**SCHEDULE-W**

**ENVIRONMENTAL MANAGEMENT PLAN**

1. ENVIRONMENTAL MANAGEMENT PLAN

A. Introduction

Environmental Management Plan (EMP) is the key to ensure as a safe; neat; green and clean environment. The desired results from the environmental mitigation measures proposed in the project may not be obtained without a management plan to assure its proper implementation and function. The EMP envisages the plans for the proper implementation of management measures to reduce the adverse impacts arising out of the project activities.

1. Stage Wise Environmental Management Measures (SWEMM)

The EMP includes a list of all project-related activities at different stages of project (design and pre -construction stage, construction stage and operation and maintenance stage), remedial measures, reference to laws/ guidelines, monitoring indicators and performance target and a clear reporting schedule. The EMP sets a time frame to all proposed mitigation and monitoring actions with specific responsibility assigned to the proponents, the contractors and the regulatory agencies to implement the project and follow-up actions defined. Stage wise management measures are tabulated in the Tables as given below:

**This EMP and EMoP are Applicable to one Sub-Project Road:** (**Siddiqiganj-Hatpipalya Road**) **EXISTING MDR** as shown in the below Tables:

Table Stage Wise Environmental Management Plan (EMP)

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Environmental Issues/ Components** | **Remedial Measure Statements** | **Reference to Laws/ Guidelines** | **Locations/ Areas** | **Monitoring Indicators** | **Monitoring Methods** | **Mitigation Coast** | **Institutional Responsibility and Requirement** | |
| **Implementation** | **Supervision** |
|  | | | | | | | | |
| 1. **Pre-Construction and Design Stage** | | | | | | | | |
| **1. Alignment** | | | | | | | | |
| **1.1: Pavement Damage and Inadequate Drainage Provisions in Habitat Areas.** | * Construction of concrete pavement in habitat areas considering alignment level and drainage. * Raise road level above the nearby areas with provision of adequate side drains to evacuate the rain water and domestic discharges (drained by habitats occasionally) to prevent damage to road and rain water entry to habitats’ houses. * Provision of adequate number of cross drainage structures based on drainage pattern around the alignment. | Design Requirement. | All habitat areas throughout the alignment. | Design of both cross and side drains no. 31 of slab/box culverts, Hume pipes. | Review of detail design documents and drawings. | Included in construction cost. | Design Consultant. | MPRDC/ ADB/ CSC |
| **1.2: Loss of Tree and Vegetation.** | * Restricting tree cutting within construction limit. * Avoid tree cutting at ancillary site. * Martian compensatory tree plantation of **00** trees @ 1: 10. | Design Requirement. | Throughout the alignment. | **00** No. of tree will be cut. | Observation | Included in construction cost | Design Consultant. | ADB/ (CSC) |
| **1.3: Protection of Sensitive Receptors.** | * Careful selection of alignment to the sensitive receptor. * Timely schedule ling of construction activity * Provision of noise suitable barriers. | Project Requirement. | Location of sensitive receptors (Refer Table). | Design and alignment plan | Review of design | Included in construction cost | Contractor. | MPRDC/ ADB/ CSC |
| **1.4: Safety along the Proposed Alignment.** | * Make provisions of crash barriers at accident prone areas as identified in the road safety studies. * Provision of rumble strips in habitat areas to regulate speed. * Provision of retro-reflective warning sign boards nears school, hospital, and religious places and forests areas. * Provision of proper sidewalks/pedestrian zone along the road near habitat areas, school, hospital, religious places and forests. * Compliance with norms specified in IRC codes for state highway for curvature and grading. * Provision of safety curve at all bridges. * The design should attempt to equalize cut and fill. * Minimize the cutting in hill areas. Incorporate slope stabilization measures to prevent any land slide situation. * Incorporate slope stabilization measures to prevent any land slide situation. | Design Requirement. | Places where height of embankment is more than 3.0 m. | No. of accident and vehicle collision. | Field observation, interview of locals. | Included in construction cost. | Design Consultant. | ADB/ (CSC) |
| **2. Natural Hazards** | | | | | | | | |
| **2.1: Protection for Damage from Earthquake.** | * Design considering relevant seismic standard in the clause under IRC 6-2014 for earthquakes in bridges. |  | Throughout the stretch. | Incorporation of IRC 6-2014 guidelines for earthquake in bridge design. | Review of bridge design. | Project preparation cost. | Design Consultant. | MPRDC/ ADB/ CSC |
| **2.2: Protection of Road Embankment in Flood Prone Areas.** | * Raise embankment height above the HFL levels in the flood prone areas. * Provision of adequate balancing culverts. * Improvement in existing culverts/ bridges to increase their carrying capacity. | IRC: 34 Recommendations for road construction in waterlogged area and IRC: 75 and MORT and H guidelines for Design of High Embankments (DHE). | All the existing culverts/ bridges. | Design of both cross and side drains, no. of slab/box culverts, no. and size of Hume pipes. | ------- | Included in construction cost. | Design Consultant. | ADB |
| **3. Shifting of Utility Structures** | | | | | | | | |
| **3.1: Disruption of Utility Services to Local Community.** | * All telephone and electrical poles/ wires and underground cables should be shifted before start of construction. * Necessary permission and payments should be made to relevant utility service agencies to allow quick shifting and restoration of utility services. * Local people must be informed through appropriate means about the time of shifting of utility structures and potential disruption of services if any. | Project Requirement. | Throughout the corridor. | Utility shifting plan.  Complaints from local people.  Status of local utility services. | Interaction with concerned utility authorities and local public. | Included in construction cost. | Contractor. | ADB/ CSC |
| 1. **Construction Stage** | | | | | | | | |
| **1. Air Quality** | | | | | | | | |
| **1.1: Dust Generation due to Construction Activities and Transport, Storage and Handling of Construction Materials.** | * Transport, loading and unloading of loose and fine materials through covered vehicles. * Paved approach roads. * Storage areas to be located downwind of the habitation area. * Water spraying on earthworks, unpaved haulage roads and other dust prone areas. | MORT and H Specifications for Road and Bridge Works Air (P and CP) Act-1981 and Central Motor and Vehicle Act-1988. | Throughout Project corridor. | PM10 level measurements dust pollution or complain of locals. | Standards CPCB methods observations public consultation. | Included in project cost. | Contractor. | MPRDC/ ADB/ CSC |
| **1.2: Emission of Air Pollutants (HC, SO2, NOX, CO etc.) from Vehicles due to Traffic Congestion and use of Equipment and Machinery.** | * Regular maintenance of machinery and equipment. * Batching, asphalt mixing plants and crushers at downwind (1 Km) direction from the nearest settlement. * Only crushers licensed by the PCB shall be used. * DG sets with stacks of adequate height and use of low sulphur diesel as fuel. * Ambient air quality monitoring. * Follow traffic management plan as given in Section-8. | The Air (Prevention and Control of Pollution) Act, 1981 (Amended 1987) and Rules1982. | Asphalt mixing plants, crushers, DG sets locations. | Monitoring of ambient air quality and checking PUC certificates. | Standards CPCB methods. | Included in project cost. | Contractor. | ADB/ CSC |
| **2. Noise** | | | | | | | | |
| **2.1: Noise from Construction Vehicle, Equipment and Machinery.** | * All equipment to be timely serviced and properly maintained. * Bottlenecks to be removed. * Construction equipment and machinery to be fitted with silencers and maintained properly. * Only IS approved equipment shall be used for construction activities. * The regulation near residential, built up and forest area construction shall be restricted to daylight hours. * Timing of noisy construction activities shall be done during night time and weekends near schools and selected suitable times near temples when there are no visitors, concurrent noisy operations may be separated to reduce the total noise generated, and if possible re-route traffic during construction to avoid the accumulation of noise beyond standards. Else provision of temporary noise barrier at sensitive locations or near sources. | Legal requirement noise Pollution (Regulation and Control) Rules, 2000 and amendments there of . Clause No. 501.8.6. MORT and Highway Specifications for Road and Bridge Works. | Throughout project section especially at construction sites, residential and identified sensitive locations. | Noise levels measurements.  Complaints from local people. | As per noise rule, 2000.  Consultation with local people. | Included in Project Cost Plantation Cost is Separate. | Contractor. | MPRDC/ ADB/ CSC |
| **3. Land and Soil** | | | | | | | | |
| **3.1: Land use Change and Loss of Productive/ Top Soil.** | * Non-agricultural areas to be used as borrow areas to the extent possible. * If using agricultural land, top soil to be preserved and laid over either on the embankment slope for growing vegetation to protect soil erosion. | Project Requirement. | Throughout the project section and borrow areas. | Borrow pit locations.  Top soil storage area. | Review borrow area plan, site visits. | Included in Construction Cost. | Contractor. | MPRDC/ ADB/ CSC |
| **3.2: Slope Failure and Soil Erosion due to Construction Activities, Earthwork, and Cut and Fill, Stockpiles etc.** | * Bio-turfing of embankments to protect slopes. * Slope protection by providing frames, dry stone pitching, masonry retaining walls, planting of grass and trees. * The side slopes of all cut and fill areas will be graded and covered with stone pitching, grass and shrub as per design specifications. Care should be taken that the slope gradient shall not be greater than 2:1. * The earth stockpiles to be provided with gentle slopes to prevent soil erosion. | IRC: 56 -1974 recommended practice for treatment of embankment slopes for erosion control Clause No. 306 and 305.2.2 MORT and Highway Specifications for Road and Bridge Works Guidelines IX for Soil Erosion. | Throughout the entire project road  Especially along hilly areas. | Occurrence of slope failure or erosion issues. | Review of design documents and site observation. | Included in Construction Cost. | Design Consultant and Contractor. | ADB/ CSC |
| **3.3: Borrow Area Management.** | * Non-productive, barren lands, upland shall be used for borrowing earth with the necessary permissions/ consents. * Depths of borrow pits to be regulated and sides not steeper than 25%. * Topsoil to be stockpiled and protected for use at the rehabilitation stage. * Transportation of earth materials through covered vehicles. * IRC recommended practice for borrow pits (IRC-10: 1961). * Borrow areas not to be dug continuously. * To the extent borrow areas shall be sited away from habituated areas. Borrow areas shall be levelled with salvaged material or other filling materials which do not pose contamination of soil. Else, it shall be converted into fishpond in consultation with fishery department and land owner/ community. * Rehabilitation of the borrow areas as per guidelines for redevelopment of borrow areas. | IRC Guidelines on borrow areas and for quarries (Environmental Protection Act And Rules-1986; Water Act, Air Act) . Clause No. 305.2.2 MORT and Highway Specifications for Road and Bridge Works Guidelines V for Borrow Areas Management. | Borrow sites location. | Existence of borrow areas in inappropriate unauthorized locations.  Poor borrow area management practices.  Incidents of accidents.  Complaints from local people. | Review of design documents and site observation. | Included in Construction Cost. | Design Consultant and Contractor. | MPRDC/ ADB/ CSC |
| **3.4: Quarry Operations.** | * Aggregates will be sourced from existing licensed quarries. * Copies of consent/ approval/ rehabilitation plan for a new quarry or use of existing source will be submitted to Environmental Officer (EO), ADB. * The contractor will develop a Quarry redevelopment plan, as per the mining rules of the state and submit a copy of approval to Executing Agency (EA). | Clause No. 111.3 MORT and Highway Specifications for Road and Bridge Work Guidelines VI for Quarry Areas Management. | Quarry area locations. | Existence of licenses for all quarry areas from which materials are being sourced existence of a quarry redevelopment plan. | Review of design documents, contractor documents and site observation. | Included in Construction cost. | Contractor. | MPRDC/ ADB/ CSC |
| **3.5: Compaction of Soil and Impact on Quarry Haul Roads due to Movement of Vehicles and Equipment.** | * Construction vehicles, machinery, and equipment to be stationed in the designated Right of Way (ROW) to avoid compaction. * Approach roads/ haulage roads shall be designed along the barren and hard soil area to reduce the compaction. * Transportation of quarry material to the dumping site through heavy vehicles shall be done through existing major roads to the extent possible to restrict wear and tear to the village/ minor roads. * Load of haulage trucks will be monitored to ensure they do not exceed the standard limits to avoid safety issues and excessive damage on the roads. * Land taken for construction camp and other temporary facility shall be restored to its original conditions. | Design Requirement. | Parking areas, haulage roads and construction yards. | Location of approach and haulage roads presence of destroyed/ compact ted agricultural land or land which has not be restored to its original condition. | Site observation. | Included in Construction Cost. | Contractor. | ADB/ CSC |
| **3.6: Contamination of Soil due to Leakage/ Spillage of Oil, Bituminous and Non-Bituminous Debris Generated from Demolition and Road Construction.** | * Construction vehicles and equipment will be maintained and refuelled in such a fashion that oil/ diesel spillage does not contaminate the soil. * Fuel storage and refuelling sites to be kept away from drainage channels. * Unusable debris shall be dumped in ditches and low lying areas. * To avoid soil contamination Oil-Interceptors shall be provided at wash down and refuelling areas. * Waste oil and oil soaked cotton/ cloth shall be stored in containers labelled ‘Waste Oil’ and ‘Hazardous’ sold off to MOEF/ SPCB authorized vendors. * Non-bituminous wastes to be dumped in approved borrow pits with the concurrence of landowner and covered with a layer of topsoil conserved from opening the pit. * Bituminous wastes will be disposed off in an identified dumping site approved, appropriately designed, compliant waste management facilities (land-fills). | Design Requirement. | Fuelling station, construction sites, and construction camps and disposal location. | Quality of soil near storage area.  Presence of spilled oil or bitumen in project area. | Site observation. | Included in Construction Cost. | Contractor. | MPRDC/ ADB/ CSC |
| **4. Water Resources** | | | | | | | | |
| **4.1: Sourcing of Water during Construction.** | * Requisite permission shall be obtained for abstraction of groundwater from Central Groundwater Authority (CGA). * Arrangements shall be made by contractor that the water availability and supply to nearby communities remain unaffected. | ------- | Throughout the project section. | Approval from competent  Authority.  Complaints from local people on water availability. | Checking of documentation on.  Talk to local people. | Included in Construction Cost. | Contractor. | MPRDC/ ADB/ CSC |
| **4.2: Disposal of Water during Construction.** | * Provisions shall be made to connect road side drains with exiting nearby ponds otherwise make provision of water harvesting pits intermittently. | Clause No. 1010 EP Act-1986 MORT and Highway Specifications for Road and Bridge Works. | Throughout the project section. | Design of road side drains existence of proper drainage system for disposal of waste water. | Standards methods site observation and review of documents. | Included in Construction Cost. | Contractor. | ADB/ CSC |
| **4.3: Alteration in Surface Water Hydrology due to Embankment.** | * Existing drainage system to be maintained and further enhanced. * Provision shall be made for adequate size and number of cross drainage structures especially in the areas where land is sloping towards road alignment. * Road level shall be raised above High Flood Level (HFL); level wherever road level is lesser than HFL. | Design Requirement, Clause No. 501.8.6. MORT and Highway Specifications. | Near all drainage  channels, river crossings etc. | Design of road side drains. | Review of design documents.  Site observation. | Included in  Construction Cost. | Contractor. | ADB/ CSC |
| **4.4: Siltation in Water Bodies due to Construction Activities/ Earthwork.** | * Embankment slopes to be modified suitably to restrict the soil debris entering water bodies. * Provision of silt fencing shall be made at water bodies. * Silt/ sediment should be collected and stockpiled for possible reuse as surfacing of slopes where they have to be re-vegetated. * Earthworks and stone works to be prevented from impeding natural flow of rivers, streams and water canals or existing drainage system. | Design Requirement, Clause No. 501.8.6. MORT and Highway Specifications for Road and Bridge Works (CP and CP) and Worldwide Best Practices. | Near all water bodies, river embankment slopes. | Siltation of rivers, streams, ponds and other water bodies in project area. | Field observation. | Included in Construction Cost. | Contractor. | MPRDC/ ADB/ CSC |
| **4.5: Deterioration in Surface Water Quality due to Leakage from Vehicles and Equipments and Waste from Construction Camps.** | * No vehicles or equipment should be parked or refuelled near water-bodies, so as to avoid contamination from fuel and lubricants. * Oil and grease traps and fuelling platforms to be provided at re-fuelling locations. * All chemicals and oil shall be stored away from water and concreted platform with catchment pit for spills collection. * All equipment operators, drivers, and warehouse personnel will be trained in immediate response for spill containment and eventual clean-up. Readily available, simple to understand and preferably written in the local language emergency response procedure, including reporting, will be provided by the contractors. * Construction camp to be sited away from water bodies. * Solid wastes shall be collected, strong and taken to the approved, appropriately designed, compliant waste management facility (landfills) only. * Water quality shall be monitored periodically. * All equipments operators, divers, and ware house personal will be trained in immediate response for spill containment and eventual cleanup. Readily available, simple to understand and preferably retain in the local language emergency response procedure, including reporting, will be provided by the contractor. | The Water (Prevention and Control of Pollution) Act-1974 and Amendments Thereof. | Water bodies, refueling stations, construction camps. | Water quality of ponds, streams, rivers and other water bodies in project.  Presence of oil floating in water bodies in project area. | Conduction of water quality tests as per the monitoring plan.  Field observation. | Included in Construction Cost. | Contractor. | ADB/ CSC |
| **5. Flora and Fauna** | | | | | | | | |
| **5.1: Vegetation Loss due to Site Preparation and Construction Activities and Structure Development.** | * Minimize tree cutting to the extent possible. * **Roadside 00 Trees** to be removed with prior approval of competent authority. * Compensatory plantation at 1: 10 basis and additional plantation as per the IRC: guidelines in consultation with Forest Department (FD). * Regular maintenance of all trees planted. * Provision of LPG in construction camp as fuel source to avoid tree cutting, wherever possible. * Plantation of trees on both sides of the road. Integrate Vegetation Management (IVM) with the carriage way completely clear of vegetation. From the edge of the road to the boundary of Right of Way (ROW), vegetation structured with smaller plants near the line and larger trees further away to avoid costly and provide habitats for a wide variety of plants and animals. Additional plantation near river banks to check erosion as part of compensatory plantation. * In the event of design changes during the construction stages additional assessments including the possibility to save trees shall be made by the Executing Agency (EA). * Road side Plantation Strategy as per IRC specifications including manuring. | Forest Conservation Act-1980 and IRC: SP: 21 and IRC: SP: 66. | Throughout project corridor. | Right of Way (ROW) width 00 number of trees for felling.  Compensatory plantation plan 00number of trees replanted. | Review of relevant documents – tree cutting permit, compensatory plantation plan.  Field observations. | Road side Plantation Cost is Included in Project Costs. | Relevant agency specialized in a forestation. | MPRDC/ ADB/ CSC |
| **6. Construction Camps** | | | | | | | | |
| **6.1: Impact Associated with Location.** | * All camps should maintain minimum distance from following:  1. 500 m from habitation; 2. 500 m from forest areas where possible; 3. 500 m from water bodies where possible; 4. 500 m from through traffic route where possible;  * The average distance between two camps should be 50 Km. | Design Requirement. | All construction camps. | Location of campsites and distance from habitation, forest areas, water bodies, through traffic route and other construction camps. | On site observation.  Interaction with workers and local community. | Included in Construction Costs. | Contractor and Environmental Officer (EO). | ADB/ CSC |
| **6.2: Worker’s Health in Construction Camp.** | * The location, layout and basic facility provision of each labour camp will be submitted to SQC prior to their construction. The construction shall commence only after approval of SQC. * The contractor will maintain necessary living accommodation and ancillary facilities in functional and hygienic manner as approved by the Executing Agency (EA). * Adequate water and sanitary latrines with septic tanks attached to soak pits shall be provided. * Preventive medical care to be provided to workers including a First-Aid-Kit (FAK) that must be available in the camp. * Waste disposal facilities such as dust bins must be provided in the camps and regular disposal of waste must be carried out. * The contractor will take all precautions to protect the workers from insect and pest to reduce the risk to health. This includes the use of insecticides, which should comply with local regulations. * No alcoholic liquor or prohibited drugs will be imported to, sell, give, and barter to the workers of host community. * Awareness rising, to immigrant workers/ local community on communicable and sexually transmitted diseases. | The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act-1996 and The Water (Prevention and Control of Pollution) Act-1974 and Amendments Thereof. | All construction camps. | Camp health records.  Existence of proper First-Aid-Kit (FAK) in camp site.  Complaints from local people. | Camp records.  Site observation.  Consultation with local people living nearby. | Part of the Contractors Cost. | Contractor. | MPRDC/ ADB/ CSC |
| **7. Management of Construction Waste/ Debris** | | | | | | | | |
| **7.1: Selection of Dumping Sites.** | * Unproductive/wastelands shall be selected for dumping sites. * Away from residential areas and water bodies. * Dumping sites have adequate capacity equal to the amount of debris generated. * Public perception and consent from the village Panchayats has to be obtained before finalizing the location. | Design Requirement and MORT and Highway Guidelines. | At all dumping sites. | Location of dumping sites.  Public complaints. | Field survey and interaction with local people. | Included in Construction Costs. | Contractor. | MPRDC/ ADB/ CSC |
| **7.2: Reuse and Disposal of Construction and Dismantled Waste.** | * The existing bitumen surface shall be utilized for paving of cross roads, access roads, and paving works in construction sites and camps, temporary traffic diversions, and haulage routes. * Unusable and non-bituminous debris materials should be suitably disposed off at pre-designated disposal locations, with approval of the concerned authority. The bituminous wastes shall be disposed in secure landfill sites only in environmentally accepted manner. For removal of debris, wastes and its disposal MORT and Highway guidelines should be followed. * Unusable and surplus materials, as determined by the Project Engineer (PE), will be removed and disposed off-site. * All excavated materials from roadway, shoulders, verges, drains, cross drainage will be used for backfilling embankments, filling pits, and landscaping. | MORT and Highway Guidelines. | Throughout the project corridor. | Percentage of reuse of existing surface material.  Method and location of disposal site of construction debris. | Contractor records.  Field observation.  Interaction with local people. | Included in Construction Costs. | Contractor. | ADB/ CSC |
| **8. Traffic Management and Safety** | | | | | | | | |
| **8.1: Management of Existing Traffic and Safety.** | * Temporary traffic diversion shall be planned by the contractor and approved by the “Engineer”. * The traffic control plans shall contain details of diversions; traffic safety arrangements during construction; safety measures for night time traffic and precautions for transportation of hazardous materials. Traffic control plans shall be prepared in line with requirements of “IRC’s: SP: 55-Document”. * The Contractor will ensure that the diversion/ detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. * On stretches where it is not possible to pass the traffic on the part width of existing carriageway, temporary paved diversions will be constructed. * Restriction of construction activity to only one side of the existing road. * The contractor shall inform local community of changes to traffic routes, and pedestrian access arrangements with assistance from “Engineer”. | Design Requirement and IRC: SP: 55. | Throughout the project corridor especially at intersections. | Traffic management plan.  Safety signs on site.  Number of traffic accidents. | Review traffic management plan field observation of traffic management and safety system.  Interaction with people in vehicles using the road. | Included in Construction Cost. | Contractor. | MPRDC/ ADB/ CSC |
| **8.2: Pedestrians, Animal Movement.** | * Temporary access and diversion, with proper drainage facilities. * Access to the schools, temples and other public places must be maintained when construction takes place near them. * Fencing wherever cattle movement is expected. * To avoid the need for cattle underpasses, some of the proposed culverts `near habitations may be widened to facilitate cattle movement. | Design requirement And IRC: SP: 27-1984; IRC: SP: 32-1988; Road Safety for Children (5-12 Years Old) IRC: SP: 44-1994 Highway Safety Code IRC: SP: 55-2001; Guidelines for The Building and other Construction Workers Act-1996 and Cess Act of 1996 Factories Act-1948. | Near habitation on both sides of schools, temples, hospitals, graveyards, construction sites, haulage roads, diversion sites. | Road signage and drainage as per IRC-guideline.  Complaints from local people. | Field observation interaction with local people. | Included in Construction Cost. | Contractor. | ADB/ CSC |
| **8.3: Safety of Workers and Accident Risk from Construction Activities.** | * Contractors to adopt and maintain safe working practices. * Usage of fluorescent and retro-flectory signage, in local language at the construction sites. * Training to workers on safety procedures and precautions. * Mandatory appointment of safety officer. * All regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress shall be complied with. * Provision of PPEs to workers. * Provision of a readily available first aid unit including an adequate supply of dressing materials. * The contractor will not employ any person below the age of 18 years for any work. * Use of hazardous material should be minimized and/ or restricted. * Emergency plan (to be approved by engineer) shall be prepared to respond to any accidents or emergencies. * Accident Prevention Officer (APO) must be appointed by the contractor. | ------- | Construction sites. | Availability of safety gears to workers.  Safety signage training records on safety.  Number of safety related accidents. | Site observation.  Review records on safety training and accidents.  Interact with construction workers. | Included in Construction Cost. | Obligation of Contractor. | MPRDC/ ADB/ CSC |
| **8.4: Accident Risk to Local Community.** | * Restrict access to construction sites to authorized personnel. * Physical separation must be provided for movement of vehicular and human traffic. * Adequate signage must be provided for safe traffic movement. | ------- | Construction sites. | Safety signs and their location.  Incidents of accidents.  Complaints from local people. | Site Inspection.  Consultation with local people. | Included in Construction Cost. | Contractor. | ADB CSC |
| **9. Site Restoration and Rehabilitation** | | | | | | | | |
| **9.1: Clean-up Operations, Restoration and Rehabilitation.** | * Contractor will prepare site restoration plans, which will be approved by the “Engineer”. * The clean-up and restoration operations are to be implemented by the contractor prior to demobilization. * 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 satisfaction of the Environmental Officer (EO). * All the opened borrow areas will be rehabilitated and “Engineer” will certify in this regard. | Project Requirement. | Throughout the project corridor, construction; camp sites and borrow areas. | Clean and restored camp sites.  Presence/ absence of construction material/ debris after completion of construction works on construction site. | Site observation.  Interaction with locals.  Issue completion certificate after restoration of all sites are found satisfactory. | Included in Construction Cost. | Contractor. | MPRDC/ ADB/ CSC |
| 1. **Operation Stage** | | | | | | | | |
| **1. Air quality** | | | | | | | | |
| **1.1: Air Pollution due to Vehicular Movement or Vehicles Playing on the Road.** | * Roadside tree plantations shall be maintained. * Regular maintenance of the road will be done to ensure good surface condition. * Vehicular air pollution will be managed and monitored. * Ambient air quality monitoring. If monitored parameters are above the prescribed limit, suitable control measures must be taken. * Technological and behavioural changes. * Road signs shall be provided reminding the motorist to properly maintain their vehicles to economize on fuel consumption and unprotect the environment. | Environmental Protection Act-1986; The Air (Prevention and Control of Pollution) Act-1981. | Throughout the corridor. | Ambient air quality (PM10, CO, NOX) survival rate of trees planted. | As per CPCB requirements site inspection. | Included in Operation/ Maintenance Cost. | Contractor. | MPRDC/ ADB/ CSC |
| **2. Noise** | | | | | | | | |
| **2.1: Noise Pollution due to Movement of Traffic.** | * Effective traffic management and good riding conditions shall be maintained to reduce the noise level throughout the stretch and speed limitation and honking restrictions may be enforced near sensitive locations. * The effectiveness of the multilayered plantation should be monitored and if needed solid noise barrier shall be placed. * Create awareness amongst the residents about likely noise levels from road operation at different distances, the safe ambient noise limits and easy to implement noise reduction measures while constructing a building close to the road. | Noise Pollution (Regulation and Control) Rules, 2000 and amendments thereof. | Sensitive receptors. | Noise levels. | Noise monitoring as per noise rules, 2000.  Discussion with people in sensitive receptor sites. | Included in Operation/ Maintenance Cost. | Contractor. | ADB/ CSC |
| **3. Land and Soil** | | | | | | | | |
| **3.1: Soil Erosion at Embankment during Heavy Rainfall.** | * Periodic checking to be carried to assess the effectiveness of the stabilization measures viz. turfing, stone pitching, river training structures etc. * Necessary measures to be followed wherever there are failures. | Project Requirement. | At bridge locations and embankment slopes and other probable soil erosion areas. | Existence of soil erosion sites.  Number of soil erosion sites. | On site observation. | Included in Construction Cost. | Contractor. | ADB/ CSC |
| **4. Water Resources/ Flooding and Inundation** | | | | | | | | |
| **4.1: Siltation.** | * Regular checks shall be made for soil erosion and turfing conditions of river training structures for its effective maintenance. | Project Requirement. | Near surface water bodies. | Water quality. | Site observation. | Included in Operation/ Maintenance Cost. | Contractor. | MPRDC/ ADB/ CSC |
| **4.2: Water Logging due to Blockage of Drains, Culverts or Streams.** | * Regular visual checks and cleaning of drains shall be done along the alignment to ensure that flow of water is maintained through cross drains and other channels/ streams. * Monitoring of water borne diseases due to stagnant water bodies. | Project Requirement. | Near surface water bodies. | Presence of flooded areas or areas with water stagnation. | Site observation. | Included in Operation/ Maintenance Cost. | Contractor. | ADB/ CSC |
| **4.3: Road Inundation due to Choking of Drainage Channels.** | * ADB will ensure that all drains (side drains and all cross drainages) are periodically cleared especially before monsoon season to facilitate the quick passage of rainwater and avoid flooding. | Project Requirement. | Flood prone sections. | Incidents of flooding and road inundation with details on change. | Field observation  Interaction with local community. | Included in Operation/ Maintenance Cost. | Contractor. | ADB/ CSC |
| **5. Flora** | | | | | | | | |
| **5.1: Vegetation.** | * Planted trees, shrubs, and grasses to be properly maintained. * The tree survivalist audit to be conducted at least once in a year to assess the effectiveness. | Forest Conservation Act-1980. | Project tree plantation sites. | Minimum of 70% of tree survival. | Records and fields observations. | Operation and Maintenance Cost. | Contractor. | MPRDC/ ADB/ CSC |
| **6. Maintenance of Right of Way and Safety** | | | | | | | | |
| **6.1: Accident Risk due to Uncontrolled Growth of Vegetation.** | * Efforts shall be made to make shoulder completely clear of vegetation. * Regular maintenance of plantation along the road side. * Invasive plant not to be planted near the road. | Project Requirement. | Throughout the project route. | Presence of and extent of vegetation growth on either side of road.  Accident data. | Visual inspection.  Accident records. | Included in Operation/ Maintenance Cost. | Contractor. | ADB/ CSC |
| **6.2: Accident Risks Associated with Traffic Movement.** | * Traffic control measures, including speed limits, will be enforced strictly. * Further encroachment of squatters within the Right of Way (ROW) will be prevented. * No school or hospital will be allowed to be established beyond the stipulated planning line as per relevant local law. * Monitor/ ensure that all safety provisions included in design and construction phase are properly maintained. * Highway patrol unit(s) for round the clock patrolling. Phone booths for accidental reporting and ambulance services with minimum response time for rescue of any accident victims, if possible. * Tow-away facility for the break down vehicles if possible. | IRC: SP: 55 | Throughout the project route. | Police records on accident.  Condition and existence of safety signs, rumble strips etc. on the road.  Presence/absence of sensitive receptor structures inside the stipulated planning line as per relevant local law. | Review accident records.  Site observation. | Included in Operation/ Maintenance Cost. | Contractor. | ADB/ CSC |
| **6.3: Transport of Dangerous Goods.** | * Existence of spill prevention and control and emergency responsive system. * Emergency plan for vehicles carrying hazardous material. | ------- | Throughout the project stretch. | Status of emergency system – whether operational or not. | Review of spill prevention and emergency response system. | Included in Operation/ Maintenance Cost. | Contractor. | MPRDC/ ADB/ CSC |

**Note: EA: Executing Agency, PWD: Asian Development Bank (ADB), EO: Environmental Officer, IRC: Indian Road Congress.**

1. The **“**Project Engineer” or “The Engineer” is the team of Construction Supervision Consultants (CSC) responsible for approving the plans, engineering drawing, release of payments to contractor etc. on behalf of the employer (ADB). It is usually the team leader of the CSC that takes the responsibility of signing approval documents on behalf of the “CSC-Team Members/ Jury Members”.
2. The “Environmental Officer” is the “Environmental Specialist or Expert” under the CSC who is responsible for providing recommendations to the “CSC-Team Leader” for approving activities specific to “Environment Safeguards” on behalf of “The Engineer” or “Project Engineer”.

Table 2Environmental Monitoring Plan (EMoP)

| **Environmental Components** | **Monitoring** | | | **Location** | **Frequency** | **Institutional Responsibility** | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Parameters** | **Special Guidance** | **Standards** | **Implementation** | **Supervision** |
| **Air** | PM2.5, PM10, SO2, NOX, CO | As per CPCB guidelines | The Air (Prevention and Control of Pollution) Rules, CPCB, 1982 | At sites where hot mix plant/ batching plant is located | 3 times in a year for 3 years or construction period  at 5 sites | Contractor through approved monitoring agency | PIU, MPRDC, CSC |
| **Water** | pH, BOD, COD, TDS, TSS, DO, Total Coli-form, Conductivity, Oil and Grease | Grab sample collected from source and analyze as per standard methods for examination of water and wastewater | Water quality standards by CPCB | Sindhu River tributaries and ground water at construction camp sites | 3 times in a year for 3 years or construction period  At 5 locations | Contractor through approved monitoring agency | PIU, MPRDC, CSC |
| **Noise Levels** | Noise Level on dB (A) Scale | In free field at 1 m distance from the equipment to be monitored | Noise standard by CPCB | At equipment yards, camp and villages along the alignment. | 3 times in a year for 3 years or construction period,  5 locations | Contractor through approved monitoring agency | PIU, MPRDC, CSC |
| **Soil Quality** | Monitoring of NPK and Heavy Metals and Grease | ----------------- | As per IRC code of practice | Ad hock if accident/ spill locations involving bulk transport of carrying hazardous materials | ----------------- | PIU through an approved agency | PIU, MPRDC |
| **Road Side Plantation** | Monitoring of Felling of Trees | It should be ensured that the marked trees are felled only | As given in the IEE report | All along the corridor | During the felling of trees | Forest department | PIU, MPRDC |
|  | Survival Rate of Trees, Success of Re-Vegetation | The number of trees surviving during each visit should be compared with the number of saplings planted | The survival rate should be at-least 70% below, which re-plantation should be done | At locations of compensatory afforestation | Every year for 3 years | PIU | PIU, MPRDC |

***Note:*** *MPRDC - Madhya Pradesh Road Development Corporation, PIU - Project Implementation Unit, CSC - Construction Supervision Consultant.*

C. Environmental Policy of MPRDC

The Madhya Pradesh State Highways Improvement Project, a unit of PWD, Government of Madhya Pradesh, implements improvement in the State’s road network to provide safe and efficient road access, that will enhance community livelihood and support economic prosperity in the State.

**MPRDC seeks to achieve balanced and sustainable outcomes with responsible environmental leadership in all the projects it implements. For achieving the above, MPRDC aims to:**

* Comply with all applicable environmental legislation and other requirements;
* Protecting and conserving natural resources and enhancing the environmental values while preventing pollution and minimizing the impact on the natural environment;
* Implement, maintain and continually improve an effective environmental management system;
* Apply an approach of “Avoid, Minimize and Mitigate”, to the management of environmental impacts associated with road improvement for its Stakeholders;
* Develop awareness of environmental management processes, standards and responsibilities among MPRDC employees, consultants, contractor partners etc.;
* Be responsive to community and stakeholder views on environmental issues;
* Set specific environmental objectives and targets relating to the key environmental aspects of MPRDC activities; measure and report progress in achieving these targets.

This policy is established in line with the Vision and Environmental Policy (VEP) of the Government of Madhya Pradesh.

Environmental Management Program (EMP)

The purpose of the environmental monitoring program is to ensure that the envisaged purpose of the project is achieved and results in desired benefits to the target population. To ensure the effective implementation of the EMoP, it is essential that an effective monitoring program has to be designed and carried out. The broad objectives are given below:

* To evaluate the performance of mitigation measures proposed in the EMoP;
* To evaluate the adequacy of Environmental Impact Assessment (EIA);
* To suggest improvements in management plan, if required;
* To enhance environmental quality;
* To satisfy the legal and community obligations;
* The environmental monitoring plan contains;
* Performance Indicators (PI);
* Environmental Monitoring Program (EMoP);
* Reporting Formats;
* Necessary Budgetary Provisions.

Performance Indicators

The physical, biological and social components identified to be particularly significant in affecting the environment at critical locations have been suggested as Performance Indicators (PI). The Performance Indicators shall be evaluated under three/ seven heads as:

1. Environmental condition indicators to determine efficiency of environmental management measures in control of air, noise, water and soil pollution;
2. Environmental management indicators to determine compliance with the suggested environmental management measures;
3. Operational performance indicators that have been devised to determine efficiency and utility of the proposed mitigation measures.
4. Hydrogen vehicles have been plagued by problems with fuel production. However, as new environmental management indicators to determine advanced technology reported in the Standard Journal “Nature” could solve that problem, by converting methanol into hydrogen gas that could be used [to power hydrogen fuel cell vehicles](http://thenewswheel.com/hydrogen-fuel-cell-cars-might-actually-be-usable/).
5. Methanol (CH3 COOH) is a type of fuel [typically used by racing drivers](http://thenewswheel.com/info-technical-aspects-components-monster-trucks/), which can be manufactured from coal. It burns efficiently with fewer pollutants, costs less, and is less flammable in an accident. However, methanol is toxic - it already poisons 1,300 people a year in many developing countries and its vapor can make people dizzy and lose consciousness.
6. The technology being developed comes to us from a team of Chinese researchers, uses a new catalyst to extract the hydrogen from methanol. The new method would replace the hydrogen fuel tank in a hydrogen vehicle for two smaller tanks, one for the methanol and one for water. Potentially, this would give vehicles good range and lower emissions than a gasoline vehicle to enhance environmental quality under Environmental Monitoring Program (EMoP).
7. Some of the disadvantages of Methanol (CH3 COOH) are that although its emissions are safer than that of gasoline, it has a high amount of formaldehyde emissions. As with Ethanol, it gets less gas mileage, so it would require more frequent fueling. The cost of Methanol is also slightly higher than that of premium gasoline.

Reporting System

Reporting system for the suggested monitoring program operates at two levels:

* Reporting of Environmental Management Indicators (EMI);
* Reporting for Operational Performance Indicators (OPI**)** at the PIU level.

Environmental monitoring involves regular checking of the environmental management issues detailed in the EMP and to ascertain whether the mitigation measures are achieving their objectives, according to the EMP, with the progress of the works. It provides the necessary feedback for project management to keep the program on schedule will still achieving the expected outcomes.

The contractor, IE and PIU are three components of the reporting system for environmental conditions and management indicators. The reporting system to be followed in construction phase is presented.

* The reporting system will start with the *Contractor* who is the main executor of the implementation activities. The contractor will report to the Sr. Environmental Specialist of IE who in turn shall report to the PIU. The *Contractor* will submit monthly and quarterly environmental compliance reports along with formal monthly and quarterly reporting to the IE;
* The IE will submit separate quarterly environmental monitoring reports to PIU in addition to submission of the summary of the activities of the month in the formal monthly report including any deviations and corrective actions;
* PIU will be responsible for preparation of the targets for identified non - compliances;
* A full record of construction activities will be kept as a part of normal contract monitoring system. Monitoring Systems for various stages of construction and related activities have been proposed are to ensure reporting and timely and effective implementation of the EMP.

During the operation phase, the supervision as well as reporting responsibilities will lie with the MPRDC site offices and overall supervision will be the responsibility of Environmental Specialist at MPRDC head office in Bhopal.

D. Emergency Response Plan (ERP)

Project proponents shall prepare site specific Emergency Response Plans (ERP) to face and address any emergency situation with respect to vehicular accidents, heavy floods and spillage of oil or other hazardous materials. Copy of emergency plan may be circulated in local language to affected villages. A consultation may also be formed regarding discussion on Emergency Response Plan with local populace. A communication flow chart may also be drafted for easy understanding of information flow during emergency situation. It requires establishing and developing a communication and response system to minimize the impacts of these situations and also minimize the time required to respond to these situations in order to safeguard people, property and environmental resources. Contractor shall submit approved Accident Safety and Hazardous Chemical Spill Management Plan (ASHCSMP). The plan should also have details of detours in case of emergency. The Emergency Contact Information (ECI) of concerned local authorities should be displayed at suitable locations along the road particularly in accident prone zones and sensitive locations/ areas/ stats/ regions.

E. Grievance Redressal Mechanism (GRM)

A project-specific Grievance Redress Mechanism (GRM) will be established to Receive, Evaluate, and Facilitate the Resolution of Affected Person’s (AP’s) concerns, complaints, and grievances about the Social and Environmental Performance (SEP) at the level of the project. The GRM will aim to provide a time - bound and transparent mechanism to voice and resolve environmental concerns linked to the project. The GRM will provide an accessible and trusted platform for receiving and facilitating the resolution of APs’ grievances related to the project. The multi - tier GRM for the project is outlined below, each tier having time - bound schedules and with responsible persons identified to address grievances and seek appropriate persons’ advice at each stage as required.

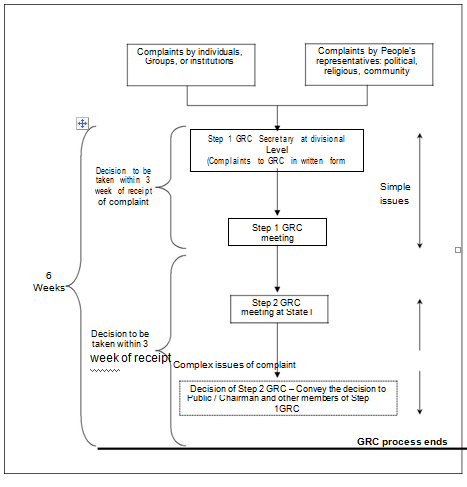
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Figure 1 Grievance Redressal Mechanism

Project area - wide Public Awareness Campaigns (PAC) will ensure that knowledge of the grievance redress procedures is generated. The PIU, with the assistance of RP-Implementation NGO will conduct awareness campaigns to ensure that general public, including poor and vulnerable households are made aware of the grievance redress procedures.

Grievance Redress Process: MPRDC-PIU has a well - established and functioning grievance redress system. The same system will be followed for this project.

**Registering Complaints:** Complainants will have the flexibility of conveying grievances/ suggestions by registering in the compliant registers placed at contract site offices, SDO and DO offices or by e-mail, or by post, or by registering online of MPRDC website. PIU established a Public Response Centre (PRC) helpline specifically addresses the issues arising out of project implementation.

The complaint received at PRC helpline is recorded and transferred to concerned official based on the nature of complaint. Environmental related complaints/ grievances are forwarded to the Environmental Specialist of the PIU. ES will review the complaint and forward to the concerned DO for redress. DO will take necessary action on the complaint and if the corrective action is to be taken by the contractor, DO will instruct the contractor to do so. It is required to address the complaint in 28 days, and inform the compliant about redress and the action taken.

Following process is followed for the complaints received at the site offices. Careful documentation of the name of the complainant, date of receipt of the complaint, address/ contact details of the person, location and nature of the problem will be undertaken. In case of grievances that are immediate and urgent in the perception of the complainant, the contractor’s EHS officer and the Project Manager, and personnel from the PIU engineers on-site will provide the most easily accessible or first level of contact for the quick resolution of grievances. Contact information of responsible officers and contractor staff will be posted at all construction sites in visible locations. The grievance redress process will have following levels:

* **1st Level Grievance:** The complaint will be reviewed by concerned AEE and forwarded to the contractor for immediate resolution of the issue on-site and will be required resolve the issue within 7 days of receipt of a complaint/ grievance. IEs-Environmental Management Specialist (EMS) will provide guidance as required by site staff.
* **2nd Level Grievance:** All grievances that cannot be redressed within 7 days at the 1st level will be dealt by at Executive Engineer (EE), DO, with the assistance of IE-EMS. If the issue is not resolved in 7 days at EE level, will be brought to the notice of the PIU head office. The Environmental Specialist of PIU will resolve the grievance within 14 days of receipt of a complaint/ grievance.
* **3rd Level Grievance:** If the grievance is not resolved at above two levels within 28 days will be referred to the District Grievance Redress Committee (DGRC) headed by the Deputy Commissioner (DC). DGRC will have following members: Assistant Commissioner, independent member from any reputed institution appointed by DC and EE of concerned DO (as Member Secretary). DGRC meets at the district headquarter as required, and resolve the matter within 30 days of receipt at DGRC.

The PIU-Environmental Officer (PIU-EO) will have the overall responsibility for timely grievance redressal on Environmental Issues (EI) and for registration of grievances, related disclosure, and communication with the aggrieved party.

The project GRM notwithstanding, an aggrieved person shall have access to the country's legal system at any stage. That is the choice of the complainant, and can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM.

In the event that the established GRM is not in a position to resolve the issue, the affected persons can also use the ADB-Accountability Mechanism Information (AMI) through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters or the ADB-India Resident Mission (IRM). The complaint can be submitted in any of the official languages of ADB’s Developing Member Countries. The ADB Accountability Mechanism Information (AMI) will be included in the Project Information Document (PID) to be distributed to the affected communities, as part of the project GRM.

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

**Periodic Review and Documentation of Lessons Learned:** The Project Director will periodically review the functioning of the GRM and record information on the effectiveness of the mechanism, especially on the project’s ability to prevent and address grievances.

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

1. Environmental Monitoring Program (EMoP)

Introduction

(Report Purpose, Brief project background including organizational set up, list of roads, planned project schedule etc., Details on Project Implementation Progress with details on current site works, location, earthworks, vegetation clearing, spoils disposal, establishment of construction camp and other construction related facilities (*e.g.,* concrete mixing plant, asphalt batching plant, crushing plant, etc.), establishment and operation of quarry/ borrow areas, etc., including locations, schedules, dates, etc., Schedule of construction activities for the subsequent months).

Compliance on Environment Safeguards Requirements

(**Status of Compliance with ADB Loan Covenants:** Provide a list of environmental loan covenants and specify level of compliance).

**Status of Compliance with Government Environmental Requirements:** Provide a list of government environmental requirements (permits, etc.) for the project as well as construction - related facilities/ activities and specify level of compliance, indicate any required environmental permit/ license/ consent obtained to date and to be obtained (including schedule) for the project and construction related facilities/ activities).

1. **Changes in Project Scope**

(Such as change in alignment or footprint in case of horizontal infrastructure, implementation of additional project component/s, etc. (with reference to the project scope identified in the ADB - Cleared Environmental Assessment Report (CEAR), *i.e.,* IEE or EIA) and corresponding safeguard measures undertaken, if applicable).

1. **Implementation of Environmental Management Plan**

(Indicate the manner by which EMP requirements are incorporated into contractual arrangements, such as with contractors or other parties.

**Summary of Environmental Mitigations and Compensation Measures Implemented.**

Based on EMP; may include measures related to air quality, water quality, noise quality, pollution prevention, bio-diversity and natural resources, health and safety, physical cultural resources, capacity building, and others. Provide a table/ matrix showing a summary of each environmental mitigation measure specified in the EMP Table below.

Table 3 Implemented Environmental Mitigations and Compensation Measures

|  |  |  |
| --- | --- | --- |
| **EMP Requirement (List All Mitigation Measures Specified in the EMP)** | **Compliance Attained (Yes, No, Partial)** | **Comment on Reasons for Partial or Non-Compliance** |
| **1.** | **Yes** | **Partial** |
| **2.** | **Partial** | **Partial** |
| **3.** | **No** | **Non-Compliance** |
| **4.** | **Partial** | **Partial** |
| **5.** | **Yes** | **Non-Compliance** |
| **etc.** | ------- | ------- |

**3. Environmental Monitoring Activities**

(Compliance Inspections, Summary of Inspection Activities, Mitigation Compliance-15 Mitigation Effectiveness-16. Findings of Environmental Monitoring Plan (EMoP) on quality of air, noise, water etc. and Results Assessment-17).

**4. Key Environmental Issues**

Key Issues Identified *e.g.,* non-compliance to loan covenants, EMP and/ or government environmental requirements, insufficient mitigation measures to address project impacts, incidents, accidents, etc. Actions Taken and Corrective Action Plan (specify actions taken and corrective action plans to be implemented to address non-compliance and other identified issues). Such action plan should provide details of specific actions to be undertaken to resolve identified issues, responsible persons who will carry out such actions and timeframe/ target date to carry out and complete required actions. The action plan could be presented in a tabular/ matrix form (see as given below). Timeframe and responsibilities for reporting to ADB on the progress of implementation of corrective action plan should also be specified under this section).

Table 4 Description and Resolution of Key Environmental Issues

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Issue** | **Cause** | **Required**  **Action** | **Responsibility** | **Timing**  **(Target Dates)** | | **Description of Resolution and Timing (Actual)** |
| **Old Issues from Previous Reports** | | | | | | |
| **1.** | **Road Network** | To be Completed | **Civil Work** | | End of 2018 | **Resolution in Mid of 2018** |
| **2.** | **Projected Area** | Ongoing | **Civil Work Construction** | | End of 2018 | **Resolution in Mid of 2018** |
| **New Issues from This Report** | | | | | | |
| **1.** | **Projected Area** | To be Completed | **Civil Work Construction** | End of 2019 | | **Resolution in Mid of 2019** |
| **2.** | **Road Network** | Ongoing | **Civil Work** | End of 2019 | | **Resolution in Mid of 2019** |

**Complaints:** Details of Complaint/s (Provide details of any complaints that have been raised by the local population and other stakeholders regarding environmental performance and environmental impacts (complainant, nature of complaint, date complaint was filed, which office received the complaint etc.)**[[1]](#footnote-2)[[2]](#footnote-3)[[3]](#footnote-4)**.

Action Taken (Document how the complaints were addressed or will be addressed by indicating the following):

1. Names and designation of specific staff or officials within the **Grievance Redress Committee (GRC)**, executing agency, project management unit, local government, contractor and/ or supervision consultant involved in receiving, documenting, and resolving the complaint (s);
2. Specific actions taken or to be taken to resolve the complaint and corresponding timeframe.

**5.** **Conclusion and Recommendation**

Overall Progress of Implementation of Environmental Management Measures (IEMM) 18-Problems Identified and Actions Recommended Monitoring (ARM) adjustment (recommended monitoring modifications based on monitoring experience/ trends and stakeholders response).

**6. Appendices**

Site Inspection/ Monitoring Reports; Source and Ambient Monitoring Results (Laboratory Analysis);

**Photographs**

Location Map of Sampling Stations Copies of Environmental Permits/ Approvals other Relevant Information/ Documents**[[4]](#footnote-5)**.

1. Institutional/ Implementation Arrangement (IA)

**Project Implementation Unit (PIU)** is responsible for implementation of all the mitigation and management measures suggested in EMP and also make sure that the statutory requirements are not violated during the pre-construction, construction and operation stages of the projected road.

The **Chief Project Officer (CPO)** heads MPRDC. He will be responsible for the successful implementation of the Project. The Chief Engineer is also the Project Director (PD) in the MPRDC set up for the implementation of the project. The PD is assisted by PIU, Technical/ Environment and LAQ/ R and R wings at the head office. Various wings are functioning under PIU such as Technical, Environment, LAQ, Administration and Accounts etc.

An **Environmental Management - Plan Implementation Unit (EM-PIU)** has been created in Project Implementation Unit (PIU) and a Sr. Environmental Specialist Environment has been positioned for the overall functioning of the EM-PIU. The main activities of the EM-PIU can be divided into two categories i.e., Forestry and Environment. Forestry related activities include diversion of forest land, compensatory afforestation, avenue plantation, plantation in oxbow land etc. while environment related activities include statutory clearances, implementation of EMP through Contractor, Grievance Redress, and Training etc. An Assistant Conservator of Forest (ACF), Range Forest Officer (RFO) and Deputy RFO, assist the Sr. Environmental Specialist for forestry related activities. For environment related activities, **1. Assistant Executive Engineer (AEE)** and **2. Assistant Engineer (AE)** has been proposed for MPRDC - VIII. Position of one AEE and one AE are already sanctioned while another position of AEE and EE are to be sanctioned.

Project Director will be heading the overall functioning of the PIU. The Executive Engineers (EEs) and supporting staff as employer’s representatives nominated for the project will be responsible for the implementation of the project under the divisions. The Sr. Environmental Specialist of the EM-PIU will look after the forestry and environmental issues during the project preparation, implementation and operation with the assistance of the Sr. Environmental Specialist of the Independent Engineer (IE). The contractor will be responsible for implementation of the EMP in the field. The “Contractors” herein mean the agency hired for execution of the construction works for the respective packages and organizational setup of for PIU.

1. Implementation Arrangements

The MPRDC is responsible for the implementation of the provisions made within the EMP through Independent Engineer (IE) with the help of project offices. The services of Independent Engineer (IE) will be procured to assist the site offices for monitoring the environmental aspects of the project during implementation. The IE will have a multi-disciplinary team and will also have an environmental management team having intermittent input of a senior level Environmental Specialist (ES) supported by middle level full time Environmental Specialists (one for each package). This team will ensure compliances of mitigation measures and all statutory requirements during implementation and operation of project.

**Independent Engineer (IE):** The Independent Engineer, to be procured through Invitation for Prequalification (ICB) for Engineering, Procurement shall assist the MPRDC with the implementation of project, once the project documents are ready. The Environmental Specialist of the IE shall be the key personnel to ensure the successful implementation of EMP provisions. Since ICB procurement is envisaged, the selected IEs are expected to have the necessary professional (s) to tackle the issues that the project is likely to bring up. The Environmental Specialist of the Independent Engineer will be a key position, which can be leveraged to ensure that the *Contractor* complies with the various EMP requirements.

The EMP prepared for the project road, needs to be followed during the implementation of the civil works. The EMP is integrated in the technical specification and contract documents.

Qualification and Responsibilities of Senior Environmental Specialist of IE:

**Qualifications and Experience**

* Postgraduate in Environmental Management/ Environmental Science/ Ecology/ Environmental Planning/ Degree in Civil Engineering with PG/ Specialization in Environment;
* Approximately 15 years of total experience with a minimum of 10 years in the preparation and implementation of EMP of highway projects and an understanding of environmental, health and safety issues;
* Prior practical experience in Highways Projects funded by Multilateral Agencies.

**Roles and Responsibilities**

* The key responsibility of the Environmental Specialist will be the successful implementation of the EMP;
* In addition, he/ she will update MPRDC on the progress of environmental protection and/ or enhancement works as envisaged in the EMP;
* Supervise and monitor the implementation of EMP by the *Contractor*;
* Review and approve site-specific environmental mitigation/ enhancement designs worked out by the *Contractor* based on the EMP prepared during project preparation;
* Review and recommend the *Contractors’* Implementation Plans for approval (with any changes that may be necessary) to ensure compliance with the environmental provisions of the Contract;
* Monitor tree plantation programs and the periodic Environmental Monitoring (Air, Noise, Water, Soil and Bio-Diversity) programs to ensure compliance with the statutory requirements and the EMP;
* Hold regular meetings with *Contractor* and provide update to MPRDC regarding the progress of environmental works;
* Prepare and submit Monthly, Quarterly, Semi-Annual and Annual Environmental Report to MPRDC;
* Develop and organize environmental training programmes to upgrade the skills within the staff of the environmental cell and the *Contractors*;
* Document and develop good practices during project implementation for wider dissemination.

The project will require continuous environmental supervision from the IE’s side. Since the Sr. Environmental Specialist for IE projects are to be deployed on intermittent basis, it is required to have fulltime Junior Environmental Specialist (JES) to assist the key professional in the area/ region/ state. Field Engineers supervising the construction works also needs to be trained on environmental aspects, who then shall apprise the Team Leader and the Sr. Environmental Specialist of any significant development on Environment.

**Qualification and Responsibilities of Junior Environmental Specialist of IE–Sub–Professional:**

**Qualifications and Experience**

* Postgraduate in Environmental Management/ Environmental Science/ Ecology/ Environmental Planning/ Environmental Engineering;
* Around 7 years of experience with a minimum of 3 years in the preparation and or implementation of EMP of highway projects and an understanding of Environmental, Health and Safety (EHS) issues;
* Prior practical experience in multilateral funded projects in highways sector would be an advantage.

**Roles and Responsibilities**

* The key responsibility of the Environmental Specialist (ES) will be the successful implementation of the Environmental Management Plan (EMP);
* In addition, he/ she will update the Key Environmental Specialist (KES) and the Team Leader **(**TL) of IE on the progress of environmental protection and/ or enhancement works as envisaged in the EMP;
* Regularly supervise and monitor the implementation of EMP by the Contractor;
* Verify the extent of environmental compliance of the *Contractor* regularly;
* Monitor tree plantation programs and the periodic Environmental Monitoring (Air, Water, Noise, Soil and Bio-Diversity) Programs to ensure compliance with the statutory requirements and the EMP;
* Interact and hold regular meetings with Contractor Environmental Officers (CEO) in implementation of the EMP;
* Assist the Key Environmental Specialist (KES) in preparation of Monthly, Quarterly, Semi-Annual and Annual Environmental Reports;
* Assist the Key Environmental Specialist in documenting good practices during project implementation for wider dissemination;
* Regularly monitor the approved site-specific environmental mitigation/ enhancement designs based on the EMP prepared.

**Contractor:** Execution of works will be the responsibility of the PBDPS Contractor (Performance based Deferred Payment System Contractor). The *Contractor* may himself be the executioner of the project or might decide to sublet some part to petty contractor. The *Contractor* shall be responsible for both the jobs done by the petty contactor (if Sub-Let) as well by him. In both the cases the *Contractor* will implement the environmental measures. This has been done with a view to ensure that road construction and environmental management goes together. The *Contractors* shall employ a full time Environmental Officer (EO) whose qualification and responsibilities shall be as stated below:

Qualification and Responsibilities of Environmental Officer (EO) of Contractor

**Qualifications and Experience**

* Postgraduate in Environmental Management/ Environmental Science/ Zoology/ Botany/ Ecology/ Environmental Planning/ Environmental Engineering;
* Around 5 years of experience with a minimum of 2 years in the implementation of EMP of highway projects and an understanding of environmental, health and safety issues;
* Prior practical experience in multilateral funded projects in highways sector would be an advantage.

**Roles and Responsibilities**

* The Environmental Officer shall report directly to the Resident Construction Manager/ Project Manager of the *Contractor* so that the pertinent environmental issues that he raises are promptly dealt with;
* He shall also have a direct interaction with the Environmental Specialist of the IE;
* Monitor/ implement measures laid out in the EMP and or as directed by the IE for the work executed both by petty contractors and the contractor;
* Implement tree plantation programs (if under Contractor’s Scope) and conduct periodic Environmental Monitoring (Air, Water, Noise, Soil and Bio-Diversity) Programs to ensure compliance with the statutory requirements and the EMP;
* Provide key inputs in the development of the Contractors’ implementation plan for all construction activities, including haulage of material to site, adhering to the requirements of the EMP and getting approval of the IE on the same before start of works;
* Ensure that the regulatory permissions required for the construction equipment, vehicles and machinery (given in the EMP) have been obtained and are valid at all times during the execution of the project;
* Prepare/ fill up the environmental and safety related compliances as per Daily, Weekly, Fortnightly, Monthly, Quarterly, Semi-Annual Checklists in the EMP;
* Prepare Safety Plans, Debris and Waste Disposal Plan, Emergency Response Plans and Quarry Management and other Safety, Health and Environment Related Plans for Approval of the IE;
* Identify locations for siting construction camps and other plants, machinery, vehicles and equipment, as well as locations for storage and disposal of wastes, both from the construction camps and from the site and obtain approval for the same from the IE;
* Detail out site-specific environmental mitigation and enhancement measures and obtain approval of the IE for the same;
* Carry out the measurements of environmental mitigation and/ or enhancement works and prepares bills for the same for approval and payment through the IE;
* Ensure that the safety of the workers and other site users is not compromised during construction;
* Ensure that adequate monitoring facilities are available for collecting samples of all discharges from the *Contractor’s* plants, equipment and camps;
* Verify the extent of environmental compliance at sites from where the Contractor is procuring the material – Borrow Area, Quarries, Crushers or Even Sand and Suggest Appropriate Mitigation Measures, if required.

**Penalty Clause:**

* For not employing a full time Environmental Officer (EO), the contractor shall be levied a fine of Rs. 2,000/- every day from his invoice;
* The Environmental Officer shall be approved by the Client;
* In case of non-notified absence of the Environmental Officer (absence to be notified to the authority in writing) for more than 15 days from site, a fine of Rs. 2,000/- per day to be levied on the contractor. Eligibility of leave due to the Environmental Officer shall be as per standard guidelines of the organization.

The environmental officer shall have an environmental, health and safety team to help him in implementing the EMP. These team members may/ may not report to him/ her directly, but shall apprise him of all the incidents and mark a formal report of any incident having an impact on the Health, Environment and Safety (HES) Issues.

**Safety Officer (SO):** The safety officer shall on day to day basis interact and assist the EO in implementation of the safety features mentioned in the EMP. He shall also assist the EO in the preparation and submission of safety plans.

**First Aider/ Medical Officer (MO):** The first aider/ medical officer shall interact and assist the EO in implementation of the health features mentioned in the EMP.

**Duty Officers (DO)/ Supervisors:** The Duty Officers shall on day to day basis, take the necessary mitigation measures as per the directions of the EO, SO and MO and monitor the project facilities and report to the EO on activities that adversely affect the environment in the vicinity.

**Plant Engineer (PE):** The Plant Engineer has the responsibility of managing and controlling the Hot Mix Plant (HMP), crusher unit and fleet of vehicles. He shall ensure that the environment is not degraded at his plant site. Even though the EO shall routinely monitor to detect any negative issues due to operations and bring it to the knowledge of plant manager for taking rectification works. In case of emergency the Plant Engineer (PE) shall immediately notify the EO for necessary actions.

1. Institutional Capacity Building (ICB)

Construction industry of India is an important indicator of the development as it creates investment opportunities across various related sectors. The industry is fragmented, with a handful of major companies involved in the construction activities across all segments; medium sized companies specializing in niche activities; and small and medium contractors, who work on the sub-contractor basis and carry out the work in the field. In the absence of any institutional mechanism for skill formation, construction workers continue to be trained by the traditional master craftsmen. Apart from its inadequacy in quantitative terms, the traditional system neither utilizes new technologies and work methods, nor does it absorb the benefits of Research and Development (R & D).

Therefore, for Successful Implementation of Environmental Management Plan (EMP) it is important to orient Contractor’s supervisory staff as well as key field staff towards Environmental Issues (EI) of Highway Projects, Implementation of Mitigation Measures (IMM), Green Construction Technology (GCT) and Sustainable Environment (SE) to Safeguard Natural Resources (SNR) and Existing Environment (EE). The Environmental Specialist/ Engineers at PIU and Independent Engineer (IE) are also responsible for the implementation of the EMP, need to be trained. To ensure the success of the proposed implementation set up, there is need for training and skill up-gradation. Hence, considering the requirement, the following training program is suggested.

**Training Components**

The environmental training should encompass the following:

* Understanding of the relevant environmental regulations and their application to the project;
* Environmental and Social Issues in Highway Projects;
* Road Safety and Road Safety Audit for Highways;
* Mainstreaming Bio-diversity in Road Transportation Projects for Promoting Smart Green Infrastructure;
* Mitigation measures of noise generated from construction equipment;
* Environmental Monitoring during Construction Stage and Operation Stage;
* Green Highways and Green Infrastructure (GH and GI);
* Use of Waste Plastic in Road Construction;
* ISO-14001: 2004; Environmental Management System/Plan (EMS/P).

**Training Program**

A training program needs to be worked out incorporating the project needs as well as the intermediate - term capacity building needs of the PIU, IE and *Contractor*. The program should consist of a number of training modules specific to target groups. The training would cover the basic principles and postulates of environmental assessment, mitigation plans and program implementation techniques, monitoring and management methods and tools. Looking into the potential requirements of each of the target groups, several training component has been suggested.

Given below is a list of Training Institutes which can be contacted for providing training in various issues related to environmental management as identified in Training Components.

1. Environment Budget

Mitigation/ Enhancement Budget

An environmental management budget of INR 652880 (Six Lakh Fifty Two Thousand Eight Hundred and Eighty only) has been estimated for implementation of the environmental management plan. This budget also includes cost of environmental monitoring and associated trainings. A detail of environmental management budget is given in Table

Table 5 Environmental Monitoring Budget

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| SNO. | ITEM DESCRIPTION | QTY. | UNIT | RATE(Rs.) | AMOUNT(Rs.) | RESPONSIBILITY |
| A | FOREST CLEARANCE AND COMPENSATORY AFFORESTATION | | | | | |
| A.1 | Compensatory afforestation and avenue plantation @1:10 trees including 3 year maintenance | 00 | NO. | 1000 | 00 | PIU through Forest Department |
| B | Environmental Monitoring | | | |  |  |
| B.1 | Ambient air quality monitoring during construction and operation phases (2 times in a year for 2 years or construction period 2 sites and five years during operation/defect liability period, once in a year at two sites | 4 | NO. | 8750 | 20840 | PIU through Forest Department |
| B.2 | Ambient noise monitoring during construction and operation phases (2 times in a year for 2 years or construction period 2 sites and five years during operation/defect liability period, once in a year at two sites | 4 | NO. | 2780 | 11120 |
| B.3 | Water quality monitoring of surface water during construction and operation phases (2 times in a year for 2 years or construction period 2 sites and five years during operation/defect liability period, once in a year at two sites | 4 | NO. | 5210 | 20840 |
| B.4 | Water quality monitoring of Drinking water during construction and operation phases (2 times in a year for 2 years or construction period 2 sites and five years during operation/defect liability period, once in a year at two sites | 4 | NO. | 5130 | 20520 |
| B.5 | Soil quality monitoring during construction and operation phases (2 times in a year for 2 years or construction period 2 sites and five years during operation/defect liability period, once in a year at two sites | 4 | NO. | 9890 | 39560 |
| C | Noise barrier ay Sensitive location | | | |  |  |
|  | Provide the noise barrier at sensitive area likes school and Temples. The noise Barrrier of hollow brick wall reinforced concrete panels with height of 3.5 m .the design of the noise barrier shall be approved by the engineer in charge. | 100 | Rm | 2100 | 210000 | Contractor through BOQ |
| D | Solid Waste Management |  |  |  |  |  |
| D.1 | Solid Waste Management during entire project period | 10 | NO. | 3000/month | 30000 |  |
| E | Dust Suppression |  |  |  |  |  |
| E.1 | Dust Suppression along the entire project length two tankers in a day | 100 | No. | 2000/-per day per tanker | 200000 |  |
| F | Environmental Training |  |  |  |  |  |
| F.1 | Training at site :Two training sessions during construction period | 2 | per sessions | 50000 per session | 100000 | PIU through Forest Department |
|  | Total cost = |  | | | 652880 |  |

1. Overall compliance with mitigation implementation requirements could be described in qualitative terms or be evaluated based on a ranking system, such as the following:

   1. Very Good (All required mitigations implemented);
   2. Good (The majority of required mitigations implemented);
   3. Fair (Some mitigations implemented);
   4. Poor (Few mitigations implemented);
   5. Very Poor (Very few or no mitigations implemented).

   Additional explanatory comments should be provided as necessary. [↑](#footnote-ref-2)
2. Effectiveness of mitigation implementation could be described in qualitative terms or be evaluated based on a ranking system, such as the following:

   1. Very Good (Mitigations are fully effective);
   2. Good (Mitigations are generally effective);
   3. Fair (Mitigations are partially effective);
   4. Poor (Mitigations are generally ineffective);
   5. Very Poor (Mitigations are completely ineffective).

   Additional explanatory comments should be provided as necessary. [↑](#footnote-ref-3)
3. Discharge levels should be compared to the relevant discharge standards and/ or performance indicators noted in the Environmental Management Plan (EMP). Any exceedences should be highlighted for attention and follow-up. In addition, discharge levels could be compared to baseline conditions (if baseline data is available) and described in qualitative terms or be evaluated based on a ranking system, such as the following:

   1. Very Good (Overall conditions are generally improved);
   2. Good (Conditions are maintained or slightly improved);
   3. Fair (Conditions are unchanged);
   4. Poor (Conditions are moderately degraded);
   5. Very Poor (Conditions are significantly degraded).

   Additional explanatory comments should be provided as necessary. [↑](#footnote-ref-4)
4. Overall sector environmental management progress could be described in qualitative terms or be evaluated based on a ranking system, such as the following:

   1. Very Good;
   2. Good;
   3. Fair;
   4. Poor;
   5. Very Poor.

   Additional explanatory comments should be provided as necessary. [↑](#footnote-ref-5)