth.
- Workers / labourers shall be provided with PPE. The use of PPE at all time during works will be ensured.
- A berm shall be left from the boundary of adjoining field having a width equal to at least half the depth of proposed excavation.
- A minimum distance of 15 m from any civil structure shall be kept from the periphery of any excavation area.

Borrowing of earth shall be carried out at locations recommended as follows:

**Non- Cultivable Lands:** Borrowing of earth will be carried out up to a depth of 2.0 m from the existing ground level. Borrowing of earth shall not be done continuously. Ridges of not less than 8 m width shall be left at intervals not exceeding 300m. Small drains shall be cut through the ridges, if necessary, to facilitate drainage. Borrow pits shall have slopes not steeper than 1 vertical in 4 horizontal.

**Productive Lands:** Borrowing of earth shall be avoided on productive lands. However, in the event of borrowing from productive lands, under circumstances as described above, top soil shall be preserved in stockpiles. At such locations, the depth of borrow pits shall not exceed 45 cm and it may be dug out to a depth of not more than 30 cm after stripping the 15 cm top soil aside.

**Elevated Lands:** At locations where private owners desire their fields to be leveled, the borrowing shall be done to a depth of not more than 2m or upto the level of surrounding fields.

**Borrow pits along Roadside:** Borrow pits shall be located 5 m away from the toe of the embankment. Depth of the pit should be such that the bottom of the pit shall not fall within an

imaginary line of slope 1 vertical to 4 horizontal projected from the edge of the final section of the bank. Borrow pits should not be dug continuously. Ridges of not less than 8 m width should be left at intervals not exceeding 300m. Small drains should be cut through the ridges to facilitate drainage.

**Borrow pits on the riverside:** The borrow pit should be located not less than 15m from the toe of the bank, distance depending on the magnitude and duration of flood to be withstood.

**Community/ Private Ponds:** Borrowing will be carried out at locations, where the private owners (or in some cases, the community) desire to develop lands (mostly low-lying areas) for pisciculture purposes and for use as fishponds.

**Borrow Area near Settlements:** Borrow pit location shall be located at least 0.8km from village and settlements. If unavoidable, they should not be dug for more than 30 cm and should be drained.

#### **BORROW AREA REDEVELOPMENT:**

Each borrow area should be rehabilitated immediately after completion of extraction of materials to the satisfactions of the land owner and the Engineer. The borrow area shall be redeveloped appropriately as per approved plan and landowner's requirement. The borrow pits may be developed into pond after leveling the bottom and slope maintenance. The borrow pits may be refilled with earth materials covered with fertile to soil. The upland used as borrow area shall be leveled matching with the level of surrounding area. No scare created due to borrowing of earth should be left unattended. The Contractor should provide completion certificate of redevelopment of each borrow pit issued by the land owner.



**QUARRY AREA MANAGEMENT PLAN**

Quarries generally required to provide material for road construction sites, can have significant adverse environmental and social effects, especially on ecologically sensitive areas. Quarries can become environmental and social hotspots and can significantly affect the visual appearance of an area. Special mitigation and management measures are often required to avoid or minimise the environmental and social impacts of due to quarry operations. The ESMP stipulations will be applicable for new quarries to be identified and operated by Contractors. In case contractor use the existing licensed quarry a copy of the valid quarry license and lease / sub-lease agreement should be submitted to the Project Proponent. Contractor shall submit a plan delineating how he shall comply with requirements stipulated in this plan and elsewhere in the ESMP on quarrying activity.

**The guidelines for quarries cover:**

- Statutory approvals
- Environmental and social impacts of quarries
- Selection of quarries
- Operation of quarries
- Rehabilitation of quarries

**The guidelines seek to ensure that Contractors:**

- Comply with the regulatory requirements in force at the time
- Reasonably manage any impacts
- Reinstate and rehabilitate the land appropriately
- Consult with affected communities

**Impacts**

Some of the potential impacts of quarries are:

- Rock blasting causing air pollution, and noise and vibrations
- Trucks transporting materials to the site causing air pollution, and noise and vibrations
- Ponds of stagnant water forming in excavated areas giving rise to the breeding of
- Mosquitoes and the spreading of malaria and other mosquito-borne diseases
- Aesthetics of the landscape being affected by excavations and the removal of vegetation
- natural drainage systems in the area being affected by excavations

The procedure for identification and finalization of quarry site/s shall be as given below:

The quarry area identified during Feasibility study are mainly operational government stone quarry. For using these quarry areas, the Contractor have to obtain necessary statutory permission from the concerned department including Environmental and Social Clearance from respective MoEFCC body. However, selection of new quarry following guidelines should be followed:

- Only licensed quarry will be used.
- New quarry will be at least 1.5km away from the settlement, forest and other ecologically sensitive areas
- Minimum 500m away from water bodies
- The Contractor shall identify alternative quarry sites along the whole corridor based on required quantity and environmental consideration and obtained approval from the Engineer(PMC) / UPPWD



- The Contractor obtain Quarry Lease Deed / License from the Department of Mines and Geology and provide copy of the same to the PIU-UPPWD prior to start of the material extraction.
- The Contractor shall estimate water requirement for dust suppression at quarry sites during operation and for water spraying on *kutchra* (non-metal) haul road and ensure availability water by identifying sources and obtaining necessary permission;
- The Contractor shall prepare quarry sites operation and redevelopment plan considering surrounding land uses, local needs and agreement with the landowner;
- Only licensed blaster i.e. short-firer certificate holder will be responsible for quarry Blasting
- Permits for transportation, storage and use of explosive, as will be required, shall be obtained from the Controller of Explosive;
- Whenever so advised by the R&B Engineer, controlled blasting e.g. using less charge, restricting depth and dia or drill holes, cut-off blasting etc., and shall be undertaken.
- Quarry operation will be undertaken in stages with adequate benching

### **Quarry Operation:**

The procedure for environmentally sound operation and management of quarry sites is given below:

- Estimating the quantity of quarry material to be collected from each quarry area;
- Demarcating the entire quarry area by fencing and putting red-flag poles;
- Providing adequate metallic access road;
- Preserving topsoil from the quarry compound, if any, by stripping and stacking aside separately at corners;
- Overburden shall be removed and disposed in environmentally sound manner.
- All workers safety measures such as helmets, footwear, earplugs, facemasks etc. shall be undertaken.
- The contractor shall ensure maintenance of crushers regularly as per manufacture schedule.
- Water sprinkling shall be done to minimize dust generated due to crushing/Vehicle movement.
- Carrying out blasting as per agreed operational plan complying with the requirements of MoRTH Specification (Clause 302 & 303) and Ministry of Environment & Forests (MoEF)
- Maintaining a Quarry Material Collection Register on daily material collection for each of the quarry area, which shall be produced to Engineer's representative as and when requested;
- Redeveloping the area within 2 months (or as will be agreed upon) of completion of quarry material collection;

### **Redevelopment of Quarry Area:**

All the quarries are should be rehabilitated as per approved rehabilitation plan immediately after completion of quarry material extraction. The restoration of Quarry will be done as per the conditions of the owner before handing over the site back to the owner.

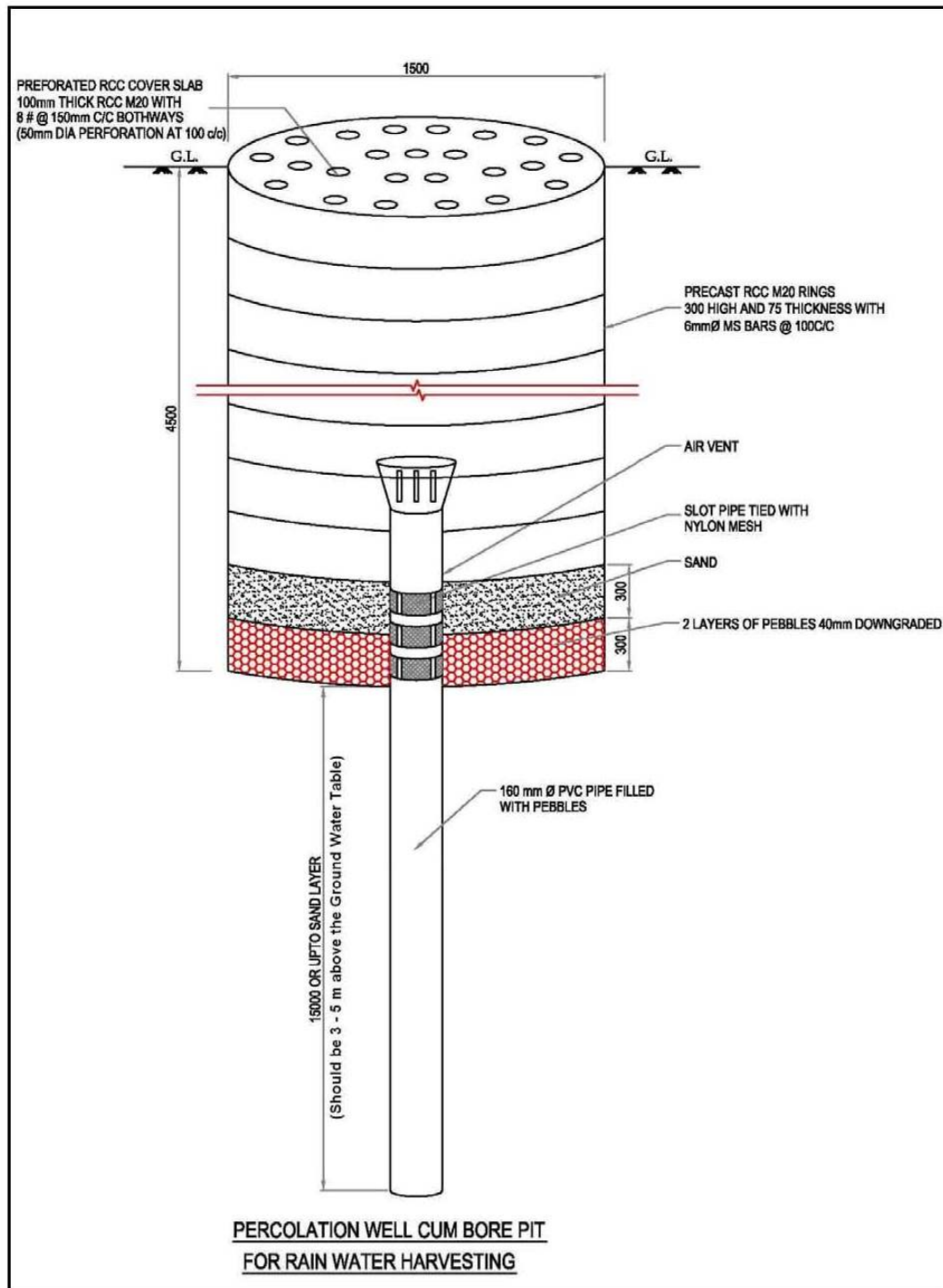
Following rehabilitation works may be taken up with the consent of owner:

**Option A:** Revegetating the quarry to merge with surrounding landscape. This is done by conserving and reapplying the topsoil for the vegetative growth.

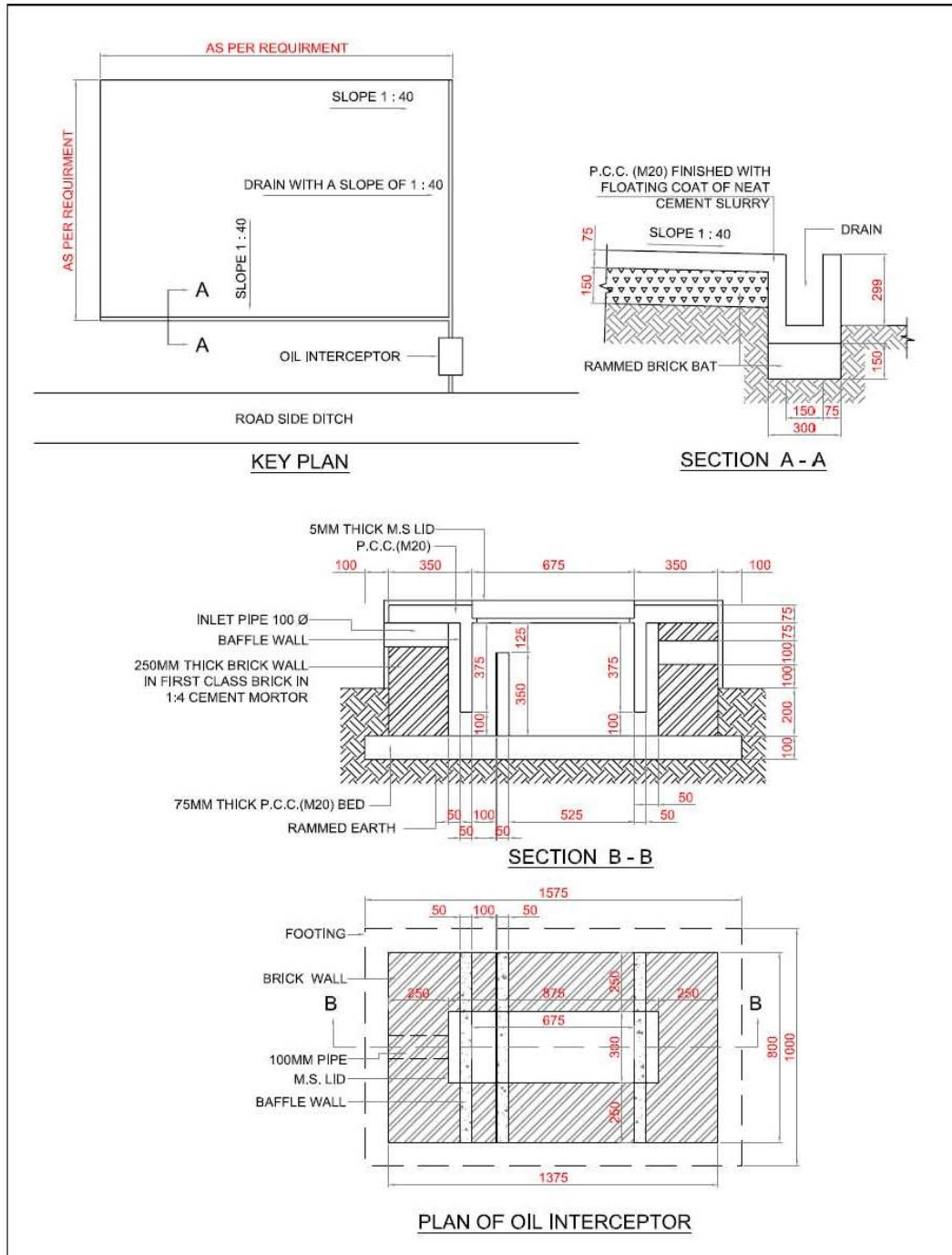
**Option B:** Development exhausted quarries as water bodies: The pit shall be reshaped and developed into pond, for harvesting rainwater. This option shall only be considered where the location of quarry is at the lowest point, i.e. surrounding area/natural drainage slopes towards it.



**SCHEMATIC PLAN OF RAIN WATER HARVESTING PIT**



**SCHEMATIC PLAN OF OIL INTERCEPTOR FOR REMOVAL OF OIL & GREASE FROM SURFACE RUNOFF WATER**



## ANNEXURE 1.7

### NATIONAL AMBIENT AIR QUALITY STANDARDS

S. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		Method of Measurement
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	
(1)	Sulphur Dioxide (SO <sub>2</sub> ) µg/m <sup>3</sup>	Annual*	50	20	Improved West and Geake Method Ultraviolet Fluorescence
		24 hours**	80	80	
(2)	Oxides of Nitrogen (NO <sub>x</sub> ) µg/m <sup>3</sup>	Annual*	40	30	Jacob & Hochheiser Modified (Na-Arsenite) Method Chemiluminescence
		24 hours**	80	80	Gas Phase Chemiluminescence
(3)	Particulate Matter (Size less than 10 µm) or PM <sub>10</sub> µg/m <sup>3</sup>	Annual*	60	60	Gravimetric TOEM Beta attenuation
		24 hours**	100	100	
(4)	Particulate Matter (Size less than 2.5 µm) or PM <sub>2.5</sub> µg/m <sup>3</sup>	Annual*	40	40	Gravimetric TOEM Beta attenuation
		24 hours**	60	60	
(5)	Ozone (O <sub>3</sub> ) µg/m <sup>3</sup>	8 hours**	100	100	UV Photometric Chemiluminescence Chemical Method
		1 hour**	180	180	
(6)	Lead (Pb) µg/m <sup>3</sup>	Annual*	0.5	0.5	ASS/ ICP Method after sampling on EPM 2000 or equivalent Filter paper ED – XRF using Teflon filter
		24 hours**	1.0	1.0	
(7)	Carbon Monoxide (CO) mg/m <sup>3</sup>	8 hours**	02	02	Non Dispersive Infra Red (NDIR) Spectroscopy
		1 hour**	04	04	
(8)	Ammonia (NH <sub>3</sub> ) µg/m <sup>3</sup>	Annual*	100	100	Chemiluminescence Indophenol blue method
		24 hours**	400	400	
(9)	Benzene (C <sub>6</sub> H <sub>6</sub> ) µg/m <sup>3</sup>	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 <sup>3</sup>	Annual*	01	01	Solvent extraction followed by HPLC/GC analysis
(11)	Arsenic (As) ng/m <sup>3</sup>	Annual*	06	06	AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
(12)	Nickel (Ni) ng/m <sup>3</sup>	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 interval.

\*\*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.

**Source:** *National Ambient Air Quality Standards, Central Pollution Control Board Notification No. 29016/20/90/PCI-I dated 18 November, 2009*



## ANNEXURE 1.8

### NATIONAL AMBIENT NOISE MONITORING STANDARDS

Area/Class	Noise Level (Leq dB (A))*	
	Day Time	Night Time
Industrial	75	70
Commercial/Mixed	65	55
Residential/Rural	55	45
Sensitive	50	40

**Note-:**

1. Day time shall mean from 6 a.m. to 10 p.m.
2. Night time shall mean from 10 p.m. to 6 a.m.
3. Silence Zone is an area comprising not less than 100 meters around hospitals, education institutions, courts, religious places or any other area, which is declared as such by Competent Authority.
4. Mixed categories of areas may be declared as one of the four above-mentioned categories by the Competent Authority.

\*dB(A) Leq denotes the time weighted average of the level of decibels on scale A which is related to Human Beings

A "decibel" is the unit in which noise is measured

"A" in dB(A) Leq, denotes the frequency weighted in the measurement of the noise corresponds to frequency response characteristics of the human ear.

Leq: It is an energy means of the noise level over a specified period.



**ANNEXURE 1.9****WATER QUALITY STANDARD AS PER BIS (IS: 10500:1991)**

S. No.	Parameters	Desirable Limit	Max. Permissible Limits in the absence of alternate source
<b>Essential Characteristics:</b>			
1.	Colour	5	25
2.	Odour	Unobjectionable	Unobjectionable
3.	Taste	Agreeable	Agreeable
4.	Turbidity, NTU	5	10
5.	pH Value	6.5 to 8.5	No relaxation
6.	Total Hardness (as CaCO <sub>3</sub> ), mg/l	300	600
7.	Iron as Fe, mg/l	0.3	1.0
8.	Chloride as Cl, mg/l	250	1000
9.	Residual free Chlorine, mg/l	0.2	-
<b>Desirable Characteristics</b>			
10.	Dissolved Solids, mg/l	500	2000
11.	Calcium as Ca, mg/l	75	200
12.	Copper as Cu, mg/l	0.05	1.5
13.	Manganese as Mn, mg/l	0.10	0.3
14.	Sulphate as SO <sub>4</sub> , mg/l	200	400
15.	Nitrate as NO <sub>3</sub> , mg/l	45	100
16.	Fluoride as F, mg/l	1.0	1.5
17.	Phenolic Compounds as C <sub>6</sub> H <sub>5</sub> OH, mg/l	0.001	0.002
18.	Mercury as Hg, mg/l	0.001	No relaxation
19.	Cadmium as Cd, mg/l	0.01	No relaxation
20.	Selenium as Se, mg/l	0.01	No relaxation
21.	Arsenic as As, mg/l	0.05	No relaxation
22.	Cyanide as CN, mg/l	0.05	No relaxation
23.	Lead as Pb, mg/l	0.05	No relaxation
24.	Zinc as Zn, mg/l	5.0	15.0
25.	Anionic detergent as MBAS, mg/l	0.2	1.0
26.	Chromium as Cr <sup>6+</sup> , mg/l	0.05	No relaxation
27.	Polynuclear aromatic hydro carbon as PAH, g/l	-	-
28.	Mineral Oil, mg/l	0.01	0.03
29.	Pesticide, mg/l	Absent	0.001
30.	Radioactive materials: Alpha Emitters, Bq/l Beta Emitters, Bq/l	- -	0.1 1.0
31.	Alkalinity, mg/l	200	600
32.	Aluminum as Al, mg/l	0.03	0.2
33.	Boron, mg/l	1.0	5.0

## ANNEXURE 1.10

### USE BASED CLASSIFICATION OF SURFACE WATERS IN INDIA

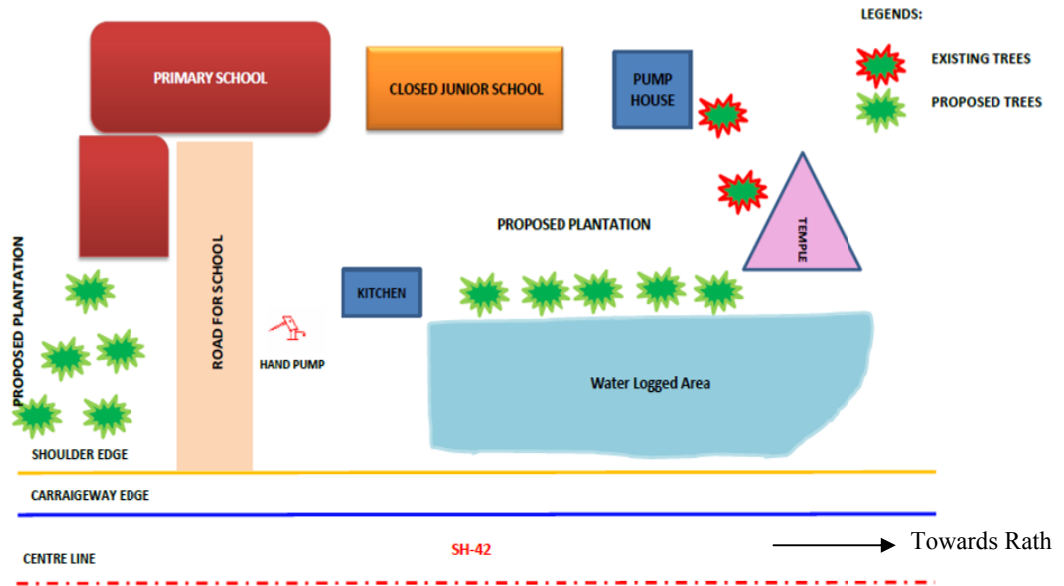
Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfections	A	<ul style="list-style-type: none"><li>i. Total Coliforms Organism MPN/100ml shall be 50 or less</li><li>ii. pH between 6.5 and 8.5</li><li>iii. Dissolved Oxygen 6mg/l or more</li><li>iv. Biochemical Oxygen Demand 5 days 20°C 2mg/l or less</li></ul>
Outdoor bathing (Organized)	B	<ul style="list-style-type: none"><li>i. Total Coliforms Organism MPN/100ml shall be 500 or less</li><li>ii. pH between 6.5 and 8.5</li><li>iii. Dissolved Oxygen 5mg/l or more</li><li>iv. Biochemical Oxygen Demand 5 days 20°C 3mg/l or less</li></ul>
Drinking water source after conventional treatment and disinfections	C	<ul style="list-style-type: none"><li>i. Total Coliforms Organism MPN/100ml shall be 5000 or less</li><li>ii. pH between 6 to 9</li><li>iii. Dissolved Oxygen 4mg/l or more</li><li>iv. Biochemical Oxygen Demand 5 days 20°C 3mg/l or less</li></ul>
Propagation of Wild life and Fisheries	D	<ul style="list-style-type: none"><li>i. pH between 6.5 to 8.5</li><li>ii. Dissolved Oxygen 4mg/l or more</li><li>iii. Free Ammonia (as N) 1.2 mg/l or less</li></ul>
Irrigation, Industrial Cooling, Controlled Waste disposal	E	<ul style="list-style-type: none"><li>i. pH between 6.0 to 8.5</li><li>ii. Electrical Conductivity at 25°C micro mhos/cm Max.2250</li><li>iii. Sodium absorption Ratio Max. 26</li><li>iv. Boron Max. 2mg/l</li></ul>

**Source:** Guidelines for Water Quality Management – CPCB 2008.



**PROPOSED ENVIRONMENTAL ENHANCEMENT MEASURES**

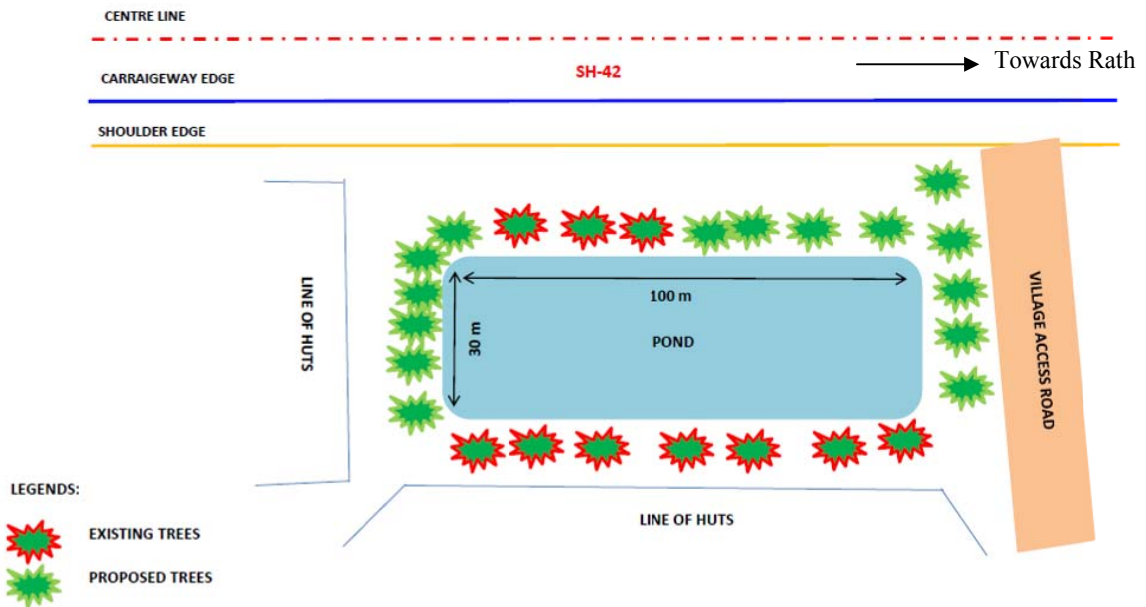
**1. Primary School at Kalauli Teer Village at Km 5.300**



**Proposed Enhancement at Km 5.300 (LHS)**

S. No	Description	Unit	Quantity
1	Trees Plantation with maintenance of 1 year	No.	10
2	Tree Guard for tree protection	No.	10

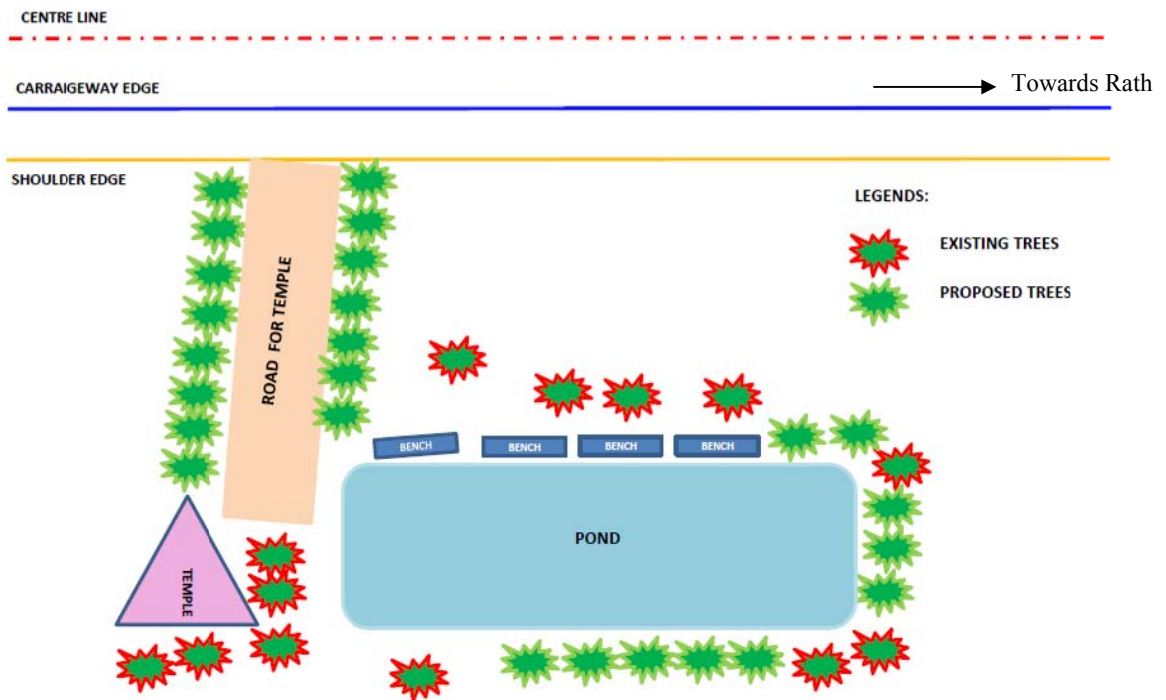
## 2. Pond Enhancement at Km 5.800



### Proposed Enhancement Pondat Km 5.800

S. No	Description	Unit	Quantity
1	Trees Plantation with maintenance of 1 year	No.	15
2	Tree Guard for tree protection	No.	15

### 3. Pond Enhancement at Km 7.700 (RHS)



#### Proposed Enhancement at Km 7.700

S. No	Description	Unit	Quantity
1	Trees Plantation with maintenance of 1 year	No.	25
2	Tree Guard for tree protection	No.	25