SECTION VID: ENVIRONMENTAL MANAGEMENT PLAN (EMP)

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1. DHANDHUKA – DHOLERA CORRIDOR

The Contractor shall implement the Environmental Management Plan as part of Work Contract. The Environmental Management Plan (EMP) forms part of the Bid Document. The aspects given in EMP are mandatory in nature and thus, the Contractor is contractually bound to abide by the same.

The Contractor shall take all reasonable steps to protect the environment at on site and off site both and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

It is deemed that the cost of implementing the EMP including safety and enhancement measures are included as the lump sum costs of the bid and no separate payment shall be tenable. All these clauses are applicable to sub-contractors as well. The main Contractor will be held responsible in the case of any non-compliance on part of his sub-contractors. The Engineer shall regularly monitor the compliance of EMP by the Contractor. The Contractor shall regularly monitor the compliance of EMP by their Sub-Contractors if any. The Contractor shall submit monthly environmental compliance reports in the format prescribed by the PIU. (Additional reports / formats shall also be submitted upon request from the PIU / Engineer).

The Contractor shall follow the Environmental Management Plan. The Engineer shall maintain record of compliance or non-compliance of Environmental Management Plan. On observing any non-compliance, the Engineer shall issue a notice to the Contractor, to rectify the same. The Contractor shall implement all mitigation measures for which responsibility is assigned to him as stipulated in the EMP. In case of any failure to rectify the non-compliance within the specified / stipulated timeframe in implementing the EMP, the Contractor is liable for the penalties as mentioned below:

1. All lapses in obtaining clearances / permissions under statutory regulations and violations of any regulations including eco-sensitive areas shall be treated as a **major lapse**.
2. Any complaints of public, within the scope of the Contractor, formally registered with the Engineer, R&BD or with the GoG and communicated to the Contractor, which is not properly addressed within the time period intimated by the Engineer / R & BD, GoG shall be treated as a **major lapse**.
3. Non-conformity to any of the mitigation measures stipulated in the EMP (other than stated above) shall be considered as a **minor lapse**.
4. On observing any lapses (i.e. major & minor), the Engineer shall issue a notice to the Contractor, to rectify the same.
5. Any minor lapse, which is not rectified and/or complied within fifteen days from the notice issued by the Engineer, shall be treated as a **major lapse**.
6. If a major lapse is not rectified upon receiving the notice the Engineer shall invoke deduction, in the subsequent Interim Payment Certificate.
7. **For major lapses**, 0.15% of the Initial Contract Price will be withheld for each notified lapse.
8. If the lapse is not rectified within one month after withholding the payment, **the amount withheld shall be forfeited**. Aggregate forfeited amount shall not exceed 3% of the Initial Contract Price.

The Contractor achieving the compliance to EMP will be appreciated through:

a) Certificate of appreciation from Employer / R&BD with regard to compliance to EMP provisions;
b) The Contractors' environmental performance will be disclosed in the GSHP-II website for their compliance in achieving the EMP.

Various aspects of EMP are presented in the ensuing tables and sections.

Table 1-1: Description of the Environmental Management Measures during Various Stages of the Project

Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
1.	**PRE-CONSTRUCTION STAGE**				
1.1.	**Pre-construction activities by PIU**				
1.1.1.	Utility Relocation and Common Property Resources (CPRs)	Clause 110, Clause 110.1. and 110.7 of MoRT&H specification	• R&B dept. and concerned line departments shall take necessary precautions and shall ascertain necessary barricades/delineation of such sites to prevent accidents including accidental fall into bore holes, pits, drains both during demolition and construction/ relocation of such facilities. Standard safety practices shall be adopted for all such works. • Contractor shall make an inventory and map all the utility services that need to be relocated or shifting from the CoI.	Corridor of Impact (CoI)	R&B Dept.
1.2.	**Pre-construction activities by the Contractor/Engineer**				
1.2.1.	Joint Field Verification		• The Engineer and Contractor shall ascertain the feasibility of implementing the Environmental Management Plan (EMP) through Joint field verification. • Any modification is required to update EMP shall be done by the Contractor in concurrence with Engineer and a copy of the modified EMP shall be submitted to the R&B dept, for review and approval.	Along project road	Contractor under the supervision of the Engineer
1.2.2.	**Procurement of Machinery**				
1.2.2.1	Crushers, Hot- Mix Plants & Batching Plants	Emission control legislations of CPCB/ GPCB for air, noise etc. Clause 111.5 of MoRT&H specification for Pollution from	• The Contractor shall follow all stipulated conditions for pollution control as suggested by the GPCB in the consent / NoC for establishing and operating the Hot-mix and Batching Plant. • No such installation by the Contractor shall be allowed till all the required legal clearances are obtained from the competent authority and the same is submitted to the Engineer / R&B dept. • The location of the hot-mix and batching plant shall	All construction machineries (Crushers, Hot-mix Plants & Batching Plants) should be kept/stationed at least 1000m away from settlements/habitations: Following towns /settlements are indicative	Contractor under the supervision of the Engineer

<table>
<tr><th colspan="2">Environmental Issues</th><th>Ref: Clauses</th><th>Additional Measures to be Adopted by the Contractor</th><th>Location</th><th>Responsibility</th></tr>
<tr><td></td><td></td><td>plants and Batching Plant</td><td>be at least(i) 1000m away from settlements and shall be placed in the downwind direction and (ii) 10 km aerial distance away from the protected areas (sanctuary, national parks etc.).
• All possible efforts shall be undertaken to identify land for establishment of Hot Mix and Batching Plant, where no major alteration will be required compelling a drastic change in landuse.
• The Contractor shall submit the detailed layout plan for approval to the Engineer before getting into formal agreement with landowners for setting up of such site. Actions by Engineer and R&B dept, against any non-compliance shall be borne by the Contractor at his own cost</td><td>only (for reference).
Dhandhuka (Ch. 0+000),
Rojka village (Ch. 7+000)
Bhadiyad (Ch. 16+000),
Dholera (Ch. 27+000)</td><td></td></tr>
<tr><td>1.2.2.2.</td><td>Other Construction Vehicles, Equipment and Machinery</td><td>Discharge standards and Noise limits as per Environment Protection Act, 1986
Emission standards as per Bureau of Indian Standard (BIS) preferably Bharat IV emission norms</td><td>• Equipment’s conforming to the latest noise and emission control measures shall be used.
• Pollution under Control (PUC) certificates for all vehicles and machinery shall be made available to the Engineer / R&B dept for verification when ever required.</td><td>Along project road</td><td>Contractor under the supervision of the Engineer</td></tr>
<tr><td>1.2.3.</td><td colspan="5">Identification & Selection of Material Sources</td></tr>
<tr><td>1.2.3.1.</td><td>Borrow Areas</td><td>Clause 305.2.2 of MoRT&H Specification for borrow material & Clause 111.2 of MoRT&H</td><td>• The Engineer shall inspect every borrow area location prior to issuing approval for use of such sites.
• Care shall be taken to avoid agriculture areas for planning haul roads for accessing borrow materials. In case of damage, the Contractor shall be solely</td><td>Source of identified borrow area location along the road are as follows:
<table><tr><th>Ch. (Km)</th><th>Dist.(m)</th><th>Side</th></tr><tr><td>1+000</td><td>200</td><td>LHS</td></tr></table></td><td>Contractor under the supervision of the Engineer</td></tr>
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Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
		Specification for borrow pits for embankment construction	responsible and shall rehabilitate it, as approved by Engineer / R&B dept. • All borrow areas shall be restored either to the original condition or as per the approved rehabilitation plan by the Engineer, immediately upon completion of the use of such a source. • Contractor shall obtain Environmental Clearance/Approvals for uses of each and every borrow area, prior to take approval from the engineer.	3+960 150 RHS 7+850 50 RHS 11+950 50 LHS 14+400 50 RHS 22+350 500 LHS	
1.2.3.2.	Quarries	Clause 111.3 of MoRT&H Specification for Quarry Operation	• No quarry and/or crusher units shall be established within 1000m aerial distance from any of the residential / settlement/habitations locations, forest boundary, wildlife movement path, breeding and nesting habitats and national parks/sanctuaries. • Contractor shall work out haul road network to be used for transport of quarry materials and report to Engineer who shall inspect and approve the same.	Below mentions are indicative locations only for reference. Dhandhuka (Ch. 0+000) Rojka village (Ch. 7+000) Bhadiyad (Ch. 16+000) Dholera(Ch. 27+000)	Contractor under the supervision of the Engineer
1.2.3.3.	Arrangement for Construction Water		• The contractor shall source the requirement of water preferably from surface water bodies, rivers, canals and tanks in the project area with the necessary approval from the concern authority. • To avoid disruption/disturbance to other water users, the contractor shall extract water from fixed locations. The contractor shall consult the local people before finalizing the locations. • Only at locations where surface water sources are not available, the contractor can contemplate extraction of ground water, after intimation and consent from the Engineer • The contractor shall comply with the requirements of Central Ground Water Board, West Central Region (WCR), Ahmadabad, Gujarat and seek their approval for extraction of groundwater.	All rivers / surface water bodies that can be utilized within the project area	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
1.2.3.4.	Sand (all river and stream beds used directly or indirectly for the project)	Clause 111.3 of MoRT&H Specification for Quarry Operation	• In case of selection of new sites for sand quarrying, the Contractor shall obtain prior approval and concurrence from Competent District Authority. • To avoid accidents and caving in of sand banks at quarry sites, sand shall be removed layer by layer. Digging deeper than the permissible limit (0.9 meter) shall not be allowed. Such quarry shall be barricaded 10m away from the periphery on all sides except the entry point, so as to prevent accidental fall of domestic cattle, wildlife and human beings.	Nearest sand quarries locations: Fadiya River (Nagnesar)	Contractor under the supervision of the Engineer
1.2.4.	**Setting up construction sites**				
1.2.4.1	Construction Camp Locations – Selection, Design & Layout	Clause 111.8.4 of MoRTH Specification for Construction Camps	Construction camps shall not be proposed: (i) Within 1000m of ecologically sensitive areas (if any) (ii) Within 1000m from the nearest habitation to avoid conflicts and stress over the infrastructure facilities, with the local community	Ecologically Sensitive areas: Back water body from Ch. 23+200 to Ch. 27+000. Acting as halt for the migratory birds during **winter season and remain dry during summer season.** **Following settlement locations are indicative only**: Dhandhuka (Ch.0+000), Rojka village (Ch.7+000) Bhadiyad (Ch.16+000) and Dholera(Ch.27+000)	Contractor under the supervision of the Engineer
1.2.4.2.	Arrangements for Temporary Land Requirement	Clause 108.3 of MoRT&H Specification	• The Engineer shall ensure that the temporary site is cleared prior to handing over to the owner (after construction or completion of the activity) and it is included in the contract	Areas temporarily acquired for construction sites / hot mix plants / borrow areas / diversions /detours	Contractor under the supervision of the Engineer
1.2.4.3.	Stock-yards	Clause 105.7 of MoRTH Specification for	• The Contractor shall identify the location for stock yards for construction materials at least 1000m away from watercourses.	Surface water sources along the road are given in the *Table 1.2 & 1.3 of*	Contractor under the supervision of

Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
		Delivery, Storage and Handling of Materials	• Separate enclosures shall be planned for storing construction materials containing fine particles such that sediment-laden water does not drain into nearby storm water drains	*Section VID; Part-2.* Some surface water pond remains dry during summer.	the Engineer
1.2.4.4.	Fuel storage and re-fuelling areas	**Clause 2.1.1.6 of EMP (**Stripping of Soil**) Clause 2.1.4.1.2 of EMP (**dispose the spent oil and grease**)**	• The Contractor shall ensure that all construction vehicle parking locations, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites are located at least 1000 m from rivers and irrigation canal/ponds.	Surface water sources along the road are given in the *Table 1.2 & 1.3 of Section VID; Part-2.* Some surface water pond remains dry during summer.	Contractor under the supervision of the Engineer
1.2.5.	**Labour Camp Management**				
1.2.5.1	Location of Construction labour camps: Accommodation	**Factories Act, 1948** and **Building & other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 (**construction & maintenance of labor camp**)**	• The Contractor shall provide, if required, erect and maintain necessary (temporary) living accommodation and ancillary facilities for labourers, to standards approved by the Engineer. • Labour camps shall not be located within 1000 m from the nearest habitation to avoid conflicts and stress over the infrastructure facilities, with the local community. The location, layout and basic facility provision of labour camps shall be submitted to Engineer for approval prior to construction.	Along the project road at the location of construction labor camps	Contractor under the supervision of the Engineer
1.2.5.2	Potable Water	**The Contract Labour (Regulation and Abolition) Act, 1970** and **Factories Act, 1948**	• The Contractor shall supply portable water through municipal/ panchayat sources. In case of groundwater it shall be treated prior to supply.	Construction labor camps	Contractor under the supervision of the Engineer
1.2.5.3	Sanitation facilities	**Factories Act, 1948** for sanitation Clause 111.9 of MoRTH	• The sanitation facilities for the camp shall be designed, built and operated in such a fashion that no health hazards occurs and no pollution to the air, ground water or adjacent water courses take place.	Construction labor camps	Contractor under the supervision of the Engineer

<table>
<tr><th colspan="2">Environmental Issues</th><th>Ref: Clauses</th><th>Additional Measures to be Adopted by the Contractor</th><th>Location</th><th>Responsibility</th></tr>
<tr><td></td><td></td><td>Specification for Occupational Health and Safety of the Workforce</td><td>• No shared toilet facility shall be closer than 100 feet to any sleeping room, dining room, lunch area, or kitchen.
• Floor drains shall be provided in all bathrooms.
• Each toilet rooms, bathing rooms and washing area shall be lighted naturally or artificially by a safe type of lighting at all hours of the day and night.</td><td></td><td></td></tr>
<tr><td>1.2.5.4</td><td>Waste Disposal</td><td>Clause 301.2.10 of MoRTH Specification for Use and Disposal of Excavated Materials.
Clause 201.4 and 202.5 of MoRTH Specification for Disposal of Material.
Municipal Solid Waste Management Rules - 2016 for effective waste disposal</td><td>• The contractor shall provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner.
• Municipal Waste shall be disposed at designated disposal sites as advised by the local Panchayat body or the municipal corporation
• The Contractor shall prepare SWM plan and implement by appointing a facilitating agency.</td><td>• Construction labor camps
• Waste collecting bins/ dust bins shall be provided on both side at start and end of the following locations or as directed by the Engineer.
<table><tr><th colspan="2">Design Ch. (km)</th><th>Remarks</th></tr><tr><td>0.000</td><td>1.500</td><td>Dhandhuka</td></tr><tr><td>6.700</td><td>7.800</td><td>Rojka</td></tr><tr><td>22.400</td><td>23.000</td><td>Bhadiyad</td></tr></table></td><td>Contractor under the supervision of the Engineer</td></tr>
<tr><td>1.2.5.5</td><td>HIV/ AIDS Prevention Measures</td><td>Clause 111.9 of MoRTH Specification for Occupational Health and Safety of the Workforce.

ESGP 12</td><td>The Contractor shall implement the following measures towards ensuring HIV/AIDS prevention during the entire Construction period.
• Conduct awareness campaign including dissemination of IEC materials (posters, pamphlets, stagers, ribbon etc.) on HIV/AIDS for all construction personnel(including labourers, supervisors, engineers and consultants) on HIV/AIDS/STDs within three months of mobilization and once a Quarter subsequently during the construction period and six monthly</td><td>Construction site, workshop area, plant area & labour camps</td><td>Contractor under the supervision of the Engineer</td></tr>
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Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
			during the operation; • Carry out screening of construction personnel for HIV/AIDS, within a quarter of mobilization • Conduct quarterly health check-up of all construction personnel including testing for STDs; • Minimum five HIV/AIDS awareness posters shall be displayed at each locations *i.e.* labour camp, construction site, vehicle repairing workshops, HMP, Batching plant and crusher plant etc. • Erect and maintain hoardings/ information signages on HIV/AIDS prevention at the construction sites, labour camps and truck parking locations; • Install two numbers of condom vending machines at the construction camp and plant site/labour camps, including fortnightly replenishment of supplies.		
2.	**CONSTRUCTION STAGE**				
2.1.	**Construction Stage Activities by Contractor**				
2.1.1.	**Site Clearance**				
2.1.1.1.	Clearing and Grubbing	Clause 201 of MoRT&H Specification	• All works shall be carried out in a manner such that the damage or disruption to flora is minimum. Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works shall be removed with prior approval from Engineer. • In areas where grass or any form of vegetation is found, efforts to conserve topsoil shall be undertaken. • Top soil (10 cm) shall be preserved and stockpile	Along project road at construction sites	
2.1.1.2.	Dismantling of Bridgework/ Culverts	Clause 202 of MoRT&H Specification Construction and Demolition Waste Management	• The contractor shall follow all necessary measures (including safety) especially while working close to cross drainage channels to prevent earthwork, stonework, materials and appendage from impeding cross drainage at rivers, streams, water canals and existing irrigation and drainage systems. • All reusable materials can be stacked and treated	At locations where bridge works and culverts are proposed. There are 48 existing culverts in addition 6 more culverts are added to ease the flooding/ drainage	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
		Rules 2016	separately. All possible efforts to reuse, recycle and reduce waste quantity shall be undertaken.	issues.	
2.1.1.3.	Generation & disposal of Debris	Clause 202.5 of MoRT&H. Specification for disposal of materials Construction and Demolition Waste Management Rules 2016	• Disposal of unutilized non-toxic debris shall be either through filling up of borrow areas or at pre-designated disposal sites, subject to the approval of the Engineer. • At locations identified for disposal of residual bituminous wastes, the disposal shall be carried out over a 60 mm thick layer of rammed clay so as to eliminate the possibility of leaching of wastes into the groundwater. • Debris generated from pile driving or other construction activities along the rivers, streams and drainage channels shall be carefully disposed in such a manner that it does not flow into the surface water bodies or form puddles in the area. • The pre-designated disposal locations shall be part of **Comprehensive Solid Waste Management Plan** to be prepared by Contractor in consultation and with approval of Engineer.	Throughout Project road	Contractor under the supervision of the Engineer
2.1.1.4.	Non-bituminous construction wastes disposal	Clause 202 of MoRT&H Specification for Dismantling Clverts, Bridges and Other Structures/ Pavements	• The contractor shall finalize the location of disposal site based on the following. o not located within designated forest area o does not impact natural drainage courses o No endangered/rare flora is impacted by such dumping. o Settlements are located at least 1000m away from the site. The Engineer shall approve disposal sites after conformation of above criteria.	Disposal site locations	Contractor under the supervision of the Engineer
2.1.1.5.	Bituminous wastes disposal	Annex "A" for Protection of the Environment of Clause 501 of	• The disposal of residual bituminous wastes shall be done by the contractor at secure land fill sites, with the requisite approvals from the concerned government agencies.	Disposal site locations	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
		MoRT&H Specification			
2.1.1.6.	Stripping, stacking and preservation of top soil	Clause 301.3.2 of MoRT&H. Specification for stripping and storing topsoil. Clause 305.3.3 of MoRT&H. Specification for construction and for embankments Clause 301.7 of MoRT&H. Specification for preservation of Top Soil.	• Contractor shall strip the topsoil at all locations opened up for construction, including temporarily acquired land for traffic detours, storage, materials handling or any other construction related or incidental activities. • Segregated topsoil shall be stored in stockpiles of 1 to 1.25-m height. The stockpiles shall be located such that disturbance to construction work is minimal. • In dry weather conditions (between Feb - June), topsoil stacks shall be sprinkled with water on all sides to keep the moisture content of the stack.	At all construction sites	Contractor under the supervision of the Engineer
2.1.1.7.	Accessibility		• The Contractor shall provide safe and convenient passage for vehicles; pedestrians and livestock to and from roadsides and property accesses by providing temporary connecting road, as necessary. • Construction activities that shall affect the use of side roads and existing accesses to individual properties, whether public or private, shall not be undertaken without providing adequate provisions to ensure uninterrupted access, as approved by the Engineer. • The Contractor shall take care that the cross roads are constructed in such a sequence that construction work over the adjacent cross roads are taken up in a manner that traffic movement in any given area does not get affected.	Throughout Project road	Contractor under the supervision of the Engineer
2.1.1.8.	Planning for Traffic Diversions and Detours	Clause 112 of MoRT&H	• Detailed traffic control plans shall be prepared by the contractor and the same shall be submitted to the	All along the project road, all access roads.	Contractor under the

Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
		Specification	Engineer. • The Contractor shall provide specific measures for safety of pedestrians and workers as a part of traffic control plans. The Contractor shall ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. • Contractor shall follow IRC: SP: 55-2014 for traffic diversion. The colour and size of the Work zone signs are as per IRC: SP: 55-2014 (Guidelines on Traffic Management in work zones). • The Contractor shall inform local community of changes in traffic routes and pedestrian access arrangements with assistance from Engineer and PIU.	Attention is required at: Dhandhuka (Ch. 0+000), Rojka village (Ch. 7+000), Bhadiyad (Ch. 16+000),& Dholera (Ch. 27+000)	supervision of the Engineer
2.1.2.	**Construction Materials**				
2.1.2.1.	Earth from Borrow Areas for Construction	IRC 010-1961 (procurement of earth materials) Clause 111.2 of MoRTH Specification	The mitigation strategy in the form of Development and rehabilitation Plan shall be prepared by Contractor The borrow pits shall not be left in a condition likely to cause hazard to human and animal life. The contractor shall seek prior approval from the concern authorities for operating the borrow pit.	All along the project road, all access roads, temporarily acquired sites & all borrow areas	Contractor under the supervision of the Engineer
2.1.2.2.	Transporting Construction Materials	Clause 111.9 of MoRT&H Specification	All vehicles delivering materials to the site shall be covered to avoid spillage of materials. The unloading of materials at construction sites closeto settlements shall be restricted to day time only.	All along the Project road and all haul roads	Contractor under the supervision of the Engineer
2.1.3.	**Construction work**				
2.1.3.1.	Disruption to other users of Water	Annex "A" of Clause 501 of MoRTH Specification for Protection of the Environment and	In case of diversion of water bodies, the Contractor shall take prior approval of the Irrigation Department and Engineer for any such activity. The PIU shall ensure that Contractor has served the notice to the downstream users of water well in advance where such diversion of the flow is likely to affect the downstream population	Narmada Canal at Ch. 2+157	Contractor under the supervision of the PIU

Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
		Water Quality	subject to the condition that under no circumstances the downstream flow shall be stopped.		
2.1.3.2.	Drainage and Flood Control	Clause 202 of MoRT&H Specification	• Contractor shall ensure that construction materials like earth, stone, ash or appendage disposed off does not block the flow of water of any water course and cross drainage channels. • Where necessary, adequate mechanical devices to bailout accumulated water from construction sites, camp sites, storage yard, excavation areas are to be arranged well in advance before the rainy season besides providing temporary cross drainage systems. • The contractor shall take all adequate precautions to ensure that construction materials and excavated materials are enclosed in such a manner that erosion or run-off of sediments is controlled. Silt fencing shall be installed prior to the onset of the monsoon at all the required locations, as directed by Engineer and PIU. • The contractor shall ensure that no material blocks the natural flow of water in any water course or cross drainage channel. Prior to monsoon, the contractor shall provide either permanent or temporary drains to prevent water	All Surface water sources/ drains/ Nalahs/ Natural and artificial ponds along the road. Silt fencing should be given near surface water locations given in *Table 1.2 & 1.3.*	Contractor under the supervision of the Engineer
2.1.3.3.	Siltation of Water Bodies and Degradation of Water Quality	Clause 306 of MoRT&H for soil erosion and sedimentation control	• Contractor shall ensure that construction materials like earth, stone, ash or appendage disposed off does not block the flow of water of any water course and cross drainage channels. • Silt fencing shall be proposed for all the effected water bodies along the road.	All Surface water sources/ drains/ Nalas/ Natural and artificial ponds along the road. Silt fencing should be given near surface water locations given in *Table 1.2 & 1.3.*	Contractor under the supervision of the Engineer
2.1.3.4.	Slope Protection and Control of Soil Erosion	Clause 306 of MoRT&H for soil erosion and	• The contractor shall construct slope protection works as per design, or as directed by the Engineer	High raise embankment and surface water bodies locations	Contractor under the supervision of

Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
		sedimentation control Clause 307 of MoRT&H for Turfing works Clause 308 of MoRT&H for other measures of Slope Protection		Stone Pitching method at all canal crossing locations.	the Engineer
2.1.4.	**Pollution Control**				
2.1.4.1.1.	Water Pollution from Construction Wastes	CPCB Schedule VI - General Standards for Discharge of Environmental Pollutants (Liquid Waste Disposal) The Environment (Protection) Rules, 1986 and Water Act, 1974	• The Contractor shall take all precautionary measures to prevent the wastewater generated during construction from entering into streams, water bodies or the irrigation channels. • Contractor shall avoid construction works close to the streams or water bodies during monsoon.	All Surface water sources/ drains/ Nalahs/ Natural and artificial ponds along the road. Silt fencing should be given near surface water locations given in *Table 1.3.*	Contractor under the supervision of the Engineer
2.1.4.1.2.	Water Pollution from Fuel, Lubricants and Chemicals	**Environment (Protection) Rules, 1986 (Standards for Emission or Discharge of Environmental Pollutants Schedule – I**) for Liquid Waste Disposal **Clause 111.** (Precaution and Safeguarding the	• Oil interceptors shall be provided for vehicle parking, wash down and refueling areas. • In all, fuel storage and refueling areas, if located on agricultural land or areas supporting vegetation, the top soil shall best ripped, stockpiled and returned after cessation of such storage.	All Surface water sources/ drains/ Nalahs/ Natural and artificial ponds along the road. Silt fencing should be given near surface water locations given in *Table 1.3.*	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
		Environment) **Annexure 'A'** to **Clause 501** (Protection of Environment)			
2.1.4.2.	**Air Pollution**				
2.1.4.2.1.	Dust Pollution	Annex 'A' to Clause 501 (Protection of Environment) - Section 3 Air Quality Clause 111.5. of MoRT&H. (Hot Mix Plant and Batch Mix Plant)	• The conditions for pollution control given in the NOC *i.e.* (consent to establish (CTE) and Consolidated Consent and Authorization (CCA)) by the GPCB shall be strictly followed. • Air pollution monitoring shall be conducted as per the Environmental Monitoring Plan and results shall be used to identify any additional pollution control measures required tobe adopted.	Construction area/ site, Construction camps, Materials Loading/ unloadingfacilities	Contractor under the supervision of the Engineer
2.1.4.2.2.	Emission from Construction Vehicles, Equipment and Machineries	Schedule-I: Standards for Emission suggested by CPCB/ GPCB	• Certification issued for such contrivances obtained from designated/approved authority shall be submitted along with the specified reporting format to the Engineer. • The contractor shall maintain a separate file and submit PUC certificates for all vehicles/equipment/machinery used for the project. Monitoring results shall be submitted to Engineer and PIU.	Construction camps, Materials Loading / unloading facilities	Contractor under the supervision of the Engineer
2.1.4.3.	**Noise Pollution**				
2.1.4.3.1.	Noise Pollution: Noise from Vehicles, Plants and Equipments	Noise Limits for vehicles (Environment Protection Amendment Rules, 2000) and Part 'E', Schedule – VI of Environment	• All plants and equipment used in construction shall strictly conform to the MoEF&CC/ CPCB noise standards. • Noisy construction activities (such as crushing, concrete mixing, batching etc.) within 150m of the nearest habitation/ educational institutes/health centers (silence zones) shall be stopped during the night time between 9.00 pm to 6.00am.	Ecologically Sensitive areas: Back water Body from Ch. 23+200 to Ch. 27+000. Acting as halt for the migratory birds during **winter season and remain dry during summer season.**	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
		(Protection) Rules, 1986. Clause 5A The Noise Pollution (Regulation and Control) Rules, 2000 (sound emitting construction equipments) Clause 201.2 of MoRT&H Specification for Idling of temporary trucks	• Contractor shall provide noise barriers to the suggested locations of select schools/ Temples/health centers prior to commencement of work. • Monitoring shall be carried out at the construction sites as per the monitoring schedule and results shall be submitted to Engineer. Based on the monitoring results, the Engineer, if required, shall recommend any additional noise mitigation measures required to be implemented by the Contractor.	Indicative residential area along the road are as follows for reference only: Dhandhuka (Ch. 0+000), Rojka (Ch. 7+000), Bhadiyad (Ch. 16+000) and Dholera (Ch. 27+000)	
2.1.4.4.	**Safety**				
2.1.4.4.1	Safety Procedures	Clause 111.11 of MoRTH Specification for Occupational Health and Safety of the Workforce Clause 112 of MoRTH Specification for Arrangement of Traffic during Construction Building and Other Construction Workers (Regulation of Employment and Conditions of	The Contractor shall: • Comply with all applicable safety regulations such as IRC SP 55 2014 for Traffic Safety during the construction and operation • Take care for the safety of all persons entitled to be on the Site, • Use reasonable efforts to keep the site and works clear of unnecessary obstruction so as to avoid danger to these persons, • Provide fencing, lighting, guarding and watching of the works until completion and taking over and provide any temporary works (including roadways, footways, guards and fences) which may be necessary, because of the execution of the works, for the use and protection of the public and of owners and occupiers of adjacent land.	All construction sites	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
		Services) Act, 1996			
2.1.4.4.2	Care and supply of documents		• The contractor shall prepare, submit and obtain approval of the Engineer for construction Safety Management Plan 14 days prior to commencement of construction works at site.		Contractor under the supervision of the Engineer
2.1.4.4.3	Contractors general obligations		• All design calculations and fabrication drawings for temporary works (such as form-work, staging, centering, scaffolding, specialized construction, handling and launching equipment and the like)material lists for structural fabrication as well as detailed drawings for templates, and anchorage and temporary support details for pre-stressing cables as well as bar bending and cutting schedules for reinforcement, etc. shall be prepared by the contractor at his own cost and forwarded to the Engineer at least six weeks in advance of actual constructional requirements. The Engineer will check the same for the contractor's use with amendments.		Contractor under the supervision of the Engineer
2.1.4.4.4	Personal Safety Measures for Labour, Material handling , Painting etc.	**Factory Act, 1948, Factories (Amendment) Act, 1987 (Chapter -5 Safety) Building and Other Construction Workers (Regulation of Employment and Conditions of Services) Act,**	• Construction Safety Plan shall be prepared by the Contractor during mobilization and approved by Engineer shall be adhered to by the Contractor throughout the construction period, and shall include provision of. • Protective footwear and protective goggles to all workers employed in mixing asphalt materials, cement, lime mortars, concrete *etc.* • Welders protective eye-shields to workers engaged in welding works • Protective goggles and clothing to workers engaged in stone breaking activities and workers shall be seated at sufficiently safe intervals • The contractor shall comply with all regulations	All construction sites	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
		1996	regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress. • The contractor shall ensure that no paint containing lead or lead products is used except in the form of paste or readymade paint. • Contractor shall provide facemasks to the workers when paint is applied in the form of spray or a surface having dry lead paint is rubbed and scrapped. • The Contractor shall mark 'hard hat' and 'no smoking' and other 'high risk' areas and enforce non-compliance of use of PPE with zero tolerance.		
2.1.4.4.5	Health and Safety	ESGP 12 Clause 111.11 of MoRTH Specification for Occupational Health and Safety of the Workforce	• The Contractor at all times shall take all reasonable precautions to maintain the health and safety of the contractor's personnel. In collaboration with local health authorities, the contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times at the site. • The contractor shall appoint an accident prevention officer at the site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents. Throughout the execution of the works, the contractor shall provide whatever is required by this person to exercise this responsibility and authority. • The contractor shall send, to the Engineer, details of any accident as soon as practicable after its occurrence. • The contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the Engineer	All construction sites and labour camps	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
			may reasonably require.		
2.1.4.4.6	Traffic Safety & Pedestrian Safety	Clause 112 of MoRT&H Specification for Arrangement of Traffic during Construction	• All safety sign boards should be place as per IRC SP 55 2014. • Pedestrian Safety shall be ensured. Pedestrian circulation shall be demarcated prior to start & unsafe areas shall be cordoned off.	All along the project road	Contractor under the supervision of the Engineer
2.1.4.4.7	Risk from Electrical Equipment(s)	**Factory Act, 1948 – Chapter -5 (Safety)** and **Factories (Amendment) Act, 1987**	• No material shall be so stacked or placed as to cause danger or inconvenience to any person or the public. • All machines to be used in the construction shall conform to the relevant Indian Standards (IS) codes, shall be free from patent defect, shall be kept in good working order, shall be regularly inspected and properly maintained as per IS provision and to the satisfaction of the Engineer	All construction equipment	Contractor under the supervision of the Engineer
2.1.4.4.8	Safety during Road Works	Clause 112.4 of MoRT&H Specification for Traffic safety Clause 112.5 of MoRT&H Specification for Maintenance and Diversions IRC:SP:55 for Road signage & markings	• The contractor shall provide adequate signage and markings as per the instruction of the Engineer in the construction zones. • Contractor shall follow IRC: SP: 55-2014 for traffic diversion. The colour and size of the Work zone signs are as per IRC: SP: 55-2014 (Guidelines on Traffic Management in work zones).	All along the project road and all haul roads	Contractor under the supervision of the Engineer
2.1.4.4.9	First Aid	Section 36 (First Aid) of Building and the other Construction Workers (Regulation of Employment and	• First aid measure shall be provided in the construction zones and labour camps.	All construction sites and labour camps	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
		Conditions of Service) Act, 1996			
2.1.4.5.	**Cultural Property**				
2.1.4.5.1.	Chance Found Archaeological Property	Ancient Monuments and Archaeological Sites and Remains Rules 1959 Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act 2010	• All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site are the property of the Government and shall be dealt with as per provisions of the relevant legislation. • The contractor shall take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or thing.	Along the project road	Contractor under the supervision of the Engineer
2.2.	**Environmental enhancement and special issues**				
			•		
2.2.1.	Rehabilitation/ Enhancement of Community Cultural and Religious Properties and Water Resources	Physical Cultural Resources (WB OP/BP 4.11)	• The architectural elements of the structure shall be conserved/reflected/translated into the design of new structures/ enhancements in accordance with wishes of the community.	As per the enhancement locations provided under the *Table 1.2 & 1.4 of Section VID; Part-2.*	Contractor under the supervision of the Engineer
2.2.2.	Flora and Chance found Fauna	Wild Life Protection Act 1972	• The contractor shall take reasonable precaution to prevent his workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal. • If any wild animal is found near the construction site at any point of time, the contractor shall acquaint the Engineer and execute the Engineer's instructions for dealing with the same. • The Engineer shall report to the nearby forest office (range office) and shall take appropriate steps/ measures in consultation with the forest officials.	Ecologically Sensitive areas: Back water Body from Ch. 23+200 to Ch. 27+000. Acting as halt for the migratory birds during **winter season and remain dry during summer season.**	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
2.2.3.	Sensitive Receptors		• Sensitive receptors like schools, hospitals shall be provided with permanent noise barriers prior to the start of work in order to minimize the dust and noise impacts due to vehicle movement (during / post construction). Their effectiveness to be checked during operation phase. • Construction activities shall be confined within the present available CoI, regularly strict monitoring/supervision shall be done to minimize/control air-noise pollution and abatement of dust particles at minimum level possible using well maintained modern machineries.	Indicative sensitive receptors along the road are as follows for reference only: Dhandhuka (Ch.0+000), Rojka (Ch.7+000), Bhadiyad (Ch.16+000) & Dholera (Ch.27+000)	Contractor under the supervision of the Engineer
2.3.	**Contractor Demobilization**				
2.3.1.	Clearing of Construction of Camps & Restoration/ Rehabilitation	Clause 111.8.4 of MoRTH specification Clause 111.16 of MoRTH specification ESGP 02	• Contractor to prepare site restoration plans for approval by the Engineer. The plan shall be implemented by the Contractor prior to demobilization. • On completion of the works, all temporary structures shall be cleared, all rubbish burnt, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the Contractor's expense, to the entire satisfaction of the Engineer. • The topsoil removed and conserved earlier shall be spread over the restoration area as per the direction of the Engineer to facilitate the growth of vegetation. • Residual topsoil shall be distributed on adjoining/proximate barren/rocky areas as identified by the Engineer in a layerof thickness of 75mm – 150mm.	All Construction Workers' Camps	Contractor under the supervision of the Engineer
2.3.2.	Redevelopment of Borrow Areas	Clause 305.2.2.2 of MoRTH specification ESGP 03	• Redevelopment of borrow areas shall be taken up in accordance with the plans approved by the Engineer	Some identified borrow area locations but not limited to along the road are given in above point	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
				no. 1.2.3.1.	
3.	**OPERATION STAGE (Activities to be Carried Out by the Contractor/R&BD/PIU)**				
3.1	Monitoring and Evaluation of Operational Performance of Environmental Mitigation Measures		• The PIU shall monitor the operational performance of the various mitigation/ enhancement measures carried out as a part of the project. Monitoring and performance indicators have been indicated in **Environmental Monitoring Plan (*Table 1.7*).**	All along the project road	Contractor under the supervision of the Engineer
3.2	Maintenance of Drainage		• PIU shall 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 without damaging the spurs and check dams erected to stabilize the course and flow of all such drainage channels. • PIU shall ensure that all the sediment/oil and grease traps setup at the water bodies are cleared once in every three months.	At locations were bridge works and culverts are proposed. There are 48 existing culverts in addition 6 more culverts are added to ease the flooding/ drainage issues	Contractor under the supervision of the Engineer
3.3	Pollution Monitoring		• The periodic monitoring of the ambient air quality, noise level, water (both ground and surface water) quality, soil pollution / contamination are to be continued at pre-designated locations as identified in the **Environmental Monitoring Plan (*Table 1.7*)** and if necessary, at additional locations for comparative study of pre and post operation data in order to ensure further improvement/modification in similar future works.	All along the project road	Contractor under the supervision of the Engineer
3.4	Atmospheric Pollution		• Ambient air concentrations of various pollutants shall be monitored as envisaged in the Environmental Monitoring Plan at pre designated locations to compare the levels with the pre- construction data. • Additional data at other location may be collected as per any site specific requirement.	All along the project road	Contractor under the supervision of the Engineer
3.5	Noise Pollution		• Noise pollution shall be monitored as per	All along the project road	Contractor

Environmental Issues		Ref: Clauses	Additional Measures to be Adopted by the Contractor	Location	Responsibility
			Environmental Monitoring Plan at sensitive locations where pre-construction noise data was collected. The functioning of the noise barriers shall be supervised and monitored for further improvement/replication at other affected points if necessary. • Signage near sensitive locations shall be maintained and kept clean. Monitoring the effectiveness of the pollution attenuation measures shall be taken up as per **Environmental Monitoring Plan (*Table 1.7*).**		under the supervision of the Engineer
3.6	Soil Erosion and Monitoring of Borrow Areas		• Visual monitoring and inspection of soil erosion at borrow areas, quarries (if closed and rehabilitated), embankments and other places expected to be affected, shall be carried to record and monitor the effectiveness of such structures after the completion of project, so as to evaluate the beneficial effects of each type of activity together with the cost involved.	Some identified borrow area location along the road are given in above point no. 1.2.3.1.	Contractor under the supervision of the Engineer
3.7	Road Safety and Maintenance of Assets	Clause 3000 of MoRTH Specification for Maintenance of Road IRC: SP :55 for Traffic Safety	• No advertisement/hoardings shall be allowed within the Right of Way limits of the project road. • Regular maintenance and cleaning of assets such as signboards, bus stops, drains etc. shall be undertaken. • Contractor shall follow IRC: SP: 55-2014 for colour and size of the road signs.	All along the project road	Contractor under the supervision of the Engineer
3.8	Enhancement Measures		• Watering for the trees and re-plantation of the dead trees at all identified enhancement locations. • Replenishment of the damage tree guard. • Cleaning and damage control of the sign boards. • Repair or reinstall all the non functional solar lights • Repair or reinstall damage sitting benching	Identified enhancement locations are given in the *Table 1.2 & 1.4 of Section VID; Part 2.*	Contractor under the supervision of the Engineer

Environmental Enhancement Measures:

There are several properties including cultural and community properties that are identified along the project road those warrant restoration / enhancement measures as a part of better environmental management plan implementation practices. The selection is based on the consultation held with the local people / communities and engineering interventions in finalizing the alignment.

Enhancement of Water Bodies / Ponds

Most of the water bodies along the road are ponds. The criteria to enhance these water bodies are;

(i) To increase water holding capacity
(ii) Easy access to the community & commuters
(iii) Stabilise the slope around periphery,
(iv) To improve visual view or improve scenic beauty of these water ponds.

Where the proposed road is passing in the vicinity of pond areas. The scope for enhancement includes the possibility of any further improvement, availability of space for enhancements and the likely benefits for the local community as well as the road users. One more round of consultation with the local public, community and authority shall be carried out prior to start the enhancement work. Conceptual plan for enhancement of water bodies are given in ***Figure N &O under Appendix 3 of Section VID; Part - 2.***

Table 1-2: Enhancement of Water-bodies

Sl. No.	Design Chainage (Km)		Length along the road (m)	Side	Feature	Mitigation
	To	Form				
1.	11.700	11.900	80	RHS	Pond	The Contactor shall enhance the identified locations with the provision includes but not limited to are retention/protection wall along the road, Solar lighting & plantation with guard.
2.	16.200	16.500	125	RHS	Pond	

Table 1-3: Silt fencing proposed for the water bodies

Sl. No.	Design Chainage (Km)		Length (m)	Side	Feature	Mitigation
	To	Form				
1.	7.600	7.650	50.0	RHS	Pond	Contractor shall protect the surface water bodies along the road with provisions includes but not limited to are silt fencing/gabion wall along the road side, High embankment with stone pitching etc.
2.	2.090	2.115	35.0	BHS	Narmada Canal	
3.	12.745	12.834	89.0	LHS	Pond	
4.	15.900	16.300	400.0	RHS	Pond	
5.	16.557	16.667	110.0	LHS	Pond	
6.	21.364	21.442	78.0	LHS	Pond	
7.	22.415	22.638	223.0	LHS	Pond	
8.	22.525	22.545	20.0	BHS	Back Water Body	
Total			**1005.00**			

Enhancement of Religious Structures:

The scope for enhancement includes the possibility of any further improvement, availability of space for enhancements and the likely benefits for the local community as well as the road users. Consultation with the local public and authority must be done prior to start the enhancement work. Enhancement measures shall be provided as describe in below table but not limited. Following locations are identified as an enhancement of religious structures. Schematic drawings for enhancement are given in *Figure J, K, L & M under Appendix 3 of Section VID; Part 2.*

Table 1-4: Enhancement of Religious Structures

Sl. No.	Chainage (Km)	Distance from ECL (m)	Length along the road (m)	Str./ Features	Side	Extant of Impact	Enhancement Measures
1.	0.860	8.5	5.0	Jogni Mata Temple	RHS	This is a very small temple. Entry gate and boundary Wall	Re construction of the effected part. Plantation with guard, Shoe rack, Solar light, Community/ dustbin and seating benches are also proposed.
2.	0.950	5.5	50.0	Hanuman Temple	RHS	Entry Gate, Gau Shala, Boundary wall, office	Re construction of the effected part. Provision of pedestrian entry, rumble strip, seating benches, shoe rack, paver block Informatory signages, plantation with brick/metal guard solar light, solar lighting and community/ dustbin,
3.	6.800	9.5	45.0	Shahid Smarak	LHS	No Impact	Provision of boundary well with metal railing, paver block, landscaping, revolving gate, plantation with brick guard / metal fencing, solar lighting, community/ dustbin and seating benches.
4.	16.200	9.5	80.0	Shiv Temple	RHS	Entry Gate, Water tank, Hawan Kund	Curve treatment, rumble strip, seating benching, shoe rack, Informatory signages, paver block plantation with brick / metal guard, Solar light and community/ dustbin

Noise Sensitive Receptors:

Special safety provisions have been taken into account while planning for such sensitive areas.

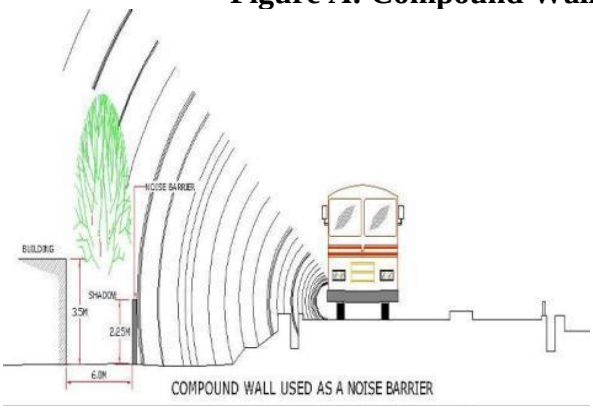
Boundary walls demarcating the site extents of these properties have also been incorporated separating it from other areas, thereby providing proper ambience for education of students. The site is dominated by soft landscape and character has been retained. Further informal seating under existing trees have also been planned for to continue with the concept of open air schools.

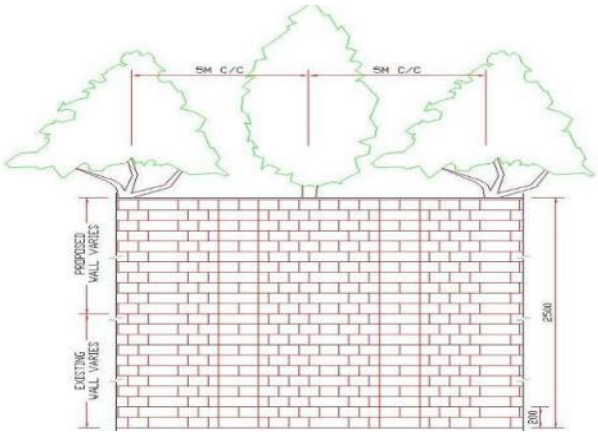
Table 1-5: Noise Barrier Proposed for Sensitive Receptors

Sl. No.	Chainage (Km)	Distance from ECL (m)	Length along the road (m)	Structure/ Features	Side
1.	7.300	20.0	50	Balvatika School & Primary Hospital	LHS

To reduce noise and vibrations, noise barriers in the form of compound wall is proposed. In case of space crunch, the use of concrete screens is also suggested. The noise barrier wall shall be constructed by excavation of foundation, laying of brick masonry wall up to a height of 2.5 m above ground, plastering and coping as per the direction of the engineer and as laid in the specification. Creepers and paints shall be used in consultation with the affected community to give an aesthetic look. Shade and flowering trees shall be planted within the boundary of the sensitive receptor, between the building line and the compound wall, wherever space shall be available, 2.5 m centre to centre. Provisions of solar light shall be taken at all identified school/ education institute as mention in above table. Figure A shows the combination of compound wall and trees which shall be used as noise barrier

Figure A: Compound Wall and Trees as Noise Barrier





Environmental Monitoring Plan:

The monitoring programme is devised to ensure that the envisaged purpose of the project is achieved and results in the desired benefit to the target population. To ensure the effective implementation of the EMP, it is essential that an effective monitoring programme be designed and carried out.

Monitoring Indicators:

The monitoring programme contains monitoring plan for all performance indicators. Physical, biological and environmental management components identified as of particular significance in affecting the environment at critical locations have been suggested as Performance Indicators (PIs).

Table 1-6: Environmental Monitoring Indicators

Sr. No.	Indicator	Details	Stage	Responsibility

Sr. No.	Indicator	Details	Stage	Responsibility
A	**Environmental Condition Indicators and Monitoring Plan**			
1.	Environmental Monitoring (AAQ, Surface, Ambient Noise Level, Soil Quality and Ground Water Quality)	The parameters to be monitored, frequency and duration of monitoring as well as the locations to be monitored will be as per the Monitoring Plan prepared (*Refer Table 1.7 of Section VID; Part 2)*	Pre-Construction	Contractor
			Construction	Contractor
			Operation (DL Period)	Contractor
B	**Environmental Management Indicators and Monitoring Plan**			
2.	Tree Cutting	Progress of tree removal marked for cutting is to be reported.	Pre-construction	Forest Department /PIU
3.	Construction Camps	Location of construction camps have to be identified and parameters indicative of environment in the area has to be reported.	Pre-construction	Contractor
4.	Borrow Areas	Location of borrow areas have to be identified and parameters indicative of environment in the area has to be reported.	Pre-construction	Contractor
5.	Borrow Areas Management and Rehabilitation	Engineer will undertake site visits to verify that all borrow areas have been rehabilitated in line with the landowner's request and to their full satisfaction.	Construction	Contractor
6.	Construction Waste (both hazardous and non-hazardous waste) Management	All type of wastes shall be reused, disposed and sold to the authorized vendors as per applicable rule and regulation.	Construction	Contractor
7.	Regulatory compliance	Contractor shall obtain all the appropriate regulatory approvals for Quarry Operation, Installing and Operating Construction Plants such as Hot-Mix Plants, Batching Plants, Crushers, and own Mining Leases etc.	Pre-construction	Contractor
8.	Management of any chance discovery of archaeological remains at any site excavated under the contract.	Contractor shall complied with all protocols, procedures and legislation for reporting and managing archaeological discoveries	Construction	Contractor
9.	Operational Management Processes including labour deployment during routine and maintenance work.	Contractor shall complied with labour laws of wages; Valid licenses, Acceptable labour campsite conditions and facilities	Construction	Contractor
			Operation (DL Period)	Contractor
10.	Prevention of communicable diseases spreading to new areas due to increased communications.	Contractor shall organize acceptable number and frequency of HIV/AIDS awareness generation events, IEC material distribution, availability of contraceptive measures in the camp site/labour camps in a year;	Construction	Contractor
			Operation (DL Period)	Contractor

For each of the environmental condition indicator, the monitoring plan specifies the parameters to be monitored, location of the monitoring sites, frequency and duration of monitoring. The monitoring plan also specifies the applicable standards, implementation and supervising responsibilities. The monitoring plan for environmental condition indicators of the project in construction and operation stages is presented in *Table 1.7 of Section VID; Part-2*.

Numbers of locations for monitoring of the various environmental parameters such as ambient air quality, Surface and ground water quality and ambient noise levels and soil characteristics shall be as desired by the engineers.

Figure B: MAP/KEY Plan for Environmental Monitoring Locations

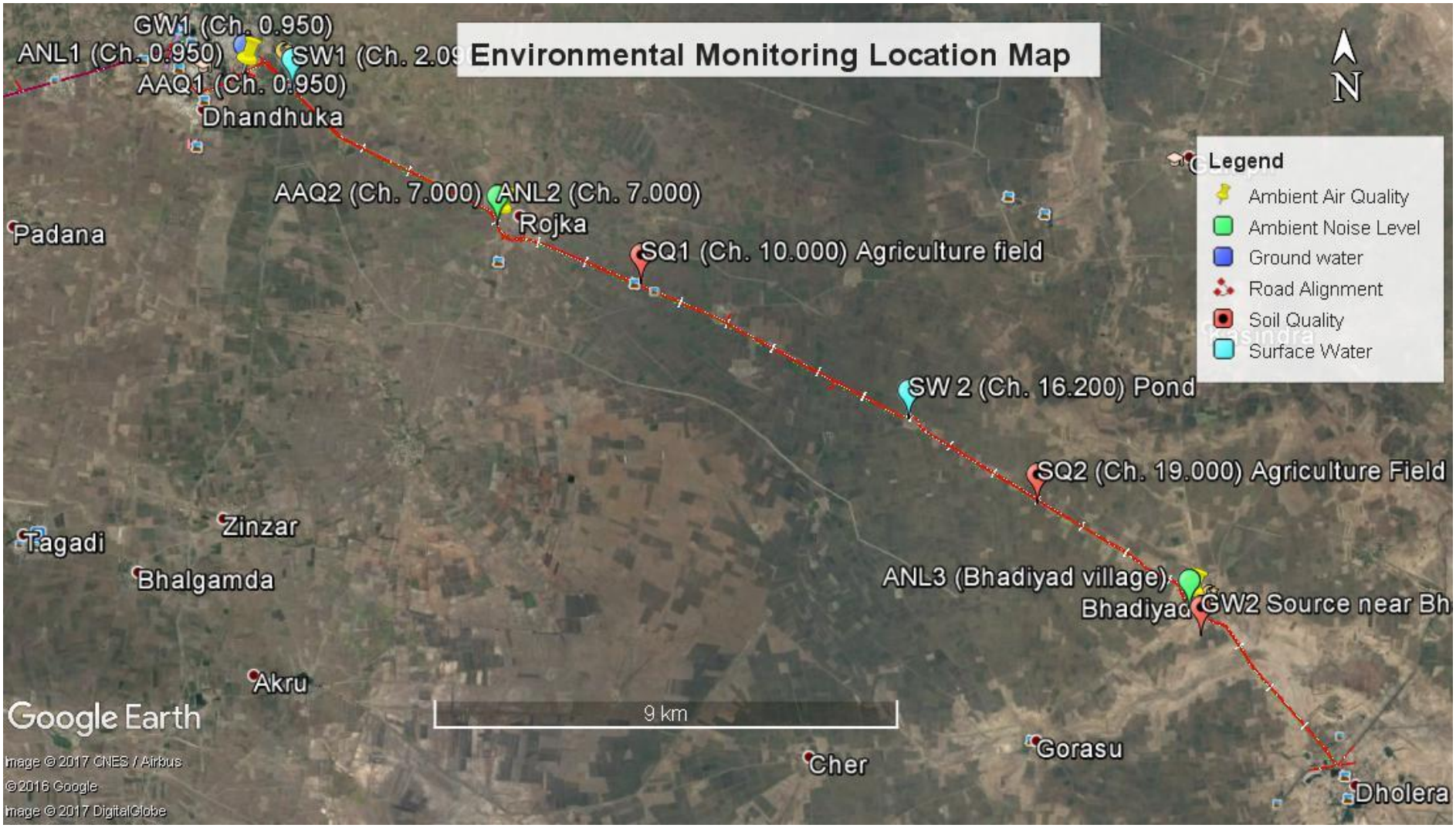


Table 1-7: Environmental Monitoring Plan (Program)

The below mentioned environmental monitoring plan program shall be in confirmation with the *IRC : SP : 108 – 2015; Air, Water, Soil and Noise Standards by CPCB, periodic and subsequent notifications issued by MoEF&CC, GoI on parameter to measure environmental monitoring

Attribute	Project Stage	Parameter	Special Guidance	Standards	Frequency	Duration	Location	Implementation
Air	Construction	SO2, NOx, PM10, PM2.5, CO	Fine Particulate Sampler (RDS) to be located 50m from the source of pollution (if any) in the Downwind direction. Use method specified by CPCB for analysis. Environmental monitoring shall be conducted by NABL accredited or MoEF&CC approved laboratory.	(NAAQS) National Ambient Air Quality Standard , CPCB, 2009	One time in a seasons and three seasons per year	24 hours Sampling	Identified sampling locations are provided in *table 1.8.*	Contractor under the supervision of the Engineer
	Operation				One time in a year		Locations and number of samples remain same as construction phase.	
Noise	Construction	**Leq Day, Leq Night, L_{DN}**	Equivalent noise levels using an integrated noise level meter kept at a distance of 15m from edge of pavement. Environmental monitoring shall be conducted by NABL accredited or MoEF&CC approved laboratory.	MoEF&CC Noise Rules, 2000	One time in a seasons and three seasons per year	24 hr sampling	Identified sampling locations are provided in *Table 1.8.*	Contractor under the supervision of the Engineer
	Operation				One time in a year		Locations and number of samples remain same as construction phase.	
Water	Construction	All essential characteristics and some of desirable characteristics as decided by the Environmental Specialist of the MC and PIU	Grab sample will be collected from source and Analyze as per Standard Methods for Examination of Water and Wastewater. Environmental monitoring shall be conducted by NABL accredited or	Indian Standards for Inland Surface Waters (IS: 2296, 1982 Indian Standards for Drinking Water (IS 10500:2012)	Twice in a year (pre and post monsoon season)	Grab Sampling	Identified sampling locations are provided in *Table 1.8.*	Contractor under the supervision of the Engineer

Attribute	Project Stage	Parameter	Special Guidance	Standards	Frequency	Duration	Location	Implementation
			MoEF&CC approved laboratory.					
Soil	Construction	Monitoring of Pb, SAR and Oil & Grease	Sample of soil collected to acidified and analyzed using absorption spectrophotometer. Environmental monitoring shall be conducted by NABL accredited or MoEF&CC approved laboratory.	Threshold for each contaminant set by IRIS database of USEPA until national standards are promulgated	Once in a year	Grab Sampling	Identified sampling locations are provided in *Table 1.8.*	Contractor under the supervision of the Engineer
Borrow area	Pre-construction	Suitability of the material as per IS 2720	-	IS 2720	Once	Once	Borrow area location	Contractor under the supervision of the Engineer
Rehabilitation of Borrow Areas	Construction	As per Clause 305.2.2.2 and ESGP 03	Visual Observation	-	Once in a month	-	Borrow area location	Contractor under the supervision of the Engineer
HIV/ AIDS Prevention Measures	Construction	HIV/ AIDS Awareness campaign and Screening of construction personnel's	-	ESGP 12	Within 3months of mobilization & quarterly during construction period and six monthly during operation	24 hrs	Settlement along the project road and Construction labour and Labour Camp sites	Contractor under the supervision of the Engineer / R&BD/PIU
		IEC materials distribution	Minimum five posters shall be displayed at each locations such as labour		Quarterly			

Attribute	Project Stage	Parameter	Special Guidance	Standards	Frequency	Duration	Location	Implementation
			camps, Workshop and plant area. Distribution of pamphlets, stagers etc during the Awareness camp.					
		Condom Vending Machine	Minimum two numbers at labour camp site		Once a month			

*** Annex 8 Environmental Monitoring Program of IRC: SP: 108 – 2015 shall be referred**

Table 1-8: Identified locations for Environmental Monitoring/Sampling

S. No.	Sample Code	Design Chainage (Km)	Location Name	Co- ordinates
Ambient Air Quality (AAQ) and Ambient Noise Level (ANL)				
1.	AAQ1 & ANL1	0+950	Near Hanuman Temple	22°22'33.15"N 71°59'15.34"E
2.	AAQ2 & ANL2	7+000	Rojka village/ School (Balvatika) and Primary health Centre	22°20'49.89"N 72° 2'11.83"E
3.	AAQ3 & ANL3	22+650	Bhadiyad Village	22°16'48.37"N 72° 9'53.02"E
4.	AAQ4 & ANL4	-	Construction camp/ Plant Area	-
5.	AAQ5 & ANL5	-	Labour Camp/Colony	-
Surface Water (SW) and Ground Water (GW)				
1.	GW1	0+950	Ground water well at Hanuman Temple	22°22'33.15"N 71°59'15.34"E
2.	GW2	22+650	Ground water source near Bhadiyad Village	22°16'48.37"N 72° 9'53.02"E
3.	SW1	2+090	Canal	22°22'23.72"N 71°59'47.84"E
4.	SW2	16+200	Near Shiv Temple	22°18'46.77"N 72° 6'48.83"E
Soil Quality (SQ)				
1.	SQ1	10+000	Agriculture field	22°20'15.81"N 72° 3'40.90"E
2.	SQ2	19+000	Agriculture field	22°17'56.70"N 72° 8'12.57"E

**locations are indicative only at the time of sampling, Contractor to consult engineer in advance (at least two week prior to collecting each of the samples and obtain approval from the Engineer prior to commencement of this activity.*

Reporting System:

The Contractor will operate the reporting system for environmental condition and environmental management indicators *(Table 1.1).* The Contractor will report to the Engineer, Monitoring Consultant EE, SRP Division on the progress of the implementation of environmental conditions and management measures as per the EMP. The reporting formats and Contractor Checklist on environmental and social issues are enclosed in the *Appendix 1 & 2* of Section VID; Part-2 respectively. The summary of reporting is given in the below table.

Table 1-9: Summary details of Reporting

Format No.	Item	Stage	Contractor	Engineer	EE, SRP Division
			Implementation & Reporting to Engineer, Monitoring Consultant	**Monitoring & reporting to EE, SRP Division**	**Oversee/ Field Compliance Monitoring**
EM 1	Identification of Disposal Locations	Pre-Construction; Construction	One Time	One Time	One Time
EM 2	Setting up of	Pre-Construction	One Time	One Time	One Time

	Construction Camp				
EM 3	Borrow Area Identification	Pre-Construction	One Time	One Time	One Time
EM 4	Top Soil Monitoring	Construction	Quarterly	Quarterly	Quarterly
EM 5	Status Regarding Rehabilitation of Borrow Areas	Construction	-	Quarterly	Quarterly
EM6	Construction Safety	Construction	Monthly	Monthly	Monthly
EC 1	Pollution Monitoring	Pre-Construction; Construction	As Per Monitoring Plan	Quarterly	Quarterly
		Post Construction (DLP)			
		End of Maintenance			

Regulatory Clearances:

During continuance of the contract, the contractor and his sub-contractors shall abide at all times by all existing enactments on environmental protection and rules made there under, regulations, notifications and bye-laws of the State or Central Government, or local authorities and any other law, bye-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority. Salient features of some of the major laws that are applicable are given below:

The Water (Prevention and Control of Pollution) Act, 1974: This provides for the prevention and control of water pollution and the maintaining and restoring of wholesomeness of water. 'Pollution' means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms.

The Air (Prevention and Control of Pollution) Act, 1981: This provides for prevention, control and abatement of air pollution. 'Air Pollution' means the presence in the atmosphere of any 'air pollutant', which means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.

The Environment (Protection) Act, 1986: This provides for the protection and improvement of environment and for matters connected therewith, and the prevention of hazards to human beings, other living creatures, plants and property. 'Environment' includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property.

EIA Notification and its Subsequent Amendments

- As per the Environmental Impact Assessment (EIA) Notification, 14th September 2006 and its amendment up to 17th April 2015, new national /state highway projects as well as expansion of national /state highway require Prior Environmental Clearance.
- Projects have been grouped under Category 'A' requiring clearance from Expert Appraisal Committee (EAC) of MoEF&CC, GoI and Category 'B' requiring clearance from the State / Union territory Environment Impact Assessment Authority (SEIAA). The SEIAA shall base its

decision on the recommendations of a State or Union territory level Expert Appraisal Committee (SEAC).

- The concerned Committee (EAC or SEAC) will finalize the TOR on the basis of Form-1, proposed draft TOR & Pre-Feasibility / Feasibility Report.
- Environmental Impact Assessment study is to be carried out strictly as per the TOR provided by the Committee. Public Hearing is required for Category 'A' project.
- Public Hearing is required for road & highway projects except expansion of Roads and Highways (item 7 (f) of the Schedule) which do not involve any further acquisition of land

List of projects requiring Prior Environmental Clearance is given in the "SCHEDULE" of EIA Notification. As per the Schedule categorization of the highway project is as follow:

Project Activity	***Category 'A'***	***Category 'B'***	***Conditions if any***
Highways *7(f)*	*i) New National High ways; and* *ii) Expansion of National Highways greater than 100 km involving additional right of way or land acquisition greater than 40m on existing alignments and 60m on re-alignments or by-passes*	*i) All New State Highway Projects* ***ii) State Highway Expansion projects in Hilly terrain (above 1,000 m MSL) and or Ecologically Sensitive Areas.***	*General Condition shall apply* ***Note:*** *Highways include expressways*

The Public Liability Insurance Act, 1991: This provides for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling hazardous substances and for matters connected herewith or incidental thereto. Hazardous substance means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act 1986, and exceeding such quantity as may be specified by notification by the Central Government.

Forest (Conservation) Act, 1980 and its amendments

The Act came into force with effect from October 25, 1980. This Act provides for the conservation of forests and regulating diversion of forestlands for non-forestry purposes. The basic objective of the Act is, to regulate the indiscriminate diversion of forestlands for non-forestry uses and to maintain a logical balance between the development needs of the country and the conservation of natural resources/ heritage.

When projects fall within forestlands, prior clearance is required from relevant authorities under the Forest (Conservation) Act, 1980. For diversion of forestland, the project proponent needs to apply to the State Government. Depending on the area required to be diverted, the proposals are cleared by MoEF Regional or Central Offices provided that the cost of compensatory afforestation, cost of rehabilitation of endangered/rare species of flora/fauna, and the net present value of the forest resources are deposited upfront with the state Forest Department.

Forest (Conservation) Rules, 2003 and its amendments

These are rules by the Central Government for working and conduct of business outlined under the Forest (Conservation) Act, 1980. As per the Forest (Conservation) Rules, 2003 & its amendment, proposal involving diversion of forest land up to 5 hectares other than the proposal relating to mining and encroachments are decided by the Regional Offices of the MOEF. The Regional Office of MOEF is competent to process, scrutinize and forward decision on proposal involving diversion of more than 5 ha to 40 ha of forest land along with the recommendation (if any), to MOEF, New Delhi. For proposal involving diversion of more than 40 ha forest land the state Government/ Union Territory would forward

the proposal with recommendation to MOEF as per para 2.5(ii) of guidelines issued under Forest (Conservation) Act.

Hazardous And Other Wastes (Management and Trans-boundary Movement) Rules, 2016, were published by the Government of India in the Ministry of Environment, Forest and Climate Change vide number G.S.R. 582(E), dated the 24th July, 2015 in the Gazette of India, Extraordinary Part II, section 3, sub-section (ii) inviting objections and suggestions from all persons likely to be affected thereby, before the expiry of the period of sixty days from the date on which copies of the Gazette containing the said notification were made available to the public;

Responsibilities of the occupier for management of hazardous and other wastes.- (1) For the management of hazardous and other wastes, an occupier shall follow the following steps, namely:- (a) prevention; (b) minimization; (c) reuse, (d) recycling; (e) recovery, utilisation including co-processing; (f) safe disposal. (2) The occupier shall be responsible for safe and environmentally sound management of hazardous and other wastes. (3) The hazardous and other wastes generated in the establishment of an occupier shall be sent or sold to an authorised actual user or shall be disposed of in an authorised disposal facility. (4) The hazardous and other wastes shall be transported from an occupier's establishment to an authorised actual user or to an authorised disposal facility in accordance with the provisions of these rules. (5) The occupier who intends to get its hazardous and other wastes treated and disposed of by the operator of a treatment, storage and disposal facility shall give to the operator of that facility, such specific information as may be needed for safe storage and disposal. (6) The occupier shall take all the steps while managing hazardous and other wastes to- 6 (a) contain contaminants and prevent accidents and limit their consequences on human beings and the environment; and (b) provide persons working in the site with appropriate training, equipment and the information necessary to ensure their safety.

Table 1-10: Regulatory Clearance Requirement

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
Pre-Construction Stage							
01	Environmental Clearance	EIA Notification, 2006 and subsequent Amendments;	MoEF&CC, GoI / SEIAA	For Category B, Applicable for new State Highway projects and SH expansion projects in hilly terrain (above 1000 MSL) or ecologically sensitive areas as per EIA Notification 2006 & its subsequent amendments – **Not Applicable** Category B to be upgraded to Category A if project falling under general conditions - **Not Applicable**	-	-	-
02	Consent to Establish (CTE)	Water (Prevention and Control of Pollution) Act1974; Air (Prevention and Control of Pollution) Act 1981	Gujarat Pollution Control Board	Applicable	3 Months	Contractor	Engineer
03	Wild Life Clearance	Wild Life Protection Act 1972	MoEF&CC, GoI	Not applicable	-	-	-

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
04	Diversion of forest land for non-forest purpose	Guidelines for diversion of forest lands for non-forest purpose under the Forest (Conservation) Act, 1980 and its amendments;	Western Zone Regional Office MoEF&CC, Bhopal	Dhandhuka – Dhulera road is not declared as Notified Protected Forest, therefore diversion of forest land along the road does not required.	-	-	-
05	Permission for felling & trimming of trees	Forest (Conservation) Act, 1980 and its amendments;	State Forest Dept., Gujarat	Permission is required from Divisional Forest Department	6 months	R & B Dept., Govt. of Gujarat Necessary assistance shall be provided by Contractor.	R& B Dept., Govt. of Gujarat
Construction/Operation Stage							
06	Permission for locating and operating Borrow pits	EIA Notification 2006 and amendments thereof. Mines and Minerals (Development and Regulation) Act, 1957	District Environmental Impact Assessment Authority (DEIAA); (MoEF&CC), Commissioner of Geology and Mining, Local Administration – Municipal Government/Panchayat	Applicable	1 Month	Contractor	Engineer
07	Permission for Withdrawal of Ground Water	Environment Protection Act 1986	Central Ground Water Board, West Central Region (WCR), Ahmadabad	Applicable, if withdrawal is proposed	1 month	Contractor	Engineer

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
08	Permission for withdrawal of Surface Water from River/Irrigation Canals		Irrigation Authorities for use of water from Irrigation Canal. River Board / Authorities for withdrawal of water from Rivers	Applicable if withdrawal is proposed	1 month	Contractor	Engineer
09	Authorization to generate, store, transport and dispose of Hazardous Waste	Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016	Gujarat Pollution Control Board (GPCB)	Applicable, if hazardous waste is generated in the project (disposal of bituminous wastes – verify with GPCB)	2 months	Contractor	Engineer
10	Consolidated Consent and authorization (CCA)	Water (Prevention and Control of Pollution) Act 1974; Air (Prevention and Control of Pollution) Act 1981	Gujarat Pollution Control Board (GPCB)	Applicable	3 Months	Contractor	Engineer
11	Traffic Police Clearance for diversion of routine traffic	Local Traffic Police Regulations and Bye-laws	Traffic Police Department	Applicable	1 Month	Contractor	Engineer
12	NOC from Archaeological Survey of India	The Ancient Monument and Archaeological sites and Remains Act 1958.	Department of Archaeology Govt. of Gujarat	Not Applicable	2 Months	Contractor	Engineer
13	Permission for Sand Mining from river bed	Mines and Minerals (Development and Regulation) Act, 1957	Commissioner of Geology and Mining Govt.of Gujarat	Applicable, if river sand is mined	6 Months	Contractor	Engineer

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
14	Permission for Opening of new Quarry sites	Mines and Minerals (Development and Regulation) Act, 1957; EIA Notification 2006 and amendment thereof. Water (Prevention and Control of Pollution) Act 1974; Air (Prevention and Control of Pollution) Act 1981	Commissioner of Geology and Mining, Govt. of Gujarat Gujarat Pollution Control Board	Applicable only if Contractor opens a new quarry site or borrow material from established quarry/third party.	6 Months 3 Months	Contractor	Engineer
15	Registration of Vehicles and Off road equipments; Pollution Under Control Certificate for Contractor Vehicles and Equipments	The Motor Vehicles Act, 1988 and amended 2015, Central Motor Vehicle Rules, 1989	Transport Department, Govt. of Gujarat	Applicable to all Contractor vehicles and off road equipments	1 Month 1 Week	Contractor	Engineer

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
16	Employing Labour	The Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and Central Rules, 1998 The Child Labour (Prohibition & Regulation) Act,1986 & Gujarat Rules 1994 The Minimum Wages Act, 1948 & The Minimum Wages (Gujarat) Rules 1961 The Contract Labour (Regulation & Abolition) Act, 1970 & The Contract Labour (P & R) (Gujarat) Rules 1972 The Work Man Compensation Act. 1923 and its amendments Labour Laws (Gujarat Amendment) Act, 2015	District Labour Commissioner	Applicable	1 Week	Contractor	Engineer

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
17	Registration of Workers	The Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and Central Rules, 1998	District Labour Commissioner	Applicable	1 Week	Contractor	Engineer
18	CRZ Clearance	CRZ Notification 2011	State CZMA / MoEF&CC / SEIAA	Not Applicable	120 days	Contractor	R&B Dept, GoG/ Engineer

Environmental Construction Guidelines for EMP Implementation:

Comprehensive Environmental and Social Guidelines for Practices has been prepared and presented in the **Appendix 4 of Section VID; Part-2.** The purpose of the guideline is to guide the bidders/contractor to mitigate the environmental issues that are like to arise during the project construction and operation.

Table 1-11: Environmental and Social Guidelines for Practices

ESGP No.	Environmental and Social Guidelines for Practice (ESGP)
ESGP01	Site Preparation
ESGP02	Construction and Labour Camps
ESGP03	Borrow Areas
ESGP04	Topsoil Salvage, Storage and Replacement
ESGP05	Quarry Management
ESGP06	Water For Construction
ESGP07	Slope Stability and Erosion Control
ESGP08	Waste Management and Debris Disposal
ESGP09	Water Bodies
ESGP10	Drainage
ESGP11	Construction Plants & Equipment Management
ESGP12	Labour and Worker's Health and Safety
ESGP13	Cultural Properties
ESGP14	Tree Cutting and Afforestation
ESGP15	Forests and Other Natural Habitats
ESGP16	Air and Noise Pollution
ESGP17	R&R Planning and Rap Framework
ESGP18	Local Traffic Management During Construction
ESGP19	Prior Information and Disclosure to the Public
ESGP20	General Workmanship
ESGP21	Onsite Concrete Preparation
ESGP22	Grievance management
ESGP 23	E&S Regulatory Compliance

2. DHANDHUKA – PALIYAD CORRIDOR

The Contractor shall implement the Environmental Management Plan as part of Work Contract. The Environmental Management Plan (EMP) forms part of the Bid Document. The aspects given in EMP are mandatory in nature and thus, the Contractor is contractually bound to abide by the same.

The Contractor shall take all reasonable steps to protect the environment at on site and off site both and to avoid damage or nuisance to persons or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

It is deemed that the cost of implementing the EMP including safety and enhancement measures are included as the lump sum costs of the bid and no separate payment shall be tenable. All these clauses are applicable to sub-contractors as well. The main Contractor will also be held responsible in the case of any non-compliance on part of his sub-contractors. The Engineer shall regularly monitor the compliance of EMP by the Contractor. The Contractor shall regularly monitor the compliance of EMP by their Sub-Contractors if any. **The Contractor shall submit monthly environmental compliance reports in the format prescribed by the PIU. (Additional reports/formats shall also be submitted upon request from the PIU / Engineer).**

The Contractor shall follow the Environmental Management Plan. The Engineer shall maintain record of compliance or non-compliance of Environmental Management Plan. On observing any non-compliance, the Engineer shall issue a notice to the Contractor, to rectify the same. The Contractor shall implement all mitigation measures for which responsibility is assigned to him as stipulated in the EMP. In case of any failure to rectify the non-compliance within the specified / stipulated timeframe in implementing the EMP, the Contractor is liable for the penalties as mentioned below:

1. All lapses in obtaining clearances / permissions under statutory regulations and violations of any regulations including eco-sensitive areas shall be treated as a **major lapse**.
2. Any complaints of public, within the scope of the Contractor, formally registered with the Engineer, R&BD or with the GoG and communicated to the Contractor, which is not properly addressed within the time period intimated by the Engineer / R & BD, GoG shall be treated as a **major lapse**.
3. Non-conformity to any of the mitigation measures stipulated in the EMP (other than stated above) shall be considered as a **minor lapse**.
4. On observing any lapses (i.e. major & minor), the Engineer shall issue a notice to the Contractor, to rectify the same.
5. Any minor lapse, which is not rectified and/or complied within fifteen days from the notice issued by the Engineer, shall be treated as a **major lapse**.
6. If a major lapse is not rectified upon receiving the notice the Engineer shall invoke deduction, in the subsequent Interim Payment Certificate.
7. **For major lapses**, 0.15% of the Initial Contract Price will be withheld for each notified lapse.
8. If the lapse is not rectified within one month after withholding the payment, **the amount withheld shall be forfeited**. Aggregate forfeited amount shall not exceed 3% of the Initial Contract Price.

The Contractor achieving the compliance to EMP will be appreciated through:

c) Certificate of appreciation from Employer / R&BD with regard to compliance to EMP provisions;
d) The Contractors' environmental performance will be disclosed in the GSHP-II website for their compliance in achieving the EMP.

Various aspects of EMP are presented in the ensuing tables and sections.

Table 2-1: Description of the Environmental Management Measures during Various Stages of the Project

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
1.	**PRE-CONSTRUCTION STAGE**				
1.1.	**Pre-construction activities by PIU**				
1.1.1.	Utility Relocation and Common Property Resources (CPRs)	Clause 110, Clause 110.1. and 110.7 of MoRT&H specification	• R&B dept. and concerned line departments shall take necessary precautions and shall ascertain necessary barricades/delineation of such sites to prevent accidents including accidental fall into bore holes, pits, drains both during demolition and construction/ relocation of such facilities. Standard safety practices shall be adopted for all such works. • Contractor shall make an inventory and map all the utility services that need to be relocated or shifting from the CoI.	Corridor of Impact (CoI)	R&B Dept.
1.2.	**Pre-construction activities by the Contractor/Engineer**				
1.2.1.	Joint Field Verification		• The Engineer and Contractor shall ascertain the feasibility of implementing the Environmental Management Plan (EMP) through Joint field verification. • Any modification is required to update EMP shall be done by the Contractor in concurrence with Engineer and a copy of the modified EMP shall be submitted to the R&B dept, for review and approval.	Along project road	Contractor under the supervision of the Engineer
1.2.2.	Procurement of Machinery				
1.2.2.1	Crushers, Hot- Mix Plants & Batching Plants	Emission control legislations of CPCB/ GPCB for air, noise etc. Clause 111.5 of MoRT&H specification for Pollution from plants	• The Contractor shall follow all stipulated conditions for pollution control as suggested by the GPCB in the consent / NoC for establishing and operating the Hot-mix and Batching Plant. • No such installation by the Contractor shall be allowed till all the required legal clearances are obtained from the competent authority and the same is submitted to the Engineer / R&B dept, • The location of the hot-mix and batching plant shall be	All construction machineries (Crushers, Hot-Mix Plants & Batching Plants) should be kept/stationed at least 1000m away from settlements/habitations: Following towns /settlements are indicative only (for reference). Dandhuka (Ch.	Contractor under the supervision of the Engineer

<table>
<tr><th colspan="2">Environmental Issues</th><th>Ref: Clauses</th><th>Additional Measures To Be Adopted By The Contractor</th><th>Location</th><th>Responsibility</th></tr>
<tr><td></td><td></td><td>and Batching Plant</td><td>at least(i) 1000m away from settlements and shall be placed in the downwind direction and (ii) 10 km aerial distance away from the protected areas (sanctuary, national parks etc.).
• All possible efforts shall be undertaken to identify land for establishment of Hot Mix and Batching Plant, where no major alteration will be required compelling a drastic change in landuse.
• The Contractor shall submit the detailed layout plan for approval to the Engineer before getting into formal agreement with landowners for setting up of such site. Actions by Engineer and R&B dept, against any non-compliance shall be borne by the Contractor at his own cost</td><td>104+900)
Gunjar Village (Ch. 111+100)
Vagad Village (Ch. 115+700)
Patna Village (Ch. 120+300)
Kinara Village (Ch. 130+700)
Bodi (Ch. 145+600)
Sankardi village (Ch. 147+600)
Babarkot (Ch. 151+000)</td><td></td></tr>
<tr><td>1.2.2.2.</td><td>Other Construction Vehicles, Equipment and Machinery</td><td>Discharge standards and Noise limits as per Environment Protection Act, 1986 Emission standards as per Bureau of Indian Standard (BIS) preferably Bharat IV emission norms</td><td>• Equipment’s conforming to the latest noise and emission control measures shall be used.
• Pollution under Control (PUC) certificates for all vehicles and machinery shall be made available to the Engineer / R&B dept for verification when ever required.</td><td>Along project road</td><td>Contractor under the supervision of the Engineer</td></tr>
<tr><td>1.2.3</td><td colspan="5">Identification & Selection of Material Sources</td></tr>
<tr><td>1.2.3.1.</td><td>Borrow Areas</td><td>Clause 305.2.2 of MoRT&H Specification for borrow material & Clause 111.2 of MoRT&H Specification for borrow pits for embankment</td><td>• The Engineer shall inspect every borrow area location prior to issuing approval for use of such sites.
• Care shall be taken to avoid agriculture areas for planning haul roads for accessing borrow materials. In case of damage, the Contractor shall be solely responsible and shall rehabilitate it, as approved by Engineer / R&B dept.
• All borrow areas shall be restored either to the original condition or as per the approved rehabilitation plan by</td><td>Source of identified borrow area location along the road
<table>
<tr><th>Chainage</th><th>Distance (m)</th><th>Side</th></tr>
<tr><td>106+000</td><td>100</td><td>RHS</td></tr>
<tr><td>110+160</td><td>100</td><td>RHS</td></tr>
<tr><td>111+200</td><td>100</td><td>LHS</td></tr>
<tr><td>114+200</td><td>200</td><td>RHS</td></tr>
<tr><td>121+500</td><td>200</td><td>RHS</td></tr>
</table></td><td>Contractor under the supervision of the Engineer</td></tr>
</table>

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location			Responsibility
		construction	the Engineer, immediately upon completion of the use of such a source. • Contractor shall obtain Environmental Clearance/Approvals for uses of each and every borrow area, prior to take approval from the engineer.	122+000	200	LHS	
				125+000	200	LHS	
				128+100	200	RHS	
				130+000	100	RHS	
				133+000	500	RHS	
				133+000	100	LHS	
				135+600	1000	LHS	
				139+400	500	RHS	
				141+400	500	RHS	
				142+500	200	LHS	
				145+000	200	RHS	
				145+000	100	LHS	
				141+150	200	RHS	
				141+150	200	LHS	
				150+600	150	RHS	
1.2.3.2.	Quarries	Clause 111.3 of MoRT&H Specification for Quarry Operation	• No quarry and/or crusher units shall be established, within 1000m aerial distance from any of the residential/settlement/habitations locations, forest boundary, wildlife movement path, breeding and nesting habitats and national parks/sanctuaries. • Contractor shall work out haul road network to be used for transport of quarry materials and report to Engineer who shall inspect and approve thesame.	Below mentions are indicative settlement locations only for reference. Dandhuka (Ch. 104+900) Gunjar village (Ch. 111+100) Vagad village (Ch. 115+700) Patna village (Ch. 120+300) Kinara village (Ch. 130+700) Bodi (Ch. 145+600) Sankardi (Ch. 147+600) Babarkot (Ch. 151+000)			Contractor under the supervision of the Engineer
1.2.3.3.	Arrangement for Construction Water		• The Contractor shall source the requirement of water preferably from surface water bodies, rivers, canals and tanks in the project area with the necessary approval from the concern authority. • To avoid disruption/disturbance to other water users, the Contractor shall extract water from fixed locations. The contractor shall consult the local people before	All rivers / surface water bodies that can be utilized within the project area			Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
			finalizing the locations. • Only at locations where surface water sources are not available, the contractor can contemplate extraction of ground water, after intimation and consent from the Engineer • The Contractor shall comply with the requirements of Central Ground Water Board, West Central Region (WCR), Ahmadabad, Gujarat and seek their approval for extraction of groundwater.		
1.2.3.4.	Sand (all river and stream beds used directly or indirectly for the project)	Clause 111.3 of MoRT&H Specification for Quarry Operation	• In case of selection of new sites for sand quarrying, the Contractor shall obtain prior approval and concurrence from Competent District Authority. • To avoid accidents and caving in of sand banks at quarry sites, sand shall be removed layer by layer. Digging deeper than the permissible limit (0.9 meters) shall not be allowed. Such quarry shall be barricaded 10m away from the periphery on all sides except the entry point, so as to prevent accidental fall of domestic cattle, wildlife and human beings.	Nearest sand quarries locations: Sand is abundantly available in Bhogavo, river, which is about 1.5 km away from the project road	Contractor under the supervision of the Engineer
1.2.4.	**Setting up construction sites**				
1.2.4.1	Construction Camp Locations – Selection, Design & Layout	Clause 111.8.4 of MoRTH Specification for Construction Camps	Construction camps shall not be proposed: (iii) Within 1000m of ecologically sensitive areas (if any) (iv) Within 1000m from the nearest habitation to avoid conflicts and stress over the infrastructure facilities, with the local community	Following settlement locations are indicative only: Dandhuka (Ch. 104+900) Gunjar village (Ch. 111+100) Vagad village (Ch. 115+700) Patna Village (Ch. 120+300) Kinara Village (Ch. 130+700) Bodi (Ch. 145+600) Sankardi village (Ch. 147+600) Babarkot (Ch. 151+000)	Contractor under the supervision of the Engineer
1.2.4.2	Arrangements for	Clause 108.3 of	• The Engineer shall ensure that the temporary site is	Areas temporarily acquired	Contractor under

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
	Temporary Land Requirement	MoRT&H Specification	cleared prior to handing over to the owner (after construction or completion of the activity) and it is included in the contract	for construction sites / hot mix plants / borrow areas / diversions /detours	the supervision of the Engineer
1.2.4.3.	Stock-yards	Clause 105.7 of MoRTH Specification for Delivery, Storage and Handling of Materials	• The contractor shall identify the location for stockyards for construction materials at least 1000m away from watercourses. • Separate enclosures shall be planned for storing construction materials containing fine particles such that sediment-laden water does not drain into nearby storm water drains	Surface water sources along the road are given in the *table 2.3 & 2.4 of Section VID; Part-2.* Some surface water pond remains dry during summer.	Contractor under the supervision of the Engineer
1.2.4.4	Fuel storage and re-fuelling areas	Clause 2.1.1.6 of EMP (Stripping of Soil) Clause 2.1.4.1.2 of EMP (dispose the spent oil and grease)	• The Contractor shall ensure that all construction vehicle parking locations, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites are located at least 1000 m from rivers and irrigation canal/ponds.	Surface water sources along the road are given in the *table 2.3 & 2.4 of Section VID of Part-2.* Some surface water pond remains dry during summer.	Contractor under the supervision of the Engineer
1.2.5.	**Labour Camp Management**				
1.2.5.1	Location of Construction labour camps: Accommodation	**Factories Act, 1948** and **Building & other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 (**construction & maintenance of labor camp**)**	• The Contractor shall provide, if required, erect and maintain necessary (temporary) living accommodation and ancillary facilities for labourers, to standards approved by the Engineer. • Labour camps shall not be located within 1000m from then earest habitation to avoid conflicts and stress over the infrastructure facilities, with the local community. The location, layout and basic facility provision of labour camps shall be submitted to Engineer for approval prior to construction.	Along the project road at the location of construction labor camps	Contractor under the supervision of the Engineer
1.2.5.2	Potable Water	**The Contract Labour (Regulation and Abolition) Act, 1970** and **Factories Act, 1948**	• The Contractor shall supply portable water through municipal/ panchayat sources. In case of groundwater it shall be treated prior to supply.	Construction labor camps	Contractor under the supervision of the Engineer
1.2.5.	Sanitation	**Factories Act, 1948**	• The sanitation facilities for the camp shall be designed,	Construction labor camps	Contractor under

<table>
<tr><th colspan="2">Environmental Issues</th><th>Ref: Clauses</th><th>Additional Measures To Be Adopted By The Contractor</th><th>Location</th><th>Responsibility</th></tr>
<tr><td>3</td><td>facilities</td><td>for sanitation
Clause 111.9 of MoRTH Specification for Occupational Health and Safety of the Workforce</td><td>built and operated in such a fashion that no health hazards occurs and no pollution to the air, ground water or adjacent water courses take place.
• No shared toilet facility shall be closer than 100 feet to any sleeping room, dining room, lunch area, or kitchen.
• Floor drains shall be provided in all bathrooms.
• Each toilet rooms, bathing rooms and washing area shall be lighted naturally or artificially by a safe type of lighting at all hours of the day and night.</td><td></td><td>the supervision of the Engineer</td></tr>
<tr><td>1.2.5.4</td><td>Waste Disposal</td><td>Clause 301.2.10 of MoRTH Specification for Use and Disposal of Excavated materials.
Clause 201.4 and 202.5 of MoRTH Specification for Disposal of Material.
Municipal Solid Waste Management Rules - 2016 for effective waste disposal</td><td>• The contractor shall provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner.
• Municipal waste shall be disposed at designated disposal sites as advised by the local Panchayat body or the municipal corporation
• The Contractor shall prepare SWM plan and implement by appointing a facilitating agency.</td><td>Construction labor camps
Waste collecting bins/ dust bins shall be provided on both side at start and end of the following locations or as directed by the Engineer.
<table>
<tr><th colspan="2">Design Chainage</th><th>Remarks</th></tr>
<tr><td>104.800</td><td>106.600</td><td>Dhandhuka</td></tr>
<tr><td>106.900</td><td>107.900</td><td>Dhandhuka</td></tr>
<tr><td>110.400</td><td>111.400</td><td>Gunjar</td></tr>
<tr><td>115.590</td><td>115.800</td><td>Vagad</td></tr>
<tr><td>129.770</td><td>131.200</td><td>Kinara</td></tr>
<tr><td>131.430</td><td>131.800</td><td>Kinara</td></tr>
<tr><td>145.310</td><td>146.100</td><td>Bodi</td></tr>
<tr><td>147.300</td><td>147.800</td><td>Sankardi</td></tr>
</table></td><td>Contractor under the supervision of the Engineer</td></tr>
<tr><td>1.2.5.5</td><td>HIV/ AIDS Prevention Measures</td><td>Clause 111.9 of MoRTH Specification for Occupational Health and Safety of the Workforce.

ESGP 12</td><td>The Contractor shall implement the following measures towards ensuring HIV/AIDS prevention during the entire construction period
• Conduct awareness campaign including dissemination of IEC materials (posters, pamphlets, stagers, ribbon etc.) on HIV/AIDS for all construction personnel(including labourers, supervisors, engineers and consultants) on HIV/AIDS/STDs within three months of mobilization and once a Quarter subsequently during the construction period and six</td><td>Construction & labor camps</td><td>Contractor under the supervision of the Engineer</td></tr>
</table>

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
			monthly during the operation; • Carry out screening of construction personnel for HIV/AIDS, within a quarter of mobilization • Conduct quarterly health check-up of all construction personnel including testing for STDs; • Minimum five HIV/AIDS awareness posters shall be displayed at each locations *i.e.* labour camps, construction site, vehicle repairing workshops, HMP, Batching plant and crusher plant etc. • Erect and maintain hoardings/ information signages on HIV/AIDS prevention at the construction sites, labour camps and truck parking locations; • Install two number of condom vending machines at the construction camp and plant site labour camps, including fortnightly replenishment of supplies.		
2.	**CONSTRUCTION STAGE**				
2.1.	**Construction Stage Activities by Contractor**				
2.1.1.	**Site Clearance**				
2.1.1.1.	Clearing and Grubbing	Clause 201. of MoRT&H Specification	• All works shall be carried out in a manner such that the damage or disruption to flora is minimum. Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works shall be removed with prior approval from Engineer. • In areas where grass or any form of vegetation is found, efforts to conserve topsoil shall be undertaken. • Top soil (10 cm) shall be preserved and stockpile	Along project road at construction sites	
2.1.1.2.	Dismantling of Bridgework/ Culverts	Clause 202 of MoRT&H Specification Construction and Demolition Waste Management Rules	• The contractor shall follow all necessary measures (including safety) especially while working close to cross drainage channels to prevent earthwork, stonework, materials and appendage from impeding cross drainage at rivers, streams, water canals and existing irrigation and drainage systems. • All reusable materials can be stacked and treated	At locations where bridge works and culverts are proposed. There are 34 existing culverts in addition 8 more culverts shall be added to ease the flooding/ drainage issues	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
		2016	separately. All possible efforts to reuse, recycle and reduce waste quantity shall be undertaken.		
2.1.1.3.	Generation & disposal of Debris	Clause 202.5 of MoRT&H. Specification for disposal of materials Construction and Demolition Waste Management Rules 2016	• Disposal of unutilized non-toxic debris shall be either through filling up of borrow areas or at pre-designated disposal sites, subject to the approval of the Engineer. • At locations identified for disposal of residual bituminous wastes, the disposal shall be carried out over a 60 mm thick layer of rammed clay so as to eliminate the possibility of leaching of wastes into the groundwater. • Debris generated from pile driving or other construction activities along the rivers, streams and drainage channels shall be carefully disposed in such a manner that it does not flow into the surface water bodies or form puddles in the area. • The pre-designated disposal locations shall be part of **Comprehensive Solid Waste Management Plan** to be prepared by Contractor in consultation and with approval of Engineer.	Throughout Project Road	Contractor under the supervision of the Engineer
2.1.1.4.	Non-bituminous construction wastes disposal	Clause 202 of MoRT&H Specification for Dismantling Clverts, Bridges and Other Structures/ Pavements	• The contractor shall finalize the location of disposal site based on the following. o not located within designated forest area o does not impact natural drainage courses o No endangered/rare flora is impacted by such dumping. o Settlements are located at least 1000m away from the site. The Engineer shall approve disposal sites after conformation of the above criteria	Disposal site locations	Contractor under the supervision of the Engineer
2.1.1.5.	Bituminous wastes disposal	Annex "A" for Protection of the Environment of Clause 501 of MoRTH	• The disposal of residual bituminous wastes shall be done by the contractor at secure land fill sites, with the requisite approvals from the concerned government agencies.	Disposal site locations	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
		Specification			
2.1.1.6.	Stripping, stacking and preservation of top soil	Clause 301.3.2 of MoRT&H. Specification for stripping and storing topsoil. Clause 305.3.3 of MoRT&H. Specification for construction and for embankments Clause 301.7 of MoRT&H. Specification for preservation of Top Soil.	• Contractor shall strip the topsoil at all locations opened up for construction, including temporarily acquired land for traffic detours, storage, materials handling or any other construction related or incidental activities. • Segregated topsoil shall be stored in stockpiles of 1 to 1.25-m height. The stockpiles shall be located such that disturbance to construction work is minimal. • In dry weather conditions (between Feb - June), topsoil stacks shall be sprinkled with water on all sides to keep the moisture content of the stack.	At all construction sites	Contractor under the supervision of the Engineer
2.1.1.7.	Accessibility		• The Contractor shall provide safe and convenient passage for vehicles; pedestrians and livestock to and from roadsides and property accesses by providing temporary connecting road, as necessary. • Construction activities that shall affect the use of side roads and existing accesses to individual properties, whether public or private, shall not be undertaken without providing adequate provisions to ensure uninterrupted access, as approved by the Engineer. • The Contractor shall take care that the cross roads are constructed in such a sequence that construction work over the adjacent cross roads are taken up in a manner that traffic movement in any given area does not get affected.	Throughout Project Road	Contractor under the supervision of the Engineer
2.1.1.8.	Planning for Traffic Diversions and Detours	Clause 112 of MoRT&H Specification	• Detailed traffic control plans shall be prepared by the Contractor and the same shall be submitted to the Engineer.	All construction site and access roads. Attention is required at:	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
			• The Contractor shall provide specific measures for safety of pedestrians and workers as a part of traffic control plans. The Contractor shall ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. • Contractor shall follow IRC: SP: 55-2014 for traffic diversion. The colour and size of the Work zone signs are as per IRC: SP: 55-2014 (Guidelines on Traffic Management in work zones). • The Contractor shall inform local community of changes in traffic routes and pedestrian access arrangements with assistance from Engineer and PIU.	Dandhuka (Ch. 104+900) Gunjar village (Ch. 111+100) Vagad village (Ch. 115+700) Patna Village (Ch. 120+300) Kinara Village (Ch. 130+700) Bodi (Ch. 145+600) Sankardi village (Ch. 147+600) Babarkot (Ch. 151+000)	
2.1.2.	**Construction Materials**				
2.1.2.1.	Earth from Borrow Areas for Construction	IRC 010-1961 (procurement of earth materials) Clause 111.2 of MoRTH Specification	The mitigation strategy in the form of Development and rehabilitation Plan shall be prepared by Contractor The borrow pits shall not be left in a condition likely to cause hazard to human and animal life. The contractor shall seek prior approval from the concern authorities for operating the borrow pit.	All along the project road, all access roads, temporarily acquired sites & all borrow areas	Contractor under the supervision of the Engineer
2.1.2.4.	Transporting Construction Materials	Clause 111.9. of MoRT&H Specification	All vehicles delivering materials to the site shall be covered to avoid spillage of materials. The unloading of materials at construction sites close to settlements shall be restricted to day time only.	All along the Project road and all haul roads	Contractor under the supervision of the Engineer
2.1.3.	**Construction work**				
2.1.3.1.	Disruption to other users of Water	Annex "A" of Clause 501 of MoRTH Specification for Protection of the Environment and Water Quality	In case of diversion of water bodies, the Contractor shall take prior approval of the Irrigation Department and Engineer for any such activity. The PIU shall ensure that Contractor has served the notice to the downstream users of water well in advance where such diversion of the flow is likely to affect the downstream population subject to the condition that under no circumstances the downstream flow shall best opped.	All crossing the Project road and all haul roads	Contractor under the supervision of the PIU

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
2.1.3.2.	Drainage and Flood Control	Clause 202 of MoRT&H Specification	• Contractor shall ensure that construction materials like earth, stone, ash or appendage disposed off does not block the flow of water of any water course and cross drainage channels. • Where necessary, adequate mechanical devices to bailout accumulated water from construction sites, camp sites, storage yard, excavation areas are to be arranged well in advance before the rainy season besides providing temporary cross drainage systems. • The contractor shall take all adequate precautions to ensure that construction materials and excavated materials are enclosed in such a manner that erosion or run-off of sediments is controlled. Silt fencing shall be installed prior to the onset of the monsoon at all the required locations, as directed by Engineer and PIU. • The contractor shall ensure that no material blocks the natural flow of water in any water course or cross drainage channel. Prior to monsoon, the contractor shall provide either permanent or temporary drains to prevent water	All Surface water sources/ drains/ Nalahs/ Natural and artificial ponds along the road. Silt fencing should be given near surface water locations given in *Table 2.3 & 2.4 of Section VID of Part-2.*	Contractor under the supervision of the Engineer
2.1.3.3.	Siltation of Water Bodies and Degradation of Water Quality	Clause 306 of MoRT&H for soil erosion and sedimentation control	• Contractor shall ensure that construction materials like earth, stone, ash or appendage disposed off does not block the flow of water of any water course and cross drainage channels. • Silt fencing shall be proposed for all the effected water bodies along the road.	All Surface water sources/ drains/ Nalahs/ Natural and artificial ponds along the road. Silt fencing should be given near surface water locations given in *Table 2.3 & 2.4 of Section VID of Part-2.*	Contractor under the supervision of the Engineer
2.1.3.4.	Slope Protection and Control of Soil Erosion	Clause 306 of MoRT&H for soil erosion and sedimentation control Clause 307 of	• The contractor shall construct slope protection works as per design, or as directed by the Engineer	High raise embankment and surface water bodies locations Stone Pitching method at all	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
		MoRT&H for Turfing works Clause 308 of MoRT&H for other measures of Slope Protection		canal crossing locations.	
2.1.4.	**Pollution Control**				
2.1.4.1.1.	Water Pollution from Construction Wastes	CPCB Schedule VI - General Standards for Discharge of Environmental Pollutants (Liquid Waste Disposal) The Environment (Protection) Rules, 1986 and Water Act, 1974	• The Contractor shall take all precautionary measures to prevent the wastewater generated during construction from entering into streams, water bodies or the irrigation channels. • Contractor shall avoid construction works close to the streams or water bodies during monsoon.	All Surface water sources/ drains/ Nalahs/ Natural and artificial ponds along the road. Silt fencing should be given near surface water locations given in *Table 2.3& 2.4 of Section VID; Part-2.*	Contractor under the supervision of the Engineer
2.1.4.1.2.	Water Pollution from Fuel, Lubricants and Chemicals	**Environment (Protection) Rules, 1986** (**Standards for Emission or Discharge of Environmental Pollutants Schedule –** **I**) for Liquid Waste Disposal **Clause 111.** (Precaution and Safeguarding the Environment) **Annex 'A'** to **Clause 501** (Protection of Environment)	• Oil interceptors shall be provided for vehicle parking, wash down and refueling areas. • In all, fuel storage and refueling areas, if located on agricultural land or areas supporting vegetation, the top soil shall best ripped, stockpiled and returned after cessation of such storage.	All Surface water sources/ drains/ Nalahs/ Natural and artificial ponds along the road. Silt fencing should be given near surface water locations given in *Table 2.3 & 2.4 of Section VID of Part-2.*	Contractor under the supervision of the Engineer

	Environmental Issues	Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
2.1.4.2.	**Air Pollution**				
2.1.4.2.1.	Dust Pollution	Annex 'A' to Clause 501 (Protection of Environment) - Section 3 Air Quality Clause 111.5. of MoRT&H. (Hot Mix Plant and Batch Mix Plant)	• The conditions for pollution control given in the **NoC *i.e.*** **(**Consent to establish (CTE)) and Consolidated Consent and Authorization (CCA)by the GPCB shall be strictly followed. • Air pollution monitoring shall be conducted as per the Environmental Monitoring Plan and results shall be used to identify any additional pollution control measures required to be adopted.	Construction area/ site, Construction camps, Materials Loading/ unloadingfacilities	Contractor under the supervision of the Engineer
2.1.4.2.2.	Emission from Construction Vehicles, Equipment and Machineries	Schedule-I: Standards for Emission suggested by CPCB/ GPCB	• Certification issued for such contrivances obtained from designated/approved authority shall be submitted along with the specified reporting format to the Engineer. • The contractor shall maintain a separate file and submit PUC certificates for all vehicles/equipment/machinery used for the project. Monitoring results shall be submitted to Engineer and PIU.	Construction camps, Materials Loading / unloadingfacilities	Contractor under the supervision of the Engineer
2.1.4.3.	**Noise Pollution**				
2.1.4.3.1.	Noise Pollution: Noise from Vehicles, Plants and Equipments	Noise Limits for vehicles (Environment (Protection) Amendment Rules, 2000) and Part 'E', Schedule – VI of Environment (Protection) Rules, 1986. Clause 5A The Noise Pollution (Regulation and Control) Rules, 2000 (sound emitting construction	• All plants and equipment used in construction shall strictly conform to the MoEF&CC/ CPCB noise standards. • Noisy construction activities (such as crushing, concrete mixing, batching etc.) within 150m of the nearest habitation/ educational institutes/health centers (silence zones) shall be stopped during the night time between 9.00 pm to 6.00am. • Contractor shall provide noise barriers to the suggested locations of select schools/ Temples/health centers prior to commencement of work. • Monitoring shall be carried out at the construction sites as per the monitoring schedule and results shall be submitted to Engineer. Based on the monitoring results, the Engineer, if required, shall recommend any	Indicative residential areas (for reference only) along the road are as follows: Dandhuka (Ch. 104+900) Gunjar village (Ch. 111+100) Vagad village (Ch. 115+700) Patna Village (Ch. 120+300) Kinara Village (Ch. 130+700) Bodi (Ch. 145+600) Sankardi village (Ch. 147+600) Babarkot (Ch. 151+000)	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
		equipments) Clause 201.2 of MoRT&H for Idling of temporary trucks	additional noise mitigation measures required to be implemented by the Contractor.		
2.1.4.4.	**Safety**				
2.1.4.4.1	Safety Procedures	Clause 111.11 of MoRTH Specification for Occupational Health and Safety of the Workforce Clause 112 of MoRTH Specification for Arrangement of Traffic during Construction Building and Other Construction Workers (Regulation of Employment and Conditions of Services) Act, 1996	The Contractor shall: • Comply with all applicable safety regulations such as IRC SP 55 2014 for Traffic Safety during the construction and operation. • Take care for the safety of all persons entitled to be on the Site, • Use reasonable efforts to keep the site and works clear of unnecessary obstruction so as to avoid danger to these persons, • Provide fencing, lighting, guarding and watching of the works until completion and taking over and provide any temporary works (including roadways, footways, guards and fences) which may be necessary, because of the execution of the works, for the use and protection of the public and of owners and occupiers of adjacent land.	All construction sites	Contractor under the supervision of the Engineer
2.1.4.4.2	Care and supply of documents		• The contractor shall prepare, submit and obtain approval of the Engineer for construction Safety Management Plan 14 days prior to commencement of construction works at site.		Contractor under the supervision of the Engineer
2.1.4.4.3	Contractors general obligations		• All design calculations and fabrication drawings for temporary works (such as form-work, staging, centering, scaffolding, specialized construction, handling and launching equipment and the like)material lists for structural fabrication as well asdetailed drawings for templates, and anchorage and temporary support details for pre-stressing cables as well as bar		Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
			bending and cutting schedules for reinforcement, etc. shall be prepared by the contractor at his own cost and forwarded to the Engineer at least six weeks in advance of actual constructional requirements. The Engineer will check the same for the contractor's use with amendments.		
2.1.4.4.4	Personal Safety Measures for Labour, Material handling , Painting etc.	Factory Act, 1948, Factories (Amendment) Act, 1987 (Chapter -5 Safety) Building and Other Construction Workers (Regulation of Employment and Conditions of Services) Act, 1996	• Construction Safety Plan shall be prepared by the Contractor during mobilization and approved by Engineer shall be adhered to by the Contractor throughout the construction period, and shall include provision of. • Protective footwear and protective goggles to all workers employed in mixing asphalt materials, cement, lime mortars, concrete *etc*. • Welders protective eye-shields to workers engaged in welding works • Protective goggles and clothing to workers engaged in stone breaking activities and workers shall be seated at sufficiently safe intervals • The contractor shall comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress. • The contractor shall ensure that no paint containing lead or lead products is used except in the form of paste or readymade paint. • Contractor shall provide facemasks to the workers when paint is applied in the form of spray or a surface having dry lead paint is rubbed and scrapped. • The Contractor shall mark ‘hard hat’ and ‘no smoking’ and other ‘high risk’ areas and enforce non-compliance of use of PPE with zero tolerance.	All construction sites	Contractor under the supervision of the Engineer
2.1.4.4.	Health and Safety	ESGP 12	• The Contractor at all times shall take all reasonable	All construction sites and	Contractor under

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
5		Clause 111.11 of MoRTH Specification for Occupational Health and Safety of the Workforce	precautions to maintain the health and safety of the contractor's personnel. In collaboration with local health authorities, the contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times at the site. • The contractor shall appoint an accident prevention officer at the site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective measures to prevent accidents. Throughout the execution of the works, the contractor shall provide whatever is required by this person to exercise this responsibility and authority. • The contractor shall send, to the Engineer, details of any accident as soon as practicable after it soccurrence. • The contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the Engineer may reasonably require.	labour camps	the supervision of the Engineer
2.1.4.4.6	Traffic Safety & Pedestrian Safety	Clause 112 of MoRT&H Specification for Arrangement of Traffic during Construction	• All safety sign boards should be place as per IRC SP 55 2014. • Pedestrian Safety shall be ensured. Pedestrian circulation shall be demarcated prior to start & unsafe areas shall be cordoned off.	All along the project road	Contractor under the supervision of the Engineer
2.1.4.4.7	Risk from Electrical Equipment(s)	Factory Act, 1948 – Chapter -5 (Safety) and Factories (Amendment) Act, 1987	• No material shall be so stacked or placed as to cause danger or inconvenience to any person or the public. • All machines to be used in the construction shall conform to the relevant Indian Standards (IS) codes, shall be free from patent defect, shall be kept in good working order, shall be regularly inspected and properly maintained as per IS provision and to the satisfaction of	All construction equipment	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
			the Engineer		
2.1.4.4.8	Safety during Road Works	Clause 112.4 of MoRT&H Specification for Traffic safety Clause 112.5. of MoRT&H Specification for Maintenance and Diversions IRC:SP:55 2014 for Road signage & markings	• The colour and size of the Work zone signs boards should be placed as per IRC: SP: 55-2014 (Guidelines on Traffic Management in work zones). • Contractor should follow IRC: SP: 55-2014 for traffic diversion works during construction. • The contractor shall provide adequate signage and markings as per the instruction of the Engineer in the construction zones.	All along the project road and all haul roads	Contractor under the supervision of the Engineer
2.1.4.4.9	First Aid	Section 36 (First Aid) of Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996	• First aid measure shall be provided in the construction zones and labour camps.	All construction sites and labour camps	Contractor under the supervision of the Engineer
2.1.4.5.	**Cultural Property**				
2.1.4.5.1.	Chance Found Archaeological Property	Ancient Monuments and Archaeological Sites and Remains Rules 1959 Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act 2010	• All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site are the property of the Government and shall be dealt with as per provisions of the relevant legislation. • The contractor shall take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or thing.	Along the project road	Contractor under the supervision of the Engineer
2.2.	**Environmental Enhancement and Special Issues**				
2.2.1.	Rehabilitation/ Enhancement of Community Cultural and	Physical Cultural Resources (WB OP/BP 4.11)	• The architectural elements of the structure shall be conserved/reflected/translated into the design of new structures/ enhancements in accordance with wishes of	As per the enhancement locations provided under the *Table 2.3 & 2.5 of Section*	Contractor under the supervision of the Engineer

	Environmental Issues	Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
	Religious Properties and Water Resources		the community.	*VID; Part-2.*	
2.2.2.	Flora and Chance found Fauna	Wild Life Protection Act 1972	• The contractor shall take reasonable precaution to prevent his workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal. • If any wild animal is found near the construction site at any point of time, the contractor shall acquaint the Engineer and execute the Engineer's instructions for dealing with the same. • The Engineer shall report to the nearby forest office (range office) and shall take appropriate steps/ measures in consultation with the forest officials.	As per Government of Gujarat Gazattee Notification, protected forest has been notified along the road.	Contractor under the supervision of the Engineer
2.2.3.	Sensitive receptors		• Sensitive receptors like schools, hospitals shall be provided with permanent noise barriers prior to the start of work in order to minimize the dust and noise impacts due to vehicle movement (during / post construction). Their effectiveness to be checked during operation phase. • Construction activities shall be confined within the present available CoI, regularly strict monitoring/supervision shall be done to minimize/control air-noise pollution and abatement of dust particles at minimum level possible using well maintained modern machineries.	Residential area along the road Dandhuka (Ch. 104+900) Gunjar village (Ch. 111+100) Vagad village (Ch. 115+700) Patna Village (Ch. 120+300) Kinara Village (Ch. 130+700) Bodi (Ch. 145+600) Sankardi village (Ch. 147+600) Babarkot (Ch. 151+000)	Contractor under the supervision of the Engineer
2.3.	**Contractor Demobilization**				
2.3.1.	Clearing of Construction of Camps & Restoration/ Rehabilitation	Clause 111.8.4 of MoRTH specification Clause 111.16 of MoRTH specification ESGP 02	• Contractor to prepare site restoration plans for approval by the Engineer. The plan shall be implemented by the contractor prior to demobilization. • On completion of the works, all temporary structures shall be cleared, all rubbish burnt, excreta or other disposal pits or trenches filled in and effectively sealed	All Construction Workers' Camps	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
			off and the site left clean and tidy, at the Contractor's expense, to the entire satisfaction of the Engineer. • The topsoil removed and conserved earlier shall be spread over the restoration area as per the direction of the Engineer to facilitate the growth of vegetation. • Residual topsoil shall be distributed on adjoining/proximate barren/rocky areas as identified by the Engineer in a layer of thickness of 75mm –150mm.		
2.3.2.	Redevelopment of Borrow Areas	Clause 305.2.2.2 of MoRTH specification ESGP 03	• Redevelopment of borrow areas shall be taken up in accordance with the plans approved by the Engineer	Some identified borrow area locations but not limited to along the road are given in above point no 1.2.3.1.	Contractor under the supervision of the Engineer
3.	**OPERATION STAGE (Activities to be Carried Out by the Contractor/R&BD/PIU)**				
3.1	Monitoring and Evaluation of Operational Performance of Environmental Mitigation Measures		• The PIU shall monitor the operational performance of the various mitigation/ enhancement measures carried out as a part of the project. Monitoring and performance indicators have been indicated in **Environmental Monitoring Plan** *(Table 2.7 of Section VID; Part-2).*	All along the project road	Contractor under the supervision of the Engineer
3.2	Maintenance of Drainage		• PIU shall 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 without damaging the spurs and check dams erected to stabilize the course and flow of all such drainage channels. • PIU shall ensure that all the sediment/oil and grease traps setup at the water bodies are cleared once in every three months.	At locations were bridge works and culverts are proposed. There are 34 existing culverts in addition 8 more culverts shall be added to ease the flooding/ drainage issues	Contractor under the supervision of the Engineer
3.3	Pollution Monitoring		• The periodic monitoring of the ambient air quality, noise level, water (both ground and surface water) quality, soil pollution/contamination are to be continued at pre-designated locations as identified in the **Environmental Monitoring Plan (***Table 2.7 of Section VID; Part-2)* and if necessary, at additional locations	All along the project road	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
			for comparative study of pre and post operation data in order to ensure further improvement/modification in similar future works.		
3.4	Atmospheric Pollution		• Ambient air concentrations of various pollutants shall be monitored as envisaged in the Environmental Monitoring Plan at pre designated locations to compare the levels with the pre- construction data. • Additional data at other location may be collected as per any site specific requirement.	All along the project road	Contractor under the supervision of the Engineer
3.5	Noise Pollution		• Noise pollution shall be monitored as per **Environmental Monitoring Plan** at sensitive locations where pre-construction noise data was collected. The functioning of the noise barriers shall be supervised and monitored for further improvement/replication at other affected points if necessary. • Signage near sensitive locations shall be maintained and kept clean. Monitoring the effectiveness of the pollution attenuation measures shall be taken up as per **Environmental Monitoring Plan** *(Table 2.7 of Section VID; Part-2).*	All along the project road	Contractor under the supervision of the Engineer
3.6	Soil Erosion and Monitoring of Borrow Areas		• Visual monitoring and inspection of soil erosion at borrow areas, quarries (if closed and rehabilitated), embankments and other places expected to be affected, shall be carried to record and monitor the effectiveness of such structures after the completion of project, so as to evaluate the beneficial effects of each type of activity together with the cost involved.	Some identified borrow area location along the road are given in above point no 1.2.3.1.	Contractor under the supervision of the Engineer
3.7	Road Safety and Maintenance of Assets	Clause 3000 of MoRTH Specification for Maintenance of Road IRC: SP :55 2014 for Traffic Safety	• No advertisement/hoardings shall be allowed within the Right of Way limits of the project road. • Regular maintenance and cleaning of assets such as signboards, bus stops, drains etc. shall be undertaken.	All along the project road	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
3.8	Enhancement Measures		• Watering for the trees and re-plantation of the dead trees at all identified enhancement locations. • Replenishment of the damage tree guard. • Cleaning and damage control of the sign boards. • Repair or reinstall all the non functional solar lights • Repair or reinstall damage sitting benching	Identified enhancement locations are given in *Table 2.2 & 2.5 of Section VID; Part-2.*	Contractor under the supervision of the Engineer

Environmental Enhancement Measures:

There are several properties including cultural and community properties that are identified along the project roads those warrant restoration / enhancement measures as a part of better environmental management plan implementation practices. The selection is based on the consultation held with the local people / communities and engineering interventions in finalizing the alignment.

Enhancement of Water Bodies / Ponds:

Most of the water bodies along the road are ponds. The criteria to enhance these water bodies are

(i) To increase water holding capacity
(ii) Easy access to the community & commuters
(iii) Stabilise the slope around periphery,
(iv) To improve the visual view or improve scenic beauty of these water bodies

Where the proposed road is passing in the vicinity of pond areas. The scope for enhancement includes the possibility of any further improvement, availability of space for enhancements and the likely benefits for the local community as well as the road users. One more round of consultation with the local public, community and authority shall be carried out prior to start the enhancement work. Conceptual plan for enhancement of pond and wells are given in ***Figure R & S respectively under Appendix 3 of Section VID; Part - 2.***

Table 2-2: Enhancement of Water-bodies

Sl. No.	Design Chainage (Km)		Length along the road (m)	Side	Feature	Mitigation
	To	Form				
1.	115.780	115.870	80.0	RHS	Pond	The Contactor shall enhance the identified locations with the provision includes but not limited to are retention/protection wall along the road, solar lighting, and plantation with guard only around the water body.
2.	125.600		5.0	LHS	Well	Contractor shall protect ground water well along the road with the provision includes but not limited to are increase the parapet height, cover with Iron Grill (MS steel), solar light and shading on top etc.
3.	125.750		5.0	LHS	Well	
4.	126.200		5.0	LHS	Well	
5.	128.050		5.0	LHS	Well	

Table 2-3: Silt fencing proposed for the water bodies

Sl. No.	Design Chainage (Km)		Length (m)	Side	Feature	Mitigation
	To	Form				
1.	104.980	105.200	150	RHS	Pond	Contractor shall protect the surface water bodies along the road with provisions includes but not limited to are silt fencing, gabion wall along the road side, High embankment with stone pitching etc.
2.	143.730	143.850	120	BHS	Seasonal Drain	

Enhancement of Religious Structures:

The scope for enhancement includes the possibility of any further improvement, availability of space for enhancements and the likely benefits for the local community as well as the road users. Consultation with

the local public and authority must be done prior to start the enhancement work. Enhancement measures shall be provided as describe in below table but not limited. Following locations are identified as an enhancement of religious structures. Schematic drawings for enhancement are given in ***Figure P & Q under Appendix 3 of Section VID; Part-2.***

Table 2-4: Enhancement of Religious Structures

Sl. No.	Chainage (Km)	Distance from ECL (m)	Structure /Features	Length along the road (m)	Side	Extant of Impact	Mitigation
1.	110.980	6.5	Shrine	20.0	RHS	Otta & Baranda	Treatment for curve, provision of rumble strip, metal fencing, water tank and adjacent RoW space shall be developed to compensate the effected Shrine structure.
2.	115.500	9.5	Temple	6.0	LHS	Within RoW	Temple shall be relocated to nearby location suggested by local community.

Noise Sensitive Receptors:

Special safety provisions have been taken into account while planning for such sensitive areas. Boundary walls demarcating the site extents of these properties have also been incorporated separating it from other areas, thereby providing proper ambience for education of students. The site is dominated by soft landscape and character has been retained. Further informal seating under existing trees have also been planned for to continue with the concept of open air schools. Consultation with the authority shall be done prior to start the construction work. Following locations are identified as noise sensitive receptor.

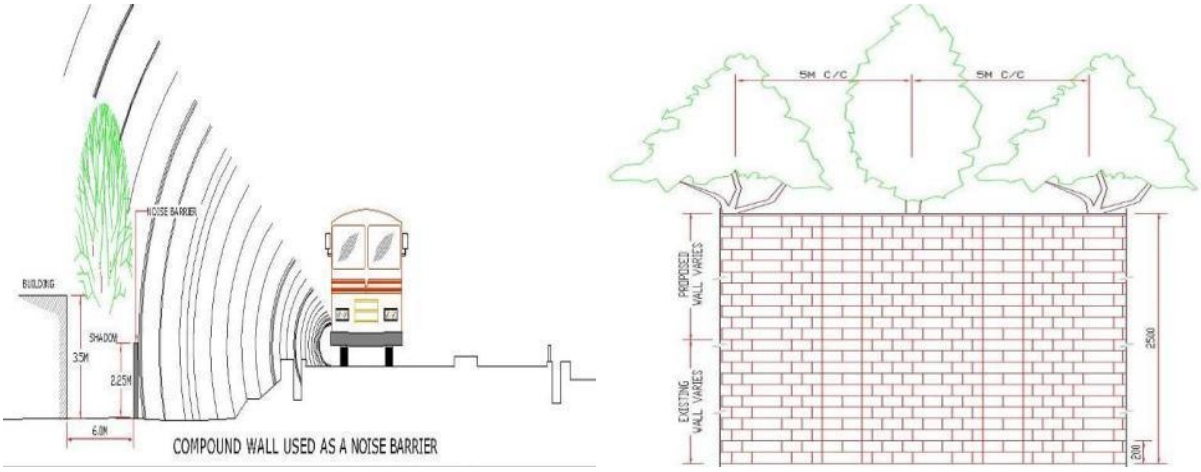
Table 2-5: Noise Barrier Proposed for Sensitive Receptors

Sl. No.	Chainage (Km)	Distance from ECL (m)	Length along the road (m)	Structure/Features	Side
2.	105.400	18.0	80.0	Primary School	LHS
3.	111.060	18.0	25.0	Primary School	RHS
4.	116.000	15.5	40.0	Primary Hospital	LHS
5.	129.800	18.0	65.0	K.D. Parmar School	LHS
6.	129.900	15.0	65.0	NM Gpsani Polytechnic	LHS
7.	130.000	18.0	55.0	Student Hostel	LHS
8.	131.300	130.0	40.0	Primary School	LHS
9.	147.697	12.0	50.0	Primary School	LHS
10.	147.800	11.9	50.0	Primary School	LHS

To reduce noise and vibrations, noise barriers in the form of compound wall is proposed. In case of space crunch, the use of concrete screens is also suggested. The noise barrier wall shall be constructed by excavation of foundation, laying of brick masonry wall up to a height of 2.5 m above ground, plastering and coping as per the direction of the engineer and as laid in the specification. Creepers and paints shall be used in consultation with the affected community to give an aesthetic look. Shade and flowering trees shall be planted within the boundary of the sensitive receptor, between the building line and the compound wall, wherever space shall be available, 2.5 m centre to centre. Provisions of solar light shall be taken at

all identified school/ education institute as mention in above table. Below figure shows the combination of compound wall and trees which shall be used as noise barrier.

Figure C: Compound Wall and Trees as Noise Barrier



Environmental Monitoring Plan:

The monitoring programme is devised to ensure that the envisaged purpose of the project is achieved and results in the desired benefit to the target population. To ensure the effective implementation of the EMP, it is essential that an effective monitoring programme be designed and carried out.

Monitoring Indicators:

The monitoring programme contains monitoring plan for all performance indicators. Physical, biological and environmental management components identified as of particular significance in affecting the environment at critical locations have been suggested as Performance Indicators (PIs).

Table 2-6: Environmental Monitoring Indicators

Sr.No.	Indicator	Details	Stage	Responsibility
A	**Environmental Condition Indicators and Monitoring Plan**			
1.	Environmental Monitoring (AAQ, Surface, Ambient Noise Level, Soil Quality and Ground Water Quality)	The parameters to be monitored, frequency and duration of monitoring as well as the locations to be monitored will be as per the Monitoring Plan prepared (Refer Table 2.7)	Pre-Construction	Contractor
			Construction	Contractor
			Operation (DL Period)	Contractor
B	**Environmental Management Indicators and Monitoring Plan**			
2.	Tree Cutting	Progress of tree removal marked for cutting is to be reported.	Pre-construction	Forest Department /PIU
3.	Construction Camps	Location of construction camps have to be identified and parameters indicative of environment in the area has to be reported.	Pre-construction	Contractor
4.	Borrow Areas	Location of borrow areas have to be	Pre-	Contractor

Sr.No.	Indicator	Details	Stage	Responsibility
		identified and parameters indicative of environment in the area has to be reported.	construction	
5.	Borrow Areas Management and Rehabilitation	Engineer will undertake site visits to verify that all borrow areas have been rehabilitated in line with the landowner's request and to their full satisfaction.	Construction	Contractor
6.	Construction Waste (both hazardous and non-hazardous waste) Management	All type of wastes shall be reused, disposed and sold to the authorized vendors as per applicable rule and regulation.	Construction	Contractor
7.	Regulatory compliance	Contractor shall obtain all the appropriate regulatory approvals for Quarry Operation, Installing and Operating Construction Plants such as Hot-Mix Plants, Batching Plants, Crushers, and own Mining Leases etc.	Pre-construction	Contractor
8.	Management of any chance discovery of archaeological remains at any site excavated under the contract.	Contractor shall complied with all protocols, procedures and legislation for reporting and managing archaeological discoveries	Construction	Contractor
9.	Operational Management Processes including labour deployment during routine and maintenance work.	Contractor shall complied with labour laws of wages; Valid licenses, Acceptable labour campsite conditions and facilities	Construction	Contractor
			Operation (DL Period)	Contractor
10.	Prevention of communicable diseases spreading to new areas due to increased communications.	Contractor shall organize acceptable number and frequency of HIV/AIDS awareness generation events, IEC material distribution, availability of contraceptive measures in the camp site/labour camps in a year;	Construction	Contractor
			Operation (DL Period)	Contractor

For each of the environmental condition indicator, the monitoring plan specifies the parameters to be monitored, location of the monitoring sites, frequency and duration of monitoring. The monitoring plan also specifies the applicable standards, implementation and supervising responsibilities. The monitoring plan for environmental condition indicators of the project in construction and operation stages is presented in Table 2.7.

Noumbers of locations formonitoring of the various environmental paramters such as ambient air quality, Surgface and ground water quality and ambient noise levels and soil characteristics shall be as desired by the engineers.

Figure D: MAP/KEY Plan for Environmental Monitoring Locations

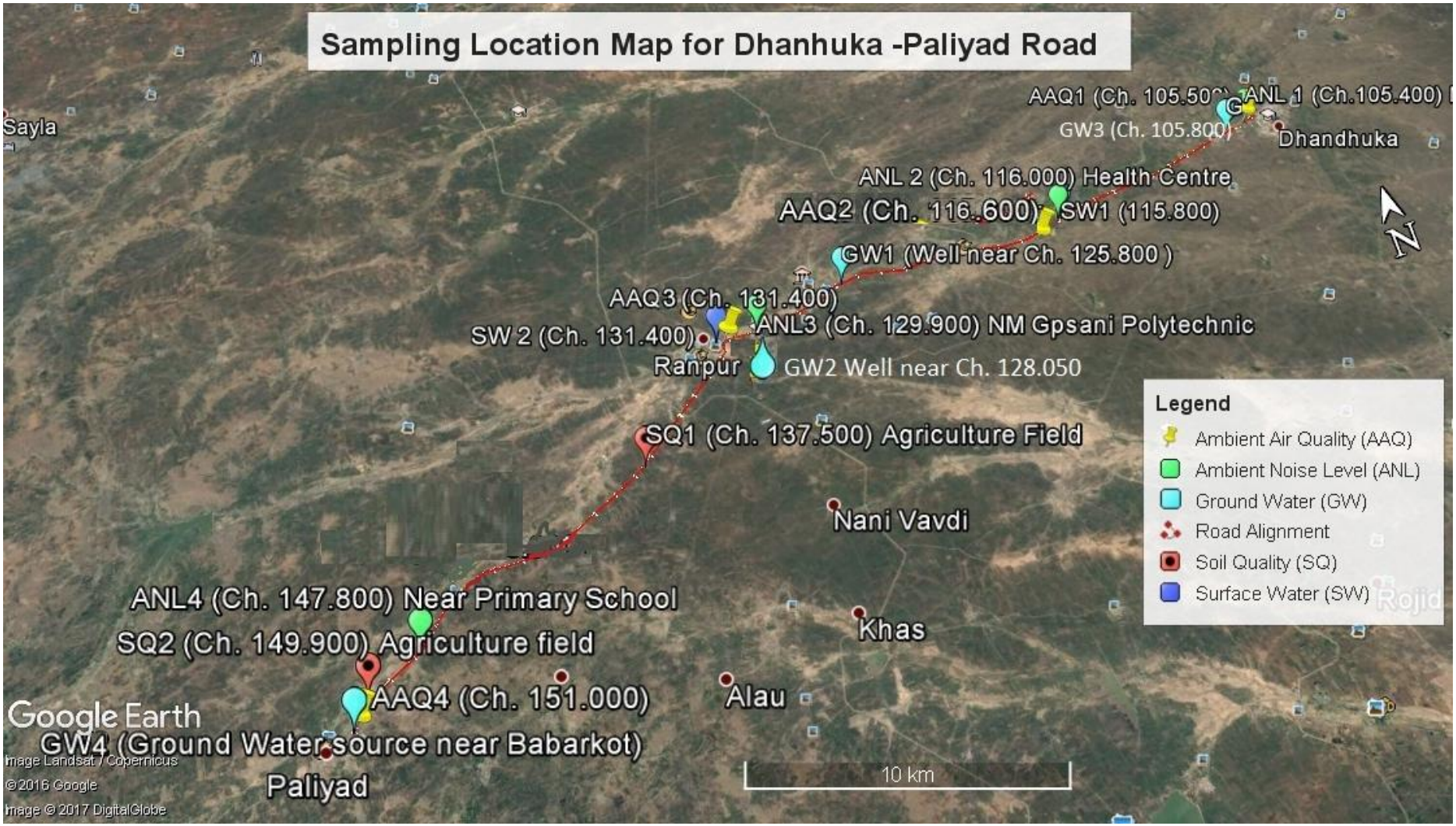


Table 2-7: Environmental Monitoring Plan (Program)
The below mentioned environmental monitoring plan program shall be in confirmation with the *IRC : SP : 108 – 2015; Air, Water, Soil and Noise Standards by CPCB, periodic and subsequent notifications issued by MoEF&CC, GoI on parameter to measure environmental monitoring

Attribute	Project Stage	Parameter	Special Guidance	Standards	Frequency	Duration	Location	Implementation
Air	Construction	SO_2, NO_x, PM_{10}, $PM_{2.5}$, CO	Fine Particulate Sampler (RDS) to be located 50m from the source of pollution (if any) in the downwind direction. Use method specified by CPCB for analysis. Environmental monitoring shall be conducted by NABL accredited or MOEF&CC approved laboratory.	(NAAQS) National Ambient Air Quality Standard , CPCB, 2009	One time in a seasons and three seasons per year	24 hours Sampling	Identified sampling locations are provided in *Table 2.8 of Section VID; Part-2.*	Contractor under the supervision of the Engineer
	Operation[4]				One time in a year		Locations and number of samples remain same as construction phase.	
Noise	Construction	**Leq Day, Leq Night, L_{DN}**	Equivalent noise levels using an integrated noise level meter kept at a distance of 15m from edge of pavement. Environmental monitoring shall be conducted by NABL accredited or MOEF&CC approved laboratory.	MoEF&CC Noise Rules, 2000	One time in a seasons and three seasons per year	24 hr sampling	Identified sampling locations are provided in *Table 2.8 of Section VID; Part-2.*	Contractor under the supervision of the Engineer
	Operation				One time in a year		Locations and number of samples remain same as construction phase.	
Water	Construction	All essential characteristics and	Grab sample will be collected from source and Analyse as per	Indian Standards for Inland Surface	Twice in a year (pre and post	Grab Sampling	Identified sampling	Contractor under the

Attribute	Project Stage	Parameter	Special Guidance	Standards	Frequency	Duration	Location	Implementation
		some of desirable characteristics as decided by the Environmental Specialist of the MC and PIU	Standard Methods for Examination of Water and Wastewater. Environmental monitoring shall be conducted by NABL accredited or MOEF&CC approved laboratory	Waters (IS: 2296, 1982 Indian Standards for Drinking Water (IS 10500:2012)	monsoon season)		locations are provided in *Table 2.8 of Section VID; Part-2.*	supervision of the Engineer
Soil	Construction	Monitoring of Pb, SAR and Oil &Grease	Sample of soil collected to acidified and analyzed using absorption Spectrophotometer. Environmental monitoring shall be conducted by NABL accredited or MOEF&CC approved laboratory.	Threshold for each contaminant set by IRIS database of USEPA until national standards are promulgated	Once in a year	Grab Sampling	Identified sampling locations are provided in *Table 2.8 of Section VID; Part-2.*	Contractor under the supervision of the Engineer
Borrow area	Pre-construction	Suitability of the material as per IS 2720	-	IS 2720	Once	Once	Borrow area location	Contractor under the supervision of the Engineer
Rehabilitation of Borrow Areas	Construction	As per Clause 305.2.2.2 of MoRTH Specification and ESGP 03	Visual Observation	-	Once in a month	-	Borrow area location	Contractor under the supervision of the Engineer
HIV/ AIDS Prevention Measures	Construction	Awareness campaign and HIV/ AIDS Screening of construction personnel's	-	-	Within 3 months of mobilization & Quarterly during construction and six monthly during operation	24 hr	Settlement along the project road and Construction labour and Labour Camp sites	Contractor under the supervision of the Engineer / R&BD/PIU
		IEC materials distribution	Minimum five posters shall be displayed at each locations such		Quarterly			

Attribute	Project Stage	Parameter	Special Guidance	Standards	Frequency	Duration	Location	Implementation
			as labour camps, Workshop and plant area. Distribution of pamphlets, stagers etc during the Awareness camp.					
		Condom Vending Machine	Minimum two numbers at labour camp site		Once a month			

*** Annex 8 Environmental Monitoring Program of IRC: SP: 108 – 2015 shall be referred**

Table 2-8: Identified locations for Environmental Monitoring/Sampling

S. No.	Sample Code	Design Chainage (Km)	Location Name	Co- ordinates
Ambient Air Quality (AAQ)				
1.	AAQ1	105+500	Near Primary School, Dhandhuka	22°22'48.64"N 71°58'22.73"E
2.	AAQ2	116+600		22°21'30.87"N 71°51'51.09"E
3.	AAQ3	131+400	Ranpur	22°21'1.45"N 71°43'27.40"E
4.	AAQ4	151+000-	Babarkot area	22°16'3.15"N 71°34'26.13"E
5.	AAQ5	-	Construction Camp/ Plant Area	--
6.	AAQ6	-	Labour Camp/Colony	-
Ambient Noise Level (ANL)				
1.	ANL1	105+400	Dhandhuka	22°22'49.29"N 71°58'26.64"E
2.	ANL2	116+000	Vagad Village	22°21'35.47"N 71°52'11.68"E
3.	ANL3	129+900	Shree N M Gopani Polytechnic Institute	22°21'4.18"N 71°44'18.43"E
4.	ANL4	147+800	Near Sankardi Village	22°16'36.74"N 71°35'35.68"E
5.	ANL5	-	Construction Camp/ Plant Area	-
6.	ANL6	-	Labour Camp/Colony	-
Surface Water (SW) and Ground Water (GW)				
1.	GW1	125+800	Ground Water Well	22°21'36.98"N 71°46'36.19"E
2.	GW2	128+050	Ground Water Well	22°21'12.61"N 71°45'19.24"E
3.	GW3	105+800	Ground water Source at Dhandhuka	22°22'44.08"N 71°57'58.76"E
4.	GW4	150+900	Ground water Source near Babarkot	22°15'36.29"N 71°34'6.94"E
5.	SW1	115+800	Vagad Village	22°21'37.52"N 71°52'19.06"E
6.	SW2	131+400	Ranpur	22°20'58.74"N 71°43'30.11"E
Soil Quality (SQ)				
1.	SQ1	137.500	Agriculture field	22°18'50.84"N 71°40'49.78"E
2.	SQ2	149+900	Agriculture field	22°16'5.38"N 71°34'30.10"E

**locations are indicative only at the time of sampling, Contractor to consult engineer in advance (at least two week prior to collecting each of the samples and obtain approval from the Engineer prior to commencement of this activity.*

Reporting System:

The Contractor will operate the reporting system for environmental condition and environmental management indicators (Table 2.1). The Contractor will report to the Engineer, Monitoring Consultant and Engineer will report to the EE, SRP Division on the progress of the implementation of environmental conditions and management measures as per the EMP. The reporting formats are enclosed in the **Appendix 1** and the summary of reporting details is given in below table.

Table 2-9: Summary details of Reporting

Format No.	Item	Stage	Contractor	Engineer	EE, SRP Division
			Implementation & Reporting to Engineer, Monitoring Consultant	**Monitoring & reporting to EE, SRP Division**	**Oversee/ Field Compliance Monitoring**
EM 1	Identification of Disposal Locations	Pre-Construction; Construction	One Time	One Time	One Time
EM 2	Setting up of Construction Camp	Pre-Construction	One Time	One Time	One Time
EM 3	Borrow Area Identification	Pre-Construction	One Time	One Time	One Time
EM 4	Top Soil Monitoring	Construction	Quarterly	Quarterly	Quarterly
EM 5	Status Regarding Rehabilitation of Borrow Areas	Construction	-	Quarterly	Quarterly
EM6	Construction Safety	Construction	Monthly	Monthly	Monthly
EC 1	Pollution Monitoring	Pre-Construction; Construction	As Per Monitoring Plan	Quarterly	Quarterly
		Post Construction (DLP)			
		End of Maintenance			

Regulatory Clearances:

During continuance of the contract, the contractor and his sub-contractors shall abide at all times by all existing enactments on environmental protection and rules made there under, regulations, notifications and bye-laws of the State or Central Government, or local authorities and any other law, bye-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority. Salient features of some of the major laws that are applicable are given below:

The Water (Prevention and Control of Pollution) Act, 1974: This provides for the prevention and control of water pollution and the maintaining and restoring of wholesomeness of water. 'Pollution' means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid

substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms.
The Air (Prevention and Control of Pollution) Act, 1981: This provides for prevention, control and abatement of air pollution. 'Air Pollution' means the presence in the atmosphere of any 'air pollutant', which means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.

The Environment (Protection) Act, 1986: This provides for the protection and improvement of environment and for matters connected therewith, and the prevention of hazards to human beings, other living creatures, plants and property. 'Environment' includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property.

EIA Notification and its Subsequent Amendments

- As per the Environmental Impact Assessment (EIA) Notification, 14th September 2006 and its amendment up to 17th April 2015, new national /state highway projects as well as expansion of national /state highway require Prior Environmental Clearance.
- Projects have been grouped under Category 'A' requiring clearance from Expert Appraisal Committee (EAC) of MoEF&CC, GoI and Category 'B' requiring clearance from the State / Union territory Environment Impact Assessment Authority (SEIAA). The SEIAA shall base its decision on the recommendations of a State or Union territory level Expert Appraisal Committee (SEAC).
- The concerned Committee (EAC or SEAC) will finalize the TOR on the basis of Form-1, proposed draft TOR & Pre-Feasibility / Feasibility Report.
- Environmental Impact Assessment study is to be carried out strictly as per the TOR provided by the Committee. Public Hearing is required for Category 'A' project.
- Public Hearing is required for road & highway projects except expansion of Roads and Highways (item 7 (f) of the Schedule) which do not involve any further acquisition of land

List of projects requiring Prior Environmental Clearance is given in the "SCHEDULE" of EIA Notification. As per the Schedule categorization of the highway project is as follow:

Project Activity	***Category 'A'***	***Category 'B'***	***Conditions if any***
Highways *7(f)*	*iii) New National High ways; and* *iv) Expansion of National Highways greater than 100 km involving additional right of way or land acquisition greater than 40m on existing alignments and 60m on re-alignments or by-passes*	*iii) All New State Highway Projects* ***iv) State Highway Expansion projects in Hilly terrain (above 1,000 m MSL) and or Ecologically Sensitive Areas.***	*General Condition shall apply* ***Note:*** *Highways include expressways*

The Public Liability Insurance Act, 1991: This provides for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling hazardous substances and for matters connected herewith or incidental thereto. Hazardous substance means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act 1986, and exceeding such quantity as may be specified by notification by the Central Government.

Forest (Conservation) Act, 1980 and its amendments

The Act came into force with effect from October 25, 1980. This Act provides for the conservation of forests and regulating diversion of forestlands for non-forestry purposes. The basic objective of the Act is, to regulate the indiscriminate diversion of forestlands for non-forestry uses and to maintain a logical balance between the development needs of the country and the conservation of natural resources/ heritage.

When projects fall within forestlands, prior clearance is required from relevant authorities under the Forest (Conservation) Act, 1980. For diversion of forestland, the project proponent needs to apply to the State Government. Depending on the area required to be diverted, the proposals are cleared by MoEF Regional or Central Offices provided that the cost of compensatory afforestation, cost of rehabilitation of endangered/rare species of flora/fauna, and the net present value of the forest resources are deposited upfront with the state Forest Department.

Forest (Conservation) Rules, 2003 and its amendments

These are rules by the Central Government for working and conduct of business outlined under the Forest (Conservation) Act, 1980. As per the Forest (Conservation) Rules, 2003 & its amendment, proposal involving diversion of forest land up to 5 hectares other than the proposal relating to mining and encroachments are decided by the Regional Offices of the MOEF. The Regional Office of MOEF is competent to process, scrutinize and forward decision on proposal involving diversion of more than 5 ha to 40 ha of forest land along with the recommendation (if any), to MOEF, New Delhi. For proposal involving diversion of more than 40 ha forest land the state Government/ Union Territory would forward the proposal with recommendation to MOEF as per para 2.5(ii) of guidelines issued under Forest (Conservation) Act.

Hazardous And Other Wastes (Management and Transboundary Movement) Rules, 2016,were published by the Government of India in the Ministry of Environment, Forest and Climate Change vide number G.S.R. 582(E), dated the 24th July, 2015 in the Gazette of India, Extraordinary Part II, section 3, sub-section (ii) inviting objections and suggestions from all persons likely to be affected thereby, before the expiry of the period of sixty days from the date on which copies of the Gazette containing the said notification were made available to the public;

Responsibilities of the occupier for management of hazardous and other wastes.- (1) For the management of hazardous and other wastes, an occupier shall follow the following steps, namely:- (a) prevention; (b) minimization; (c) reuse, (d) recycling; (e) recovery, utilisation including co-processing; (f) safe disposal. (2) The occupier shall be responsible for safe and environmentally sound management of hazardous and other wastes. (3) The hazardous and other wastes generated in the establishment of an occupier shall be sent or sold to an authorised actual user or shall be disposed of in an authorised disposal facility. (4) The hazardous and other wastes shall be transported from an occupier's establishment to an authorised actual user or to an authorised disposal facility in accordance with the provisions of these rules. (5) The occupier who intends to get its hazardous and other wastes treated and disposed of by the operator of a treatment, storage and disposal facility shall give to the operator of that facility, such specific information as may be needed for safe storage and disposal. (6) The occupier shall take all the steps while managing hazardous and other wastes to- 6 (a) contain contaminants and prevent accidents and limit their consequences on human beings and the environment; and (b) provide persons working in the site with appropriate training, equipment and the information necessary to ensure their safety.

Table 2-10: Regulatory Clearance Requirement

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
Pre-Construction Stage							
01	Environmental Clearance	EIA Notification, 2006 and subsequent Amendments;	MoEF&CC, GoI/ SEIAA	For Category B, Applicable for newState Highway projects and SH expansion projects in hilly terrain (above 1000 MSL) or ecologically sensitive areas as per EIA Notification 2006 & its subsequent amendments – **Not Applicable** Category B to be upgraded to Category A if project falling under general conditions - **Not Applicable**	-	-	-
02	Consent to Establish (CTE)	Water (Prevention and Control of Pollution) Act1974; Air (Prevention and Control of Pollution) Act 1981	Gujarat Pollution Control Board	Applicable	3 Months	Contractor	Engineer
03	Wild Life Clearance	Wild Life Protection Act 1972	MoEF&CC, GoI	Not applicable	-	-	-

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
04	Diversion of forest land for non-forest purpose	Guidelines for diversion of forest lands for non-forest purpose under the Forest (Conservation) Act, 1980 and its amendments;	Western Zone Regional Office MoEF&CC, Bhopal	As per the Gujarat Government Gazattee Notification area along the project road is declared as Protected Forest. Therefore forest land diversion/clearance shall be applicable for Dhandhuka-Paliyad road.	12 months	R&B Dept., Govt. of Gujarat Necessary assistance shall be provided by Contractor	R&B Dept., Govt. of Gujarat
05	Permission for felling & trimming of trees	Forest (Conservation) Act, 1980 and its amendments;	State Forest Dept., Gujarat	Permission shall be required from Forest Department of GoG	6 months	R & B Dept., Govt. of Gujarat Necessary assistance shall be provided by Contractor.	R& B Dept., Govt. of Gujarat
Construction/Operation Stage							
06	Permission for locating and operating Borrow pits	EIA Notifications 2006 and Amendments thereof. Mines and Minerals (Development and Regulation) Act, 1957	District Environmental Impact Assessment Authority (DEIAA)(MoEF&CC), Commissioner of Geology and Mining, Local Administration – Municipal Government/Panchayat	Applicable	1 Month	Contractor	Engineer
07	Permission for Withdrawal of Ground Water	Environment Protection Act 1986	Central Ground Water Board, West Central Region (WCR), Ahmedaabd	Applicable, if withdrawal is proposed	1 month	Contractor	Engineer

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
08	Permission for withdrawal ofSurface Water from River/Irrigation Canals		Irrigation Authorities for use of water from Irrigation Canal. River Board / Authorities for withdrawal of water from Rivers	Applicable if withdrawal is proposed	1 month	Contractor	Engineer
09	Authorization to generate, store, transport and dispose of Hazardous Waste	Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016	Gujarat Pollution Control Board (GPCB)	Applicable, if hazardous waste is generated in the project (disposal of bituminous wastes – verify with GPCB)	2 months	Contractor	Engineer
10	Consolidated Consent and authorization (CCA)	Water (Prevention and Control of Pollution) Act 1974; Air (Prevention and Control of Pollution) Act 1981	Gujarat Pollution Control Board (GPCB)	Applicable	3 Months	Contractor	Engineer
11	Traffic Police Clearance for diversion of routine traffic	Local Traffic Police Regulations and Bye-laws	Traffic Police Department	Applicable	1 Month	Contractor	Engineer
12	NOC from Archaeological Survey of India	The Ancient Monument and Archaeological sites and Remains Act 1958.	Department of Archaeology Govt. of Gujarat	Not Applicable	2 Months	Contractor	Engineer

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
13	Permission for Sand Mining from river bed	Mines and Minerals (Development and Regulation) Act, 1957	Commissioner of Geology and Mining Govt.of Gujarat	Applicable, if river sand is mined	6 Months	Contractor	Engineer
14	Permission for Opening of new Quarry sites	Mines and Minerals (Development and Regulation) Act, 1957; EIA Notification 2006 and amendment thereof. Water (Prevention and Control of Pollution) Act1974; Air (Prevention and Control of Pollution) Act 1981	Commissioner of Geology and Mining, Govt. of Gujarat Gujarat Pollution Control Board (GPCB)	Applicable only if Contractor opens a new quarry site or borrow material from established quarry/third party.	6 Months 3 Months	Contractor	Engineer
15	Registration of Vehicles and Off road equipments; Pollution Under Control Certificate for Contractor Vehicles and Equipments	The Motor Vehicles Act, 1988 and amended 2015, Central Motor Vehicle Rules, 1989	Transport Department, Govt. of Gujarat	Applicable to all Contractor vehicles and off road equipments	1 Month 1 Week	Contractor	Engineer

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
16	Employing Labour	The Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and Central Rules, 1998 The Child Labour (Prohibition & Regulation) Act,1986 & Gujarat Rules 1994 The Minimum Wages Act, 1948 & The Minimum Wages (Gujarat) Rules 1961 The Contract Labour (Regulation & Abolition) Act, 1970 & The Contract Labour (P & R) (Gujarat) Rules 1972 The Work Man Compensation Act. 1923 and its amendments Labour Laws (Gujarat Amendment) Act, 2015	District Labour Commissioner	Applicable	1 Week	Contractor	Engineer

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
17	Registration of Workers	The Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and Central Rules, 1998	District Labour Commissioner	Applicable	1 Week	Contractor	Engineer
18	CRZ Clearance	CRZ Notification 2011	State CZMA/MoEF&CC/SEIAA	Applicable if project road is going through CRZ area	120 days	Contractor	R&BDept, GoG/ Engineer

Environmental Construction Guidelines for EMP Implementation

The purpose of the guideline is to guide the bidders/contractor to mitigate the environmental issues that are like to arise during the project construction and operation. Comprehensive Environmental and Social Guidelines for Practices has been prepared. (Refer Appendix 4 of Section VI D of Part - 2)

Table 2-11: Environmental and Social Guidelines for Practices

ESGP No.	Environmental and Social Guidelines for Practice (ESGP)
ESGP01	Site Preparation
ESGP02	Construction and Labour Camps
ESGP03	Borrow Areas
ESGP04	Topsoil Salvage, Storage and Replacement
ESGP05	Quarry Management
ESGP06	Water For Construction
ESGP07	Slope Stability and Erosion Control
ESGP08	Waste Management and Debris Disposal
ESGP09	Water Bodies
ESGP10	Drainage
ESGP11	Construction Plants & Equipment Management
ESGP12	Labour and Worker's Health and Safety
ESGP13	Cultural Properties
ESGP14	Tree Cutting and Afforestation
ESGP15	Forests and Other Natural Habitats
ESGP16	Air and Noise Pollution
ESGP17	R&R Planning and Rap Framework
ESGP18	Local Traffic Management During Construction
ESGP19	Prior Information and Disclosure to the Public
ESGP20	General Workmanship
ESGP21	Onsite Concrete Preparation
ESGP22	Grievance management
ESGP 23	E&S Regulatory Compliance

3. LIMBDI- DHANDHUKA CORRIDOR

The Contractor shall implement the Environmental Management Plan as part of Work Contract. The Environmental Management Plan (EMP) forms part of the Bid Document. The aspects given in EMP are mandatory in nature and thus, the Contractor is contractually bound to abide by the same.

The Contractor shall take all reasonable steps to protect the environment at on-site and off-site both and to avoid damage or nuisance to society or to property of the public or others resulting from pollution, noise or other causes arising as a consequence of his methods of operation.

It is deemed that the cost of implementing the EMP including safety and enhancement measures are included as the lumsum costs of the bid and no separate payment shall be tenable. All these clauses are applicable to sub-contractors as well. The main contractor will also be held responsible in the case of any non-compliance on part of his sub-contractors. The Engineer shall regularly monitor the compliance of EMP by the Contractor. The Contractor shall regularly monitor the compliance of EMP by their Sub-Contractors if any. **The Contractor shall submit monthly environmental compliance reports in the format prescribed by the PIU. (Additional reports/formats shall also be submitted upon request from the PIU / Engineer).**

The Contractor shall follow the Environmental Management Plan. The Engineer shall maintain record of compliance or non-compliance of Environmental Management Plan. On observing any non-compliance, the Engineer shall issue a notice to the Contractor, to rectify the same. The Contractor shall implement all mitigation measures for which responsibility is assigned to him as stipulated in the EMP. In case of any failure to rectify the non-compliance within the specified / stipulated timeframe in implementing the EMP, the Contractor is liable for the penalties as mentioned below:

1. All lapses in obtaining clearances / permissions under statutory regulations and violations of any regulations including eco-sensitive areas shall be treated as a **major lapse**.
2. Any complaints of public, within the scope of the Contractor, formally registered with the Engineer, R&BD or with the GoG and communicated to the Contractor, which is not properly addressed within the time period intimated by the Engineer / R & BD, GoG shall be treated as a **major lapse**.
3. Non-conformity to any of the mitigation measures stipulated in the EMP (other than stated above) shall be considered as a **minor lapse**.
4. On observing any lapses (i.e. major & minor), the Engineer shall issue a notice to the Contractor, to rectify the same.
5. Any minor lapse, which is not rectified and/or complied within fifteen days from the notice issued by the Engineer, shall be treated as a **major lapse**.
6. If a major lapse is not rectified upon receiving the notice the Engineer shall invoke deduction, in the subsequent Interim Payment Certificate.
7. **For major lapses**, 0.15% of the Initial Contract Price will be withheld for each notified lapse.
8. If the lapse is not rectified within one month after withholding the payment, **the amount withheld shall be forfeited**. Aggregate forfeited amount shall not exceed 3% of the Initial Contract Price.

The Contractor achieving the compliance to EMP will be appreciated through:

e) Certificate of appreciation from Employer / R&BD with regard to compliance to EMP provisions;
f) The Contractors' environmental performance will be disclosed in the GSHP-II website for their compliance in achieving the EMP.

Various aspects of EMP are presented in the ensuing tables and sections.

Table 3-1: Description of the Environmental Management Measures during Various Stages of the Project

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
1. PRE-CONSTRUCTION STAGE					
1.1.	**Pre-construction activities by PIU**				
1.1.1.	Utility Relocation and Common Property Resources (CPRs)	Clause 110, Clause 110.1. and 110.7 of MoRT&H specification	• R&B dept. and concerned line departments shall take necessary precautions, and shall ascertain necessary barricades/delineation of such sites to prevent accidents including accidental fall into bore holes, pits, drains both during demolition and construction/ relocation of such facilities. Standard safety practices shall be adopted for all such works. • Contractor shall make inventory and map all the utility services that need to be relocated or shifting from the CoI.	Corridor of Impact (CoI)	R&B Dept.
1.2.	**Pre-construction activities by the Contractor/Engineer**				
1.2.1.	Joint Field Verification		• The Engineer and Contractor shall ascertain the feasibility of implementing the Environmental Management Plan (EMP) through Joint field verification. • Any modification is required to update EMP shall be done by the Contractor in concurrence with Engineer and a copy of the modified EMP shall be submitted to the R&B dept, for review and approval.	Along project road	Contractor under the supervision of the Engineer
1.2.2.	**Procurement of Machinery**				
1.2.2.1	Crushers, Hot- Mix Plants & Batching Plants	Emission control legislations of CPCB/ GPCB for air, noise etc. Clause 111.5 of MoRT&H specification for Pollution from plants and BatchingPlant	• The Contractor shall follow all stipulated conditions for pollution control as suggested by the GPCB in the consent / NoC for establishing and operating the Hot-mix and Batching Plant. • No such installation by the Contractor shall be allowed till all the required legal clearances are obtained from the competent authority and the same is submitted to the Engineer / R&B dept,. • The location of the hot-mix and batching plant shall be at least(i) 1000m away from settlements and shall be placed in the downwind direction and (ii) 10 km aerial distance away from the protected areas (sanctuary,	All construction machineries (Crushers, Hot-Mix Plants & Batching Plants) should be kept/stationed at least 1000m away from settlements/habitations : Following towns /settlements are indicative only (for reference). Borana (Ch. 72+400)	Contractor under the supervision of the Engineer

<table>
<tr><th colspan="2">Environmental Issues</th><th>Ref: Clauses</th><th>Additional Measures To Be Adopted By The Contractor</th><th>Location</th><th>Responsibility</th></tr>
<tr><td></td><td></td><td></td><td>national parks etc.).
• All possible efforts shall be undertaken to identify land for establishment of Hot Mix and Batching Plant, where no major alteration will be required compelling a drastic change in landuse.
• The Contractor shall submit the detailed layout plan for approval to the Engineer before getting into formal agreement with landowners for setting up of such site. Actions by Engineer and R&B dept, against any non-compliance shall be borne by the Contractor at his own cost</td><td>Chachana (Ch. 82+100)
Vanala (Ch. 85+500)
Rangpur (Ch. 89+500)
Vasana (Ch. 92+550)</td><td></td></tr>
<tr><td>1.2.2.2.</td><td>Other Construction Vehicles, Equipment and Machinery</td><td>Discharge standards and Noise limits as per Environment Protection Act, 1986
Emission standards as per Bureau of Indian Standard (BIS) preferably Bharat IV emission norms</td><td>• Equipment’s conforming to the latest noise and emission control measures shall be used.
• Pollution under Control (PUC) certificates for all vehicles and machinery shall be made available to the Engineer / R&B dept for verification whenever required.</td><td>Along project road</td><td>Contractor under the supervision of the Engineer</td></tr>
<tr><td>1.2.3.</td><td colspan="3">Identification & Selection of Material Sources</td><td></td><td></td></tr>
<tr><td>1.2.3.1.</td><td>Borrow Areas</td><td>Clause 305.2.2 of MoRT&H Specification for borrow material & Clause 111.2 of MoRT&H Specification for borrow pits for embankment construction</td><td>• The Engineer shall inspect every borrow area location prior to issuing approval for use of such sites.
• Care shall be taken to avoid agriculture areas for planning haul roads for accessing borrow materials. In case of damage, the Contractor shall be solely responsible and shall rehabilitate it, as approved by Engineer / R&B dept.
• All borrow areas shall be restored either to the original condition or as per the approved rehabilitation plan by the Engineer, immediately upon completion of the use of such a source.
• Contractor shall obtain Environmental Clearance</td><td>Source of identified borrow area location along the road.
<table>
<tr><th>Chainage (Km)</th><th>Distance (m)</th><th>Side</th></tr>
<tr><td>67+200</td><td>100</td><td>RHS</td></tr>
<tr><td>70+450</td><td>100</td><td>LHS</td></tr>
<tr><td>71+020</td><td>100</td><td>RHS</td></tr>
<tr><td>75+250</td><td>2500</td><td>LHS</td></tr>
<tr><td>77+450</td><td>2000</td><td>RHS</td></tr>
<tr><td>82+000</td><td>200</td><td>RHS</td></tr>
<tr><td>85+050</td><td>100</td><td>RHS</td></tr>
</table></td><td>Contractor under the supervision of the Engineer</td></tr>
</table>

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
			/Approvals for uses of each and every borrow area, prior to take approval from the engineer.	85+450 | 100 | RHS	
1.2.3.2.	Quarries	Clause 111.3 of MoRT&H Specification for Quarry Operation	• No quarry and/or crusher units shall be established, within 1000m aerial distance from any of the residential/ settlement/habitation locations, forest boundary, wildlife movement path, breeding and nesting habitats and national parks/sanctuaries. • Contractor shall work out haul road network to be used for transport of quarry materials and report to Engineer who shall inspect and approve the same.	Below mentions are indicative village locations only for reference. Borana (Ch. 72+400) Chachana (Ch. 82+100) Vanala (Ch. 85+500) Rangpur (Ch. 89+500) Vasana (Ch. 92+550)	Contractor under the supervision of the Engineer
1.2.3.3.	Arrangement for Construction Water		• The Contractor shall source the requirement of water preferably from surface water bodies, rivers, canals and tanks in the project area with the necessary approval from the concern authority. • To avoid disruption/disturbance to other water users, the Contractor shall extract water from fixed locations. The Contractor shall consult the local people before finalizing the locations. • Only at locations where surface water sources are not available, the Contractor can contemplate extraction of ground water, after intimation and consent from the Engineer • The Contractor shall comply with the requirements of Central Ground Water Board, West Central Region (WCR), Ahmadabad, Gujarat and seek their approval for extraction of groundwater.	All rivers / surface water bodies that can be utilized within the project area	Contractor under the supervision of the Engineer
1.2.3.4.	Sand (all river and stream beds used directly or indirectly for the project)	Clause 111.3 of MoRT&H Specification for Quarry Operation	• In case of selection of new sites for sand quarrying, the Contractor shall obtain prior approval and concurrence from Competent District Authority. • To avoid accidents and caving in of sand banks at quarry sites, sand shall be removed layer by layer. Digging deeper than the permissible limit (0.9 meters) shall not be allowed. Such quarry shall be barricaded 10m away from the periphery on all sides except the entry point, so as to prevent accidental fall of domestic	Nearest sand quarries locations: Sand is abundantly available in Bhogavo, river, which is about 1.5 km away from the project road	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
			cattle, wildlife and human beings.		
1.2.4.	**Setting up construction sites**				
1.2.4.1	Construction Camp Locations – Selection, Design & Layout	Clause 111.8.4 of MoRTH Specification for Construction Camps	Construction camps shall not be proposed: (v) Within 1000m of ecologically sensitive areas (if any) (vi) Within 1000m from the nearest habitation to avoid conflicts and stress over the infrastructure facilities, with the local community	Below mentions are indicative habitation /village locations only for reference. Borana (Ch. 72+400) Chachana (Ch. 82+100) Vanala (Ch. 85+500) Rangpur (Ch. 89+500) Vasana (Ch. 92+550)	Contractor under the supervision of the Engineer
1.2.4.2.	Arrangements for Temporary Land Requirement	Clause 108.3 of MoRT&H Specification	• The Engineer shall ensure that the temporary site is cleared prior to handing over to the owner (after construction or completion of the activity) and it is included in the contract	Areas temporarily acquired for construction sites / hot mix plants / borrow areas / diversions /detours	Contractor under the supervision of the Engineer
1.2.4.3.	Stock-yards	Clause 105.7 of MoRTH Specification for Delivery, Storage and Handling of Materials	• The Contractor shall identify the location for stockyards for construction materials at least 1000m away from watercourses. • Separate enclosures shall be planned for storing construction materials containing fine particles such that sediment-laden water does not drain into nearby storm water drains	Surface water sources along the road are given in the *Table 3.2 & 3.3 of Section VID; Part-2.* Some surface water pond remains dry during summer.	Contractor under the supervision of the Engineer
1.2.4.4.	Fuel storage and re-fuelling areas	Clause 2.1.1.6 of EMP (Stripping of Soil) Clause 2.1.4.1.2 of EMP (dispose the spent oil and grease)	• The Contractor shall ensure that all construction vehicle parking locations, fuel/lubricants storage sites, vehicle, machinery and equipment maintenance and refueling sites are located at least 1000 m from rivers and irrigation canal/ponds.	Surface water sources along the road are given in the able 3.2 & 3.3. Some surface water pond remains dry during summer.	Contractor under the supervision of the Engineer
1.2.5.	**Labour Camp Management**				
1.2.5.1	Location of Construction labour camps: Accommodation	**Factories Act, 1948** and **Building & other Construction Workers (Regulation of Employment and**	• The Contractor shall provide, if required, erect and maintain necessary (temporary) living accommodation and ancillary facilities for labourers, to standards approved by the Engineer. • Labour camps shall not be located within 1000m from then nearest habitation to avoid conflicts and stress over	Along the project road at the location of construction labor camps	Contractor under the supervision of the Engineer

<table>
<tr><th colspan="2">Environmental Issues</th><th>Ref: Clauses</th><th>Additional Measures To Be Adopted By The Contractor</th><th>Location</th><th>Responsibility</th></tr>
<tr><td></td><td></td><td>Conditions of Service) Act, 1996 (construction & maintenance of labor camp)</td><td>the infrastructure facilities, with the local community. The location, layout and basic facility provision of labour camps shall be submitted to Engineer for approval prior to construction.</td><td></td><td></td></tr>
<tr><td>1.2.5.2</td><td>Potable Water</td><td>The Contract Labour (Regulation and Abolition) Act, 1970 and Factories Act, 1948</td><td>• The Contractor shall supply portable water through municipal/ panchayat sources. In case of groundwater it shall be treated prior to supply.</td><td>Construction labor camps</td><td>Contractor under the supervision of the Engineer</td></tr>
<tr><td>1.2.5.3</td><td>Sanitation facilities</td><td>Factories Act, 1948 for sanitation
Clause 111.9 of MoRTH Specification for Occupational Health and Safety of the Workforce</td><td>• The sanitation facilities for the camp shall be designed, built and operated in such a fashion that no health hazards occurs and no pollution to the air, ground water or adjacent water courses take place.
• No shared toilet facility shall be closer than 100 feet to any sleeping room, dining room, lunch area, or kitchen.
• Floor drains shall be provided in all bathrooms.
• Each toilet rooms, bathing rooms and washing area shall be lighted naturally or artificially by a safe type of lighting at all hours of the day and night.</td><td>Construction labor camps</td><td>Contractor under the supervision of the Engineer</td></tr>
<tr><td>1.2.5.4</td><td>Waste Disposal</td><td>Clause 301.2.10 of MoRTH Specification for Use and Disposal of Excavated Materials.
Clause 201.4 and 202.5 of MoRTH Specification for Disposal of Material.
Municipal Solid Waste Management Rules - 2016 for effective waste disposal</td><td>• The Contractor shall provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner.
• Municipal waste shall be disposed at designated disposal sites as advised by the local Panchayat body or the municipal corporation.
• The Contractor shall prepare SWM plan and implement by appointing a facilitating agency.</td><td>• Construction labor camps
• Waste collecting bins/ dust bins shall be provided on both side at start and end of the following locations or as directed by the Engineer.
<table>
<tr><th colspan="2">Design Ch. (Km)</th><th>Remarks</th></tr>
<tr><td>72.280</td><td>72.800</td><td>Borana</td></tr>
<tr><td>81.600</td><td>82.400</td><td>Chachana</td></tr>
<tr><td>85.500</td><td>86.100</td><td>Vanala</td></tr>
<tr><td>89.100</td><td>89.800</td><td>Rangpur</td></tr>
</table></td><td>Contractor under the supervision of the Engineer</td></tr>
</table>

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
1.2.5.5	HIV/ AIDS Prevention Measures	Clause 111.9 of MoRTH Specification for Occupational Health and Safety of the Workforce. ESGP 12	The Contractor shall implement the following measures towards ensuring HIV/AIDS prevention during the entire construction period • Conduct awareness campaign including dissemination of IEC materials (posters, pamphlets, stagers, ribbon etc.) on HIV/AIDS for all construction personnel(including labourers, supervisors, engineers and consultants) on HIV/AIDS/STDs within three months of mobilization and once a Quarter subsequently during the construction period and six monthly during operation; • Carry out screening of construction personnel for HIV/AIDS, within a quarter of mobilisation • Conduct quarterly health check-up of all construction personnel including testing for STDs; • Minimum five HIV/AIDS awareness posters shall be displayed at each locations *i.e.* labour camps, construction site, vehicle repairing workshops, HMP, Batching plant and crusher plant etc. • Erect and maintain hoardings/ information signages on HIV/AIDS prevention at the construction sites, labour camps and truck parking locations; • Install two numbers of condom vending machines at the construction camp and plant site/labour camps, including fortnightly replenishment of supplies.	Construction & labor camps	Contractor under the supervision of the Engineer
2. CONSTRUCTION STAGE					
2.1.	**Construction Stage Activities by Contractor**				
2.1.1.	**Site Clearance**				
2.1.1.1.	Clearing and Grubbing	Clause 201. of MoRT&H Specification	• All works shall be carried out in a manner such that the damage or disruption to flora is minimum. Onlyground cover/shrubs that impinge directly on the permanent works or necessary temporary works shall be removed with prior approval from Engineer. • In areas where grass or any form of vegetation is found, efforts to conserve topsoil shall be undertaken. • Top soil (10 cm) shall be preserved and stockpile	Along project road at construction sites	

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
2.1.1.2.	Dismantling of Bridgework/ Culverts	Clause 202 of MoRT&H Specification Construction and Demolition Waste Management Rules 2016	• The Contractor shall follow all necessary measures (including safety) especially while working close to cross drainage channels to prevent earthwork, stonework, materials and appendage from impeding cross drainage at rivers, streams, water canals and existing irrigation and drainage systems. • All reusable materials can be stacked and treated separately. All possible efforts to reuse, recycle and reduce waste quantity shall be undertaken.	At locations where bridge works and culverts are proposed. There are 28 existing culverts in addition 16 more culverts shall be added to ease the flooding/ drainage issues	Contractor under the supervision of the Engineer
2.1.1.3.	Generation & disposal of Debris	Clause 202.5 of MoRT&H. Specification for disposal of materials Construction and Demolition Waste Management Rules 2016	• Disposal of unutilized non-toxic debris shall be either hrough filling up of borrow areas or at pre-designated disposal sites, subject to the approval of the Engineer. • At locations identified for disposal of residual bituminous wastes, the disposal shall be carried out over a 60 mm thick layer of rammed clay so as to eliminate the possibility of leaching of wastes into the groundwater. • Debris generated from pile driving or other construction activities along the rivers, streams and drainage channels shall be carefully disposed in such a manner that it does not flow into the surface water bodies or form puddles in the area. • The pre-designated disposal locations shall be part of **Comprehensive Solid Waste Management Plan** to be prepared by Contractor in consultation and with approval of Engineer.	Throughout Project Road	Contractor under the supervision of the Engineer
2.1.1.4.	Non-bituminous construction wastes disposal	Clause 202 of MoRT&H Specification for Dismantling Clverts, Bridges and Other Structures/ Pavements	• The Contractor shall finalize the location of disposal site based on the following. o not located within designated forestarea o does not impact natural drainage courses o No endangered/rare flora is impacted by such dumping. o Settlements are located at least 1000m away from the site. The Engineer shall approve disposal sites after conformation of above criteria.	Disposal site locations	Contractor under the supervision of the Engineer
2.1.1.5.	Bituminous wastes	Annex "A" for	• The disposal of residual bituminous wastes shall be	Disposal site locations	Contractor under

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
	disposal	Protection of the Environment of Clause 501 of MoRTH Specification	done by the Contractor at secure land fill sites, with the requisite approvals from the concerned government agencies.		the supervision of the Engineer
2.1.1.6.	Stripping, stacking and preservation of top soil	Clause 301.3.2 of MoRT&H. Specification for stripping and storing topsoil. Clause 305.3.3 of MoRT&H. Specification for construction and for embankments Clause 301.7 of MoRT&H. Specification for preservation of Top Soil.	• Contractor shall strip the topsoil at all locations opened up for construction, including temporarily acquired land for traffic detours, storage, materials handling or any other construction related or incidental activities. • Segregated topsoil shall be stored in stockpiles of 1 to 1.25-m height. The stockpiles shall be located such that disturbance to construction work is minimal. • In dry weather conditions (between Feb - June), topsoil stacks shall be sprinkled with water on all sides to keep the moisture content of the stack.	At all construction sites	Contractor under the supervision of the Engineer
2.1.1.7.	Accessibility		• The Contractor shall provide safe and convenient passage for vehicles; pedestrians and livestock to and from roadsides and property accesses by providing temporary connecting road, as necessary. • Construction activities that shall affect the use of side roads and existing accesses to individual properties, whether public or private, shall not be undertaken without providing adequate provisions to ensure uninterrupted access, as approved by the Engineer. • The Contractor shall take care that the cross roads are constructed in such a sequence that construction work over the adjacent cross roads are taken up in a manner that traffic movement in any given area does not get affected.	Throughout Project Road	Contractor under the supervision of the Engineer
2.1.1.8.	Planning for Traffic Diversions and Detours	Clause 112 of MoRT&H	• Detailed traffic control plans shall be prepared by the Contractor and the same shall be submitted to the	All construction site and access roads.	Contractor under the supervision of

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
		Specification	Engineer. • The Contractor shall provide specific measures for safety of pedestrians and workers as a part of traffic control plans. The Contractor shall ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. • Contractor shall follow IRC: SP: 55-2014 for traffic diversion. The colour and size of the Work zone signs are as per IRC: SP: 55-2014 (Guidelines on Traffic Management in work zones). • The Contractor shall inform local community of changes in traffic routes and pedestrian access arrangements with assistance from Engineer and PIU.	Attention is required at villages such as: Borana (Ch. 72+400) Chachana (Ch. 82+100) Vanala (Ch. 85+500) Rangpur (Ch. 89+500) Vasana (Ch. 92+550)	the Engineer
2.1.2.	**Construction Materials**				
2.1.2.1.	Earth from Borrow Areas for Construction	IRC 010-1961 (procurement of earth materials) Clause 111.2 of MoRTH Specification	The mitigation strategy in the form of Development and rehabilitation Plan shall be prepared by Contractor The borrow pits shall not be left in a condition likely to cause hazard to human and animal life. The Contractor shall seek prior approval from the concern authorities for operating the borrow pit.	All along the project road, all access roads, temporarily acquired sites & all borrow areas	Contractor under the supervision of the Engineer
2.1.2.2.	Transporting Construction Materials	Clause 111.9. of MoRT&H Specification	All vehicles delivering materials to the site shall be covered to avoid spillage of materials. The unloading of materials at construction sites close to settlements shall be restricted to daytimeonly.	All along the Project road and all haul roads	Contractor under the supervision of the Engineer
2.1.3.	**Construction work**				
2.1.3.1.	Disruption to other users of Water	Annex "A" of Clause 501 of MoRTH Specification for Protection of the Environment and Water Quality	In case of diversion of water bodies, the Contractor shall take prior approval of the Irrigation Department and Engineer for any such activity. The PIU shall ensure that Contractor has served the notice to the downstream users of water well in advance where such diversion of the flow is likely to affect the downstream population subject to the condition that under no circumstances the downstream flow shall be stopped.	All locations where water flow crossings the road	Contractor under the supervision of the PIU
2.1.3.2.	Drainage and Flood Control	Clause 202 of MoRT&H	• Contractor shall ensure that construction materials like earth, stone, ash or appendage disposed off does not	All Surface water sources/ drains/ Nalahs/	Contractor under the supervision of

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
		Specification	block the flow of water of any water course and cross drainage channels. • Where necessary, adequate mechanical devices to bailout accumulated water from construction sites, camp sites, storage yard, excavation areas are to be arranged well in advance before the rainy season besides providing temporary cross drainage systems. • The Contractor shall take all adequate precautions to ensure that construction materials and excavated materials are enclosed in such a manner that erosion or run-off of sediments is controlled. Silt fencing shall be installed prior to the onset of the monsoon at all the required locations, as directed by Engineer and PIU. • The Contractor shall ensure that no material blocks the natural flow of water in any water course or cross drainage channel. Prior to monsoon, the Contractor shall provide either permanent or temporary drains to prevent water	Natural and artificial ponds along the road. Silt fencing should be given near surface water locations given in *Table 3.2 & 3.3 of Section VID; Part-2.*	the Engineer
2.1.3.3.	Siltation of Water Bodies and Degradation of Water Quality	Clause 306 of MoRT&H for soil erosion and sedimentation control	• Contractor shall ensure that construction materials like earth, stone, ash or appendage disposed off does not block the flow of water of any water course and cross drainage channels. • Silt fencing shall be proposed for all the effected water bodies along the road.	All Surface water sources/ drains/ Nalahs/ Natural and artificial ponds along the road. Silt fencing should be given near surface water locations given in *Table 3.2 & 3.3 of Section VID;Part-2.*	Contractor under the supervision of the Engineer
2.1.3.4.	Slope Protection and Control of Soil Erosion	Clause 306 of MoRT&H for soil erosion and sedimentation control Clause 307 of MoRT&H for Turfing works Clause 308 of MoRT&H for other	• The Contractor shall construct slope protection works as per design, or as directed by the Engineer	High raise embankment and surface water bodies locations Stone Pitching method at all canal crossing locations.	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
		measures of Slope Protection			
2.1.4.	**Pollution Control**				
2.1.4.1.1.	Water Pollution from Construction Wastes	CPCB Schedule VI - General Standards for Discharge of Environmental Pollutants (Liquid Waste Disposal) The Environment (Protection) Rules, 1986 and Water Act, 1974	• The Contractor shall take all precautionary measures to prevent the wastewater generated during construction from entering into streams, water bodies or the irrigation channels. • Contractor shall avoid construction works close to the streams or water bodies during monsoon.	All Surface water sources/ drains/ Nalahs/ Natural and artificial ponds along the road. Silt fencing should be given near surface water locations given in *Table 3.2&3.3 of Section VID;Part-2.*	Contractor under the supervision of the Engineer
2.1.4.1.2.	Water Pollution from Fuel, Lubricants and Chemicals	**Environment (Protection) Rules, 1986 (Standards for Emission or Discharge of Environmental Pollutants Schedule – I)** for Liquid Waste Disposal **Clause 111.** (Precaution and Safeguarding the Environment) **Annex'A'** to **Clause 501** (Protection of Environment)	• Oil interceptors shall be provided for vehicle parking, wash down and refueling areas. • In all, fuel storage and refueling areas, if located on agricultural land or areas supporting vegetation, the top soil shall be stripped, stockpiled and returned after cessation of such storage.	All Surface water sources/ drains/ Nalahs/ Natural and artificial ponds along the road. Silt fencing should be given near surface water locations given in *Table 3.3&3.2 of Section VID;Part-2.*	Contractor under the supervision of the Engineer
2.1.4.2.	**Air Pollution**				
2.1.4.2.1.	Dust Pollution	Annex 'A' to Clause 501 (Protection of Environment) - Section 3 Air	• The conditions for pollution control given in the **NOC i.e. Consent To Establish (CTE) and Consolidated Consent and Authorization (CCA)**by the GPCB shall be strictly followed.	Construction area/ site, Construction camps, Materials Loading/ unloading facilities	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
		Quality Clause 111.5. of MoRT&H. (Hot Mix Plant and Batch Mix Plant)	• Air pollution monitoring shall be conducted as per the Environmental Monitoring Plan and results shall be used to identify any additional pollution control measures required tobe adopted.		
2.1.4.2.2.	Emission from Construction Vehicles, Equipment and Machineries	Schedule-I: Standards for Emission suggested by CPCB/ GPCB	• Certification issued for such contrivances obtained from designated/approved authority shall be submitted along with the specified reporting format to the Engineer. • The Contractor shall maintain a separate file and submit PUC certificates for all vehicles/equipment/machinery used for the project. Monitoring results shall be submitted to Engineer and PIU.	Construction camps, Materials Loading / unloading facilities	Contractor under the supervision of the Engineer
2.1.4.3.	**Noise Pollution**				
2.1.4.3.1.	Noise Pollution: Noise from Vehicles, Plants and Equipments	Noise Limits for vehicles (Environment (Protection) Amendment Rules, 2000) and Part 'E', Schedule – VI of Environment (Protection) Rules, 1986. Clause 5A The Noise Pollution (Regulation and Control) Rules, 2000 (sound emitting construction equipments) Clause 201.2 of MoRT&H for Idling of temporary trucks	• All plants and equipment used in construction shall strictly conform to the MoEF/ CPCB noise standards. • Noisy construction activities (such as crushing, concrete mixing, batching etc.) within 150m of the nearest habitation/ educational institutes/health centers (silence zones) shall be stopped during the night time between 9.00 pm to 6.00am. • Contractor shall provide noise barriers to the suggested locations of select schools/ Temples/health centers prior to commencement of work. • Monitoring shall be carried out at the construction sites as per the monitoring schedule and results shall be submitted to Engineer. Based on the monitoring results, the Engineer, if required, shall recommend any additional noise mitigation measures required to be implemented by the Contractor.	Indicative residential area along the road are as follows for reference only: Borana (Ch. 72+400) Chachana (Ch. 82+100) Vanala (Ch. 85+500) Rangpur (Ch. 89+500) Vasana (Ch. 92+550)	Contractor under the supervision of the Engineer
2.1.4.4.	**Safety**				
2.1.4.4.1	Safety Procedures	Clause 111.11 of	The Contractor shall:	All construction sites	Contractor under

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
		MoRTH Specification for Occupational Health and Safety of the Workforce Clause 112 of MoRTH Specification for Arrangement of Traffic during Construction Building and Other Construction Workers (Regulation of Employment and Conditions of Services) Act, 1996	• Comply with all applicable safety regulations such as IRC SP 55 2014 for Traffic Safety during the construction and operation • Take care for the safety of all persons entitled to be on the Site, • Use reasonable efforts to keep the site and works clear of unnecessary obstruction so as to avoid danger to these persons, • Provide fencing, lighting, guarding and watching of the works until completion and taking over and provide any temporary works (including roadways, footways, guards and fences) which may be necessary, because of the execution of the works, for the use and protection of the public and of owners and occupiers of adjacent land.		the supervision of the Engineer
2.1.4.4.2	Care and supply of documents		• The Contractor shall prepare, submit and obtain approval of the Engineer for construction Safety Management Plan 14 days prior to commencement of construction works at site.		Contractor under the supervision of the Engineer
2.1.4.4.3	Contractors general obligations		• All design calculations and fabrication drawings for temporary works (such as form-work, staging, centering, scaffolding, specialized construction, handling and launching equipment and the like)material lists for structural fabrication as well asdetailed drawings for templates, and anchorage and temporary support details for pre-stressing cables as well as bar bending and cutting schedules for reinforcement, etc. shall be prepared by the Contractor at his own cost and forwarded to the Engineer at least six weeks in advance of actual constructional requirements. The Engineer will check the same for the Contractor's use with amendments.		Contractor under the supervision of the Engineer
2.1.4.4.4	Personal Safety	Factory Act, 1948,	• Construction Safety Plan shall be prepared by the	All construction sites	Contractor under

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
	Measures for Labour, Material handling , Painting etc.	Factories (Amendment) Act, 1987 (Chapter -5 Safety) Building and Other Construction Workers (Regulation of Employment and Conditions of Services) Act, 1996	Contractor during mobilization and approved by Engineer shall be adhered to by the Contractor throughout the construction period, and shall include provision of. • Protective footwear and protective goggles to all workers employed in mixing asphalt materials, cement, lime mortars, concrete etc. • Welders protective eye-shields to workers engaged in welding works • Protective goggles and clothing to workers engaged in stone breaking activities and workers shall be seated at sufficiently safe intervals • The Contractor shall comply with all regulations regarding safe scaffolding, ladders, working platforms, gangway, stairwells, excavations, trenches and safe means of entry and egress. • The Contractor shall ensure that no paint containing lead or lead products is used except in the form of paste or readymade paint. • Contractor shall provide facemasks to the workers when paint is applied in the form of spray or a surface having dry lead paint is rubbed and scrapped. • The Contractor shall mark 'hard hat' and 'no smoking' and other 'high risk' areas and enforce non-compliance of use of PPE with zero tolerance.		the supervision of the Engineer
2.1.4.4.5	Health and Safety	ESGP 12 Clause 111.11 of MoRTH Specification for Occupational Health and Safety of the Workforce	• The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's personnel. In collaboration with local health authorities, the Contractor shall ensure that medical staff, first aid facilities, sick bay and ambulance service are available at all times at the site. • The Contractor shall appoint an accident prevention officer at the site, responsible for maintaining safety and protection against accidents. This person shall be qualified for this responsibility, and shall have the authority to issue instructions and take protective	All construction sites and labour camps	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
			measures to prevent accidents. Throughout the execution of the works, the Contractor shall provide whatever is required by this person to exercise this responsibility and authority. • The Contractor shall send, to the Engineer, details of any accident as soon as practicable after its occurrence. • The Contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the Engineer may reasonably require.		
2.1.4.4.6	Traffic Safety & Pedestrian Safety	Clause 112 of MoRT&H Specification for Arrangement of Traffic during Construction	• All safety sign boards should be place as per IRC SP 55 2014. • Pedestrian Safety shall be ensured. Pedestrian circulation shall be demarcated prior to start & unsafe areas shall be cordoned off.	All along the project road	Contractor under the supervision of the Engineer
2.1.4.4.7	Risk from Electrical Equipment(s)	Factory Act, 1948 – Chapter -5 (Safety) and Factories (Amendment) Act, 1987	• No material shall be so stacked or placed as to cause danger or inconvenience to any person or the public. • All machines to be used in the construction shall conform to the relevant Indian Standards (IS) codes, shall be free from patent defect, shall be kept in good working order, shall be regularly inspected and properly maintained as per IS provision and to the satisfaction of the Engineer	All construction equipment	Contractor under the supervision of the Engineer
2.1.4.4.8	Safety during Road Works	Clause 112.4 of MoRT&H Specification for Traffic safety Clause 112.5. of MoRT&H Specification for Maintenance and Diversions IRC:SP:55 2014 for Road signage & markings	• The colour and size of the Work zone signs boards should be placed as per IRC: SP: 55-2014 (Guidelines on Traffic Management in work zones). • Contractor should follow IRC: SP: 55-2014 for traffic diversion works during construction. • The Contractor shall provide adequate signage and markings as per the instruction of the Engineer in the construction zones.	All along the project road and all haul roads	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
2.1.4.4.9	First Aid	Section 36 (First Aid) of Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996	• First aid measure shall be provided in the construction zones and labour camps.	All construction sites and labour camps	Contractor under the supervision of the Engineer
2.1.4.5.	**Cultural Property**				
2.1.4.5.1.	Chance Found Archaeological Property	Ancient Monuments and Archaeological Sites and Remains Rules 1959 Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act 2010	• All fossils, coins, articles of value of antiquity, structures and other remains or things of geological or archaeological interest discovered on the site are the property of the Government and shall be dealt with as per provisions of the relevant legislation. • The Contractor shall take reasonable precautions to prevent his workmen or any other persons from removing and damaging any such article or thing.	Along the project road	Contractor under the supervision of the Engineer
2.2.	**Environmental enhancement and special issues**				
2.2.1.	Rehabilitation/ Enhancement of Community Cultural and Religious Properties and Water Resources	Physical Cultural Resources (WB OP/BP 4.11)	• The architectural elements of the structure shall be conserved/reflected/translated into the design of new structures/ enhancements in accordance with wishes of the community.	As per enhancement locations provided under *Table 3.2 & 3.5 of Section VID; Part-2.*	Contractor under the supervision of the Engineer
2.2.2.	Flora and Chance found Fauna	Wild Life Protection Act 1972	• The Contractor shall take reasonable precaution to prevent his workmen or any other persons from removing and damaging any flora (plant/vegetation) and fauna (animal) including fishing in any water body and hunting of any animal. • If any wild animal is found near the construction site at any point of time, the Contractor shall acquaint the Engineer and execute the Engineer's instructions for dealing with the same. • The Engineer shall report to the nearby forest office (range office) and shall take appropriate steps/	As per Government of Gujarat Gazette Notification, protected forest has been notified along the road	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
			measures in consultation with the forest officials.		
2.2.3.	Sensitive receptors		• Sensitive receptors like schools, hospitals shall be provided with permanent noise barriers prior to the start of work in order to minimize the dust and noise impacts due to vehicle movement (during / post construction). Their effectiveness to be checked during operation phase. • Construction activities shall be confined within the present available CoI, regularly strict monitoring/supervision shall be done to minimize/control air-noise pollution and abatement of dust particles at minimum level possible using well maintained modern machineries.	Indicative sensitive receptors along the road are as follows for reference only: Borana (Ch. 72+400) Chachana (Ch. 82+100) Vanala (Ch. 85+500) Rangpur (Ch. 89+500) Vasana (Ch. 92+550)	Contractor under the supervision of the Engineer
2.3.	**Contractor Demobilization**				
2.3.1.	Clearing of Construction of Camps & Restoration	Clause 111.8.4 of MoRTH specification Clause 111.16 of MoRTH specification ESGP 02	• Contractor to prepare site restoration plans for approval by the Engineer. The plan shall be implemented by the Contractor prior to demobilization. • On completion of the works, all temporary structures shall be cleared, all rubbish burnt, excreta or other disposal pits or trenches filled in and effectively sealed off and the site left clean and tidy, at the Contractor's expense, to the entire satisfaction of the Engineer. • The topsoil removed and conserved earlier shall be spread over the restoration area as per the direction of the Engineer to facilitate the growth of vegetation. • Residual topsoil shall be distributed on adjoining/proximate barren/rocky areas as identified by the Engineer in a layer of thickness of 75mm –150mm.	All Construction Workers' Camps	Contractor under the supervision of the Engineer
2.3.2.	Redevelopment of Borrow Areas	Clause 305.2.2.2 of MoRTH specification ESGP 03	• Redevelopment of borrow areas shall be taken up in accordance with the plans approved by the Engineer	Some identified borrow area location along the road are given in above point no. 1.2.3.1.	Contractor under the supervision of the Engineer
3. OPERATION STAGE (Activities to be Carried Out by the Contractor/R&BD/PIU)					
3.1	Monitoring and Evaluation of Operational		• The PIU shall monitor the operational performance of the various mitigation/ enhancement measures carried	All along the project road	Contractor under the supervision of

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
	Performance of Environmental Mitigation Measures		out as a part of the project. Monitoring and performance indicators have been indicated in **Environmental Monitoring Plan (Table 3.7 of Section VID; Part-2).**		the Engineer
3.2	Maintenance of Drainage		• PIU shall 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 without damaging the spurs and check dams erected to stabilize the course and flow of all such drainage channels. • PIU shall ensure that all the sediment/oil and grease traps setup at the water bodies are cleared once in every three months.	At locations were bridge works and culverts are proposed. There are 28 existing culverts in addition 16 more culverts shall be added to ease the flooding/ drainage issues	Contractor under the supervision of the Engineer
3.3	Pollution Monitoring		• The periodic monitoring of the ambient air quality, noise level, water (both ground and surface water) quality, soil pollution/contamination are to be continued at pre-designated locations as identified in the **Environmental Monitoring Plan (Table 3.7 of Section VID;Part-2)** and if necessary, at additional locations for comparative study of pre and post operation data in order to ensure further improvement/modification in similar future works.	All along the project road	Contractor under the supervision of the Engineer
3.4	Atmospheric Pollution		• Ambient air concentrations of various pollutants shall be monitored as envisaged in the Environmental Monitoring Plan at pre designated locations to compare the levels with the pre- construction data. • Additional data at other location may be collected as per any site specific requirement.	All along the project road	Contractor under the supervision of the Engineer
3.5	Noise Pollution		• Noise pollution shall be monitored as per **Environmental Monitoring Plan** at sensitive locations where pre-construction noise data was collected. The functioning of the noise barriers shall be supervised and monitored for further improvement/replication at other affected points if necessary. • Signage near sensitive locations shall be maintained and kept clean. Monitoring the effectiveness of the pollution attenuation measures shall be taken up as per	All along the project road	Contractor under the supervision of the Engineer

Environmental Issues		Ref: Clauses	Additional Measures To Be Adopted By The Contractor	Location	Responsibility
			Environmental Monitoring Plan (Table 3.7 of Section VID; Part-2).		
3.6	Soil Erosion and Monitoring of Borrow Areas		• Visual monitoring and inspection of soil erosion at borrow areas, quarries (if closed and rehabilitated), embankments and other places expected to be affected, shall be carried to record and monitor the effectiveness of such structures after the completion of project, so as to evaluate the beneficial effects of each type of activity together with the cost involved.	Some identified borrow area location along the road are given in above point no. 1.2.3.1.	Contractor under the supervision of the Engineer
3.7	Road Safety and Maintenance of Assets	Clause 3000 of MoRTH Specification for Maintenance of Road IRC: SP :55 2014 for Traffic Safety	• No advertisement/hoardings shall be allowed within the Right of Way limits of the project road. • Regular maintenance and cleaning of assets such as signboards, bus stops, drains etc. shall be undertaken. • Contractor shall follow IRC: SP: 55-2014 for road signs are as per IRC: SP: 55-2014	All along the project road	Contractor under the supervision of the Engineer
3.8	Enhancement Measures		• Watering for the trees and re-plantation of the dead trees at all identified enhancement locations. • Replenishment of the damage tree guard. • Cleaning and damage control of the sign boards. • Repair or reinstall all the non functional solar lights • Repair or reinstall damage sitting benching •	Identified enhancement locations are given in the *Table 3.2 & 3.5 of Section VID; Part-2.*	Contractor under the supervision of the Engineer

Environmental Enhancement Measures:

There are several properties including cultural and community properties that are identified along the project roads those warrant restoration / enhancement measures as a part of better environmental management plan implementation practices. The selection is based on the consultation held with the local people / communities and engineering interventions in finalizing the alignment.

Enhancement of Water Bodies / Ponds

Most of the water bodies along the road are ponds. The criteria to enhance these water bodies are

(i) To increase water holding capacity
(ii) Easy access to the community & commuters
(iii) Stabilise the slope around periphery,
(iv) To improve visual view or improve scenic beauty of these water ponds.

Where the proposed road is passing in the vicinity of pond areas. The scope for enhancement includes the possibility of any further improvement, availability of space for enhancements and the likely benefits for the local community as well as the road users. One more round of consultation with the local public, community and authority shall be carried out prior to start the enhancement work.
Contractor shall protect the all ground water well along the road with the provision includes but not limited to are increase the parapet height, cover with Iron Grill (MS still) and roofing on top *etc.* Conceptual plan for enhancement of water bodies are given in ***Figure W, X & Y under Appendix 3 of Section VID; Part - 2.***

Table 3-2: Enhancement of Water-bodies

Sl. No.	Design Chainage (Km)		Length along the road	Side	Feature	Mitigation
	To	Form	(m)			
1.	66.970	67.080	110.0	RHS	Pond	The Contactor shall enhance the identified locations with the provision includes but not limited to are retention/protection wall along the road, Solar lighting & plantation with guard.
2.	69.130	69.200	70.0	LHS	Pond	
3.	72.000	72.120	120.0	RHS	Pond	

Table 3-3: Silt fencing proposed for the water bodies

Sl. No.	Design Chainage (Km)		Side	Length	Feature	Mitigation
	To	Form		(m)		
1.	68.760	68.970	RHS	210.0	Artificial Pond	Contractor shall protect the surface water bodies along the road with provisions includes but not limited to are silt fencing, gabion wall along the road side, High embankment with stone pitching etc.
2.	69.900	70.000	LHS	100.0	Artificial Pond	
3.	73.800	74.000	BHS	200.0	Seasonal River	
4.	76.500	76.600	BHS	100.0	Seasonal River	
5.	85.900	86.150	RHS	250.0	Pond	
6.	88.350	88.420	BHS	70.0	Seasonal River	
7.	89.200	89.900	RHS	700.0	Pond	
Total				**1630.0**		

Enhancement of Religious Structures:

The scope for enhancement includes the possibility of any further improvement, availability of space for

enhancements and the likely benefits for the local community as well as the road users. Consultation with the local public and authority must be done prior to start the enhancement work. Enhancement measures shall be provided as describe in below table but not limited. Following locations are identified as an enhancement of religious structures. Schematic drawings for enhancement are given in ***Figure T, U, & V under Appendix 3 of Section VID; Part-2.***

Table 3-4: Enhancement of Religious Structures

Sl. No.	Chainage (Km)	Distance from ECL (m)	Length along the road (m)	Structure/ Features	Side	Extant of Impact	Mitigation
1.	66.300	7.0	50.0	Temple	RHS	Entry & Compound Wall	Re construction of the effected part. Plantation with guard, Shoe rack, solar lighting, community bin /dustbin, Informatory signages and seating benches are also proposed.
2.	71.850	5.5	40.0	Temple	RHS	Large Impact, Temple coming within RoW	It is a large temple without any compound area. Temple wall coming within the Row. As per the consultation with the authority, they don't want to shift the temple. Therefore, provision of rumble strip, pedestrian crossing and Informatory signages shall be placed.
3.	72.280	7.0	45.0	Temple	LHS	Boundary Wall	Provision of compound boundary wall along the road, entry gate, rumble strip, seating benches, shoe rack, Solar lighting, dustbin/community bin Informatory signages, landscaping and plantation with guard.
4.	89.340	5.8	35.0	Temple	LHS	Boundary wall	Re construction of the effected part, provision of rumble strip, Informatory signages, plantation with guard /, shoe rack solar lighting and dustbin.

Noise Sensitive Receptors:

Special safety provisions have been taken into account while planning for such sensitive areas. Boundary walls demarcating the site extents of these properties have also been incorporated separating it from other areas, thereby providing proper ambience for education of students. The site is dominated by soft landscape and character has been retained. Further informal seating under existing trees have also been planned for to continue with the concept of open air schools.

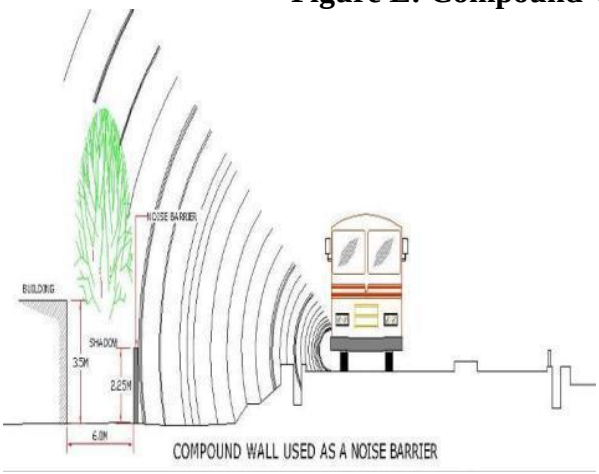
Table 3-5: Noise Barrier Proposed for Sensitive Receptors

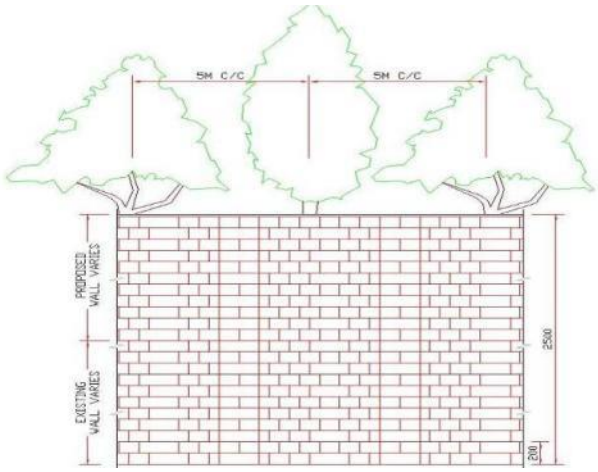
Sl. No.	Chainage (Km)	Distance from ECL (m)	Structure/Features	Side
1	68.000	50.0	Jay Jagdish hostel	LHS
2	81.890	10.0	Primary School, Chachaana	LHS
3	85.730	11.5	Primary School, Vanala	LHS

To reduce noise and vibrations, noise barriers in the form of compound wall is proposed. In case of space crunch, the use of concrete screens is also suggested. The noise barrier wall shall be constructed by excavation

of foundation, laying of brick masonry wall up to a height of 2.5 m above ground, plastering and coping as per the direction of the engineer and as laid in the specification. Creepers and paints shall be used in consultation with the affected community to give an aesthetic look. Shade and flowering trees shall be planted within the boundary of the sensitive receptor, between the building line and the compound wall, wherever space shall be available, 2.5m centre to centre. Provisions of solar light shall be taken at all identified school/ education institute as mention in above table. Below figure shows the combination of compound wall and trees which shall be used as noise barrier

Figure E: Compound Wall and Trees as Noise Barrier





Environmental Monitoring Plan

The monitoring programme is devised to ensure that the envisaged purpose of the project is achieved and results in the desired benefit to the target population. To ensure the effective implementation of the EMP, it is essential that an effective monitoring programme be designed and carried out.

Monitoring Indicators

The monitoring programme contains monitoring plan for all performance indicators. Physical, biological and environmental management components identified as of particular significance in affecting the environment at critical locations have been suggested as Performance Indicators (PIs).

Table 3-6: Environmental Monitoring Indicators

Sr. No.	Indicator	Details	Stage	Responsibility
A	**Environmental Condition Indicators and Monitoring Plan**			
1.	Environmental Monitoring (AAQ, Surface, Ambient Noise Level, Soil Quality and Ground Water Quality)	The parameters to be monitored, frequency and duration of monitoring as well as the locations to be monitored will be as per the Monitoring Plan prepared (Refer table 3.7 of Section VID; Part-2)	Pre-Construction	Contractor
			Construction	Contractor
			Operation (DL Period)	Contractor
B	**Environmental Management Indicators and Monitoring Plan**			
2.	Tree Cutting	Progress of tree removal marked for cutting is to be reported.	Pre-construction	Forest Department /PIU
3.	Construction Camps	Location of construction camps have to be identified and parameters indicative of environment in the area has to be reported.	Pre-construction	Contractor

Sr. No.	Indicator	Details	Stage	Responsibility
4.	Borrow Areas	Location of borrow areas have to be identified and parameters indicative of environment in the area has to be reported.	Pre-construction	Contractor
5.	Borrow Areas Management and Rehabilitation	Engineer will undertake site visits to verify that all borrow areas have been rehabilitated in line with the landowner's request and to their full satisfaction.	Construction	Contractor
6.	Construction Waste (both hazardous and non-hazardous waste) Management	All type of wastes shall be reused, disposed and sold to the authorized vendors as per applicable rule and regulation.	Construction	Contractor
7.	Regulatory compliance	Contractor shall obtain all the appropriate regulatory approvals for Quarry Operation, Installing and Operating Construction Plants such as Hot-Mix Plants, Batching Plants, Crushers, and own Mining Leases etc.	Pre-construction	Contractor
8.	Management of any chance discovery of archaeological remains at any site excavated under the contract.	Contractor shall complied with all protocols, procedures and legislation for reporting and managing archaeological discoveries	Construction	Contractor
9.	Operational Management Processes including labour deployment during routine and maintenance work.	Contractor shall complied with labour laws of wages; Valid licenses, Acceptable labour campsite conditions and facilities	Construction	Contractor
			Operation (DL Period)	Contractor
10.	Prevention of communicable diseases spreading to new areas due to increased communications.	Contractor shall organize acceptable number and frequency of HIV/AIDS awareness generation events, IEC material distribution, availability of contraceptive measures in the camp site/labour camps in a year;	Construction	Contractor
			Operation (DL Period)	Contractor

For each of the environmental condition indicator, the monitoring plan specifies the parameters to be monitored, location of the monitoring sites, frequency and duration of monitoring. The monitoring plan also specifies the applicable standards, implementation and supervising responsibilities. The monitoring plan for environmental condition indicators of the project in construction and operation stages is presented in Table 3.7 of Section VID; Part-2.

Noumbers of locations formonitoring of the various environmental paramters such as ambient air quality, Surgface and ground water quality and ambient noise levels and soil characteristics shall be as desired by the engineers.

Figure F: MAP/KEY Plan for Environmental Monitoring Location

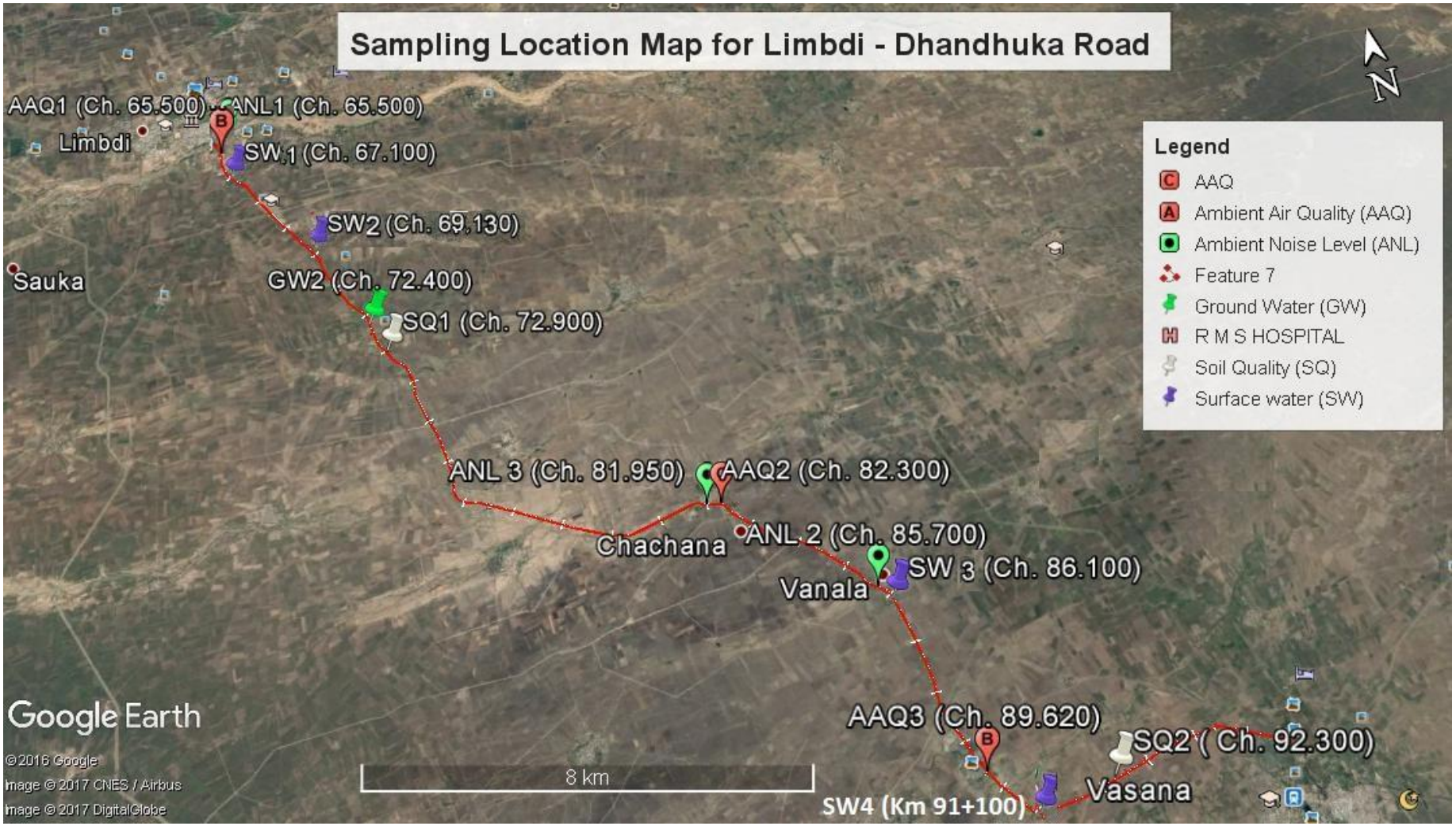


Table 3-7: Environmental Monitoring Plan (Program)
The below mentioned environmental monitoring plan program shall be in confirmation with the *IRC : SP : 108 – 2015; Air, Water, Soil and Noise Standards by CPCB, periodic and subsequent notifications issued by MoEF&CC, GoI on parameter to measure environmental monitoring

Attribute	Project Stage	Parameter	Special Guidance	Standards	Frequency	Duration	Location	Implementation
Air	Construction	SO_2, NO_x, PM_{10}, $PM_{2.5}$, CO	Fine Particulate Sampler (RDS) to be located 50m from thesourec of pollution (if any) in the Downwind direction. Use method specified by CPCB for analysis. Environmental monitoring shall be conducted by NABL accredited or MOEF&CC approved laboratory.	**(NAAQS)** National Ambient Air Quality Standard , CPCB, 2009	One time in a seasons and three seasons per year	24 hours Sampling	Sampling shall be done as per given in the *Table 3.9 of Section VID; Part-2.*	Contractor under the supervision of the Engineer
	Operation[4]				One time in a year		Locations and number of samples remain same as construction phase.	
Noise	Construction	**Leq Day, Leq Night, L_{DN}**	Equivalent noise levels using an integrated noise level meter kept at a distance of 15m from edge of pavement. Environmental monitoring shall be conducted by NABL accredited or MOEF&CC approved laboratory.	MoEF&CC Noise Rules, 2000	One time in a seasons and three seasons per year	24 hr sampling	Sampling shall be done as per given in the *Table 3.9 of Section VID; Part-2.*	Contractor under the supervision of the Engineer
	Operation				One time in a year		Locations and number of samples remain same as construction phase.	
Water	Construction	All essential characteristics and some of desirable characteristics as decided by the Environmental Specialist of the MC	Grab sample will be collected from source and Analyse as per Standard Methods for Examination of Water and Wastewater. Environmental monitoring shall be conducted by NABL accredited or MOEF&CC	Indian Standards for Inland Surface Waters (IS: 2296, 1982 Indian Standards for Drinking Water (IS	Twice in a year (pre and post monsoon season)	Grab Sampling	Sampling shall be done as per given in the *Table 3.9 of Section VID; Part-2.*	Contractor under the supervision of the Engineer

Attribute	Project Stage	Parameter	Special Guidance	Standards	Frequency	Duration	Location	Implementation
		and PIU	approved laboratory.	10500:2012)				
Soil	Construction	Monitoring of Pb, SAR and Oil &Grease	Sample of soil collected to acidified and analyzed using absorption Spectrophotometer. Environmental monitoring shall be conducted by NABL Approved laboratory.	Threshold for each contaminant set by IRIS database of USEPA until national standards are promulgated	Once in a year	Grab Sampling	Sampling shall be done as per given in the *Table 3.9 of Section VID; Part-2.*	Contractor under the supervision of the Engineer
Borrow area	Pre-construction	Suitability of the material as per IS 2720	-	IS 2720	Once	Once	Borrow area location	Contractor under the supervision of the Engineer
Rehabilitation of Borrow Areas	Construction	As per Clause 305.2.2.2 of MoRTH Specification and ESGP 03	Visual Observation	-	Once in a month	-	Borrow area location	Contractor under the supervision of the Engineer
HIV/ AIDS Prevention Measures	Construction	Awareness campaign and HIV/ AIDS Screening of construction personnel's	-	ESGP 12	Within 3 months of mobilization & Quarterly during construction and six monthly during operation	24 hrs	Settlement along the project road and Construction labour and Labour Camp sites	Contractor under the supervision of the Engineer / R&BD/PIU
		IEC materials distribution	Minimum five posters shall be displayed at each locations such as labour camps, Workshop and plant area. Distribution of pamphlets, stagers etc during the Awareness camp.		Quarterly			
		Condom Vending	Minimum two numbers at labour		Once a			

Attribute	Project Stage	Parameter	Special Guidance	Standards	Frequency	Duration	Location	Implementation
		Machine	camp site		month			

*** Annex 8 Environmental Monitoring Program of IRC: SP: 108 – 2015 shall be referred**

Table 3-8: Identified locations for Environmental Monitoring/Sampling

S. No.	Sample Code	Design Chainage (Km)	Location Name	Co- ordinates
Ambient Air Quality (AAQ)				
1.	AAQ1	65+500	Limbdi Settlement area	22°33'43.91"N 71°48'49.74"E
2.	AAQ2	82+300	Chachana Village	22°27'24.62"N 71°53'49.46"E
3.	AAQ3	89+620	Rangpur	22°24'7.60"N 71°55'40.64"E
4.	AAQ4	-	Construction camp/ Plant Area	-
5.	AAQ5	-	Labour Camp/Colony	-
Ambient Noise Level (ANL)				
1.	ANL 1	65+500	Limbdi Settlement area	22°33'43.91"N 71°48'49.74"E
2.	ANL 2	85+700	Primary school at Vanala	22°26'9.29"N 71°55'11.72"E
3.	ANL 3	81+950	Primary school Chachana	22°27'29.82"N 71°53'37.29"E
4.	ANL 4	-	Construction camp/ Plant Area	-
5.	ANL 5	-	Labour Camp/Colony	-
Surface Water (SW) and Ground Water (GW)				
1.	GW1	65+300	Limbdi residential area	22°33'44.47"N 71°48'49.23"E
2.	GW2	72+400	Well near Borana village	22°30'30.16"N 71°50'16.63"E
3.	SW1	67+100	Pond	22°33'1.69"N 71°48'50.94"E
4.	SW2	69+130	Pond	22°32'4.83"N 71°49'30.14"E
5.	SW3	86+100	Pond	22°25'59.61"N 71°55'19.14"E
6.	SW4	91+100	River	22°23'54.86"N 71°55'48.20"E
Soil Quality (SQ)				
1.	SQ1	72+900	Near Borana village	22°30'14.37"N 71°50'21.79"E
2.	SQ2	92+300	Vasana Village	22°23'43.03"N 71°56'56.90"E

**locations are indicative only at the time of sampling, Contractor to consult engineer in advance (at least two week prior to collecting each of the samples and obtain approval from the Engineer prior to commencement of this activity.*

Reporting System:

The contractor will operate the reporting system for environmental condition and environmental management indicators. The Contractor will report to the Engineer, Monitoring Consultant and Engineer will report to the EE, SRP Division on the progress of the implementation of environmental conditions and management measures as per the EMP. The reporting formats and Contractor's Checklist on Environmental and Social Issues

are enclosed in the ***Appendix 1 & 2 of Section VID; Part-2***. Summary of reporting details is given in below table.

Table 3-9: Summary Details of Reporting

Format No.	Item	Stage	Contractor	Engineer	EE, SRP Division
			Implementation & Reporting to Engineer, Monitoring Consultant	**Monitoring & reporting to EE, SRP Division**	**Oversee/ Field Compliance Monitoring**
EM 1	Identification of Disposal Locations	Pre-Construction; Construction	One Time	One Time	One Time
EM 2	Setting up of Construction Camp	Pre-Construction	One Time	One Time	One Time
EM 3	Borrow Area Identification	Pre-Construction	One Time	One Time	One Time
EM 4	Top Soil Monitoring	Construction	Quarterly	Quarterly	Quarterly
EM 5	Status Regarding Rehabilitation of Borrow Areas	Construction	-	Quarterly	Quarterly
EM6	Construction Safety	Construction	Monthly	Monthly	Monthly
EC 1	Pollution Monitoring	Pre-Construction; Construction	As Per Monitoring Plan	Quarterly	Quarterly
		Post Construction (DLP)			
		End of Maintenance			

Regulatory Clearances:

During continuance of the contract, the contractor and his sub-contractors shall abide at all times by all existing enactments on environmental protection and rules made there under, regulations, notifications and bye-laws of the State or Central Government, or local authorities and any other law, bye-law, regulations that may be passed or notification that may be issued in this respect in future by the State or Central Government or the local authority. Salient features of some of the major laws that are applicable are given below:

The Water (Prevention and Control of Pollution) Act, 1974: This provides for the prevention and control of water pollution and the maintaining and restoring of wholesomeness of water. 'Pollution' means such contamination of water or such alteration of the physical, chemical or biological properties of water or such discharge of any sewage or trade effluent or of any other liquid, gaseous or solid substance into water (whether directly or indirectly) as may, or is likely to, create a nuisance or render such water harmful or injurious to public health or safety, or to domestic, commercial, industrial, agricultural or other legitimate uses, or to the life and health of animals or plants or of aquatic organisms.

The Air (Prevention and Control of Pollution) Act, 1981: This provides for prevention, control and abatement of air pollution. 'Air Pollution' means the presence in the atmosphere of any 'air pollutant', which means any solid, liquid or gaseous substance (including noise) present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment.

The Environment (Protection) Act, 1986: This provides for the protection and improvement of environment and for matters connected therewith, and the prevention of hazards to human beings, other living creatures,

plants and property. 'Environment' includes water, air and land and the inter-relationship which exists among and between water, air and land, and human beings, other living creatures, plants, micro-organism and property.

EIA Notification and its Subsequent Amendments

- As per the Environmental Impact Assessment (EIA) Notification, 14th September 2006 and its amendment up to 17th April 2015, new national /state highway projects as well as expansion of national /state highway require Prior Environmental Clearance.
- Projects have been grouped under Category 'A' requiring clearance from Expert Appraisal Committee (EAC) of MoEF&CC, GoI and Category 'B' requiring clearance from the State / Union territory Environment Impact Assessment Authority (SEIAA). The SEIAA shall base its decision on the recommendations of a State or Union territory level Expert Appraisal Committee (SEAC).
- The concerned Committee (EAC or SEAC) will finalize the TOR on the basis of Form-1, proposed draft TOR & Pre-Feasibility / Feasibility Report.
- Environmental Impact Assessment study is to be carried out strictly as per the TOR provided by the Committee. Public Hearing is required for Category 'A' project.
- Public Hearing is required for road & highway projects except expansion of Roads and Highways (item 7 (f) of the Schedule) which do not involve any further acquisition of land

List of projects requiring Prior Environmental Clearance is given in the "SCHEDULE" of EIA Notification. As per the Schedule categorization of the highway project is as follow:

Project Activity	***Category 'A'***	***Category 'B'***	***Conditions if any***
Highways *7(f)*	*v) New National High ways; and* *vi) Expansion of National Highways greater than 100 km involving additional right of way or land acquisition greater than 40m on existing alignments and 60m on re-alignments or by-passes*	*v) All New State Highway Projects* ***vi) State Highway Expansion projects in Hilly terrain (above 1,000 m MSL) and or Ecologically Sensitive Areas.***	*General Condition shall apply* ***Note:*** *Highways include expressways*

The Public Liability Insurance Act, 1991: This provides for public liability insurance for the purpose of providing immediate relief to the persons affected by accident occurring while handling hazardous substances and for matters connected herewith or incidental thereto. Hazardous substance means any substance or preparation which is defined as hazardous substance under the Environment (Protection) Act 1986, and exceeding such quantity as may be specified by notification by the Central Government.

Forest (Conservation) Act, 1980 and its amendments

The Act came into force with effect from October 25, 1980. This Act provides for the conservation of forests and regulating diversion of forestlands for non-forestry purposes. The basic objective of the Act is, to regulate the indiscriminate diversion of forestlands for non-forestry uses and to maintain a logical balance between the development needs of the country and the conservation of natural resources/ heritage.

When projects fall within forestlands, prior clearance is required from relevant authorities under the Forest (Conservation) Act, 1980. For diversion of forestland, the project proponent needs to apply to the State Government. Depending on the area required to be diverted, the proposals are cleared by MoEF Regional or Central Offices provided that the cost of compensatory afforestation, cost of rehabilitation of endangered/rare species of flora/fauna, and the net present value of the forest resources are deposited upfront with the state Forest Department.

Forest (Conservation) Rules, 2003 and its amendments

These are rules by the Central Government for working and conduct of business outlined under the Forest (Conservation) Act, 1980. As per the Forest (Conservation) Rules, 2003 & its amendment, proposal involving diversion of forest land up to 5 hectares other than the proposal relating to mining and encroachments are decided by the Regional Offices of the MOEF. The Regional Office of MOEF is competent to process, scrutinize and forward decision on proposal involving diversion of more than 5 ha to 40 ha of forest land along with the recommendation (if any), to MOEF, New Delhi. For proposal involving diversion of more than 40 ha forest land the state Government/ Union Territory would forward the proposal with recommendation to MOEF as per para 2.5(ii) of guidelines issued under Forest (Conservation) Act.

Hazardous And Other Wastes (Management and Trans-boundary Movement) Rules, 2016, were published by the Government of India in the Ministry of Environment, Forest and Climate Change vide number G.S.R. 582(E), dated the 24th July, 2015 in the Gazette of India, Extraordinary Part II, section 3, sub-section (ii) inviting objections and suggestions from all persons likely to be affected thereby, before the expiry of the period of sixty days from the date on which copies of the Gazette containing the said notification were made available to the public;

Responsibilities of the occupier for management of hazardous and other wastes.- (1) For the management of hazardous and other wastes, an occupier shall follow the following steps, namely:- (a) prevention; (b) minimization; (c) reuse, (d) recycling; (e) recovery, utilisation including co-processing; (f) safe disposal. (2) The occupier shall be responsible for safe and environmentally sound management of hazardous and other wastes. (3) The hazardous and other wastes generated in the establishment of an occupier shall be sent or sold to an authorised actual user or shall be disposed of in an authorised disposal facility. (4) The hazardous and other wastes shall be transported from an occupier's establishment to an authorised actual user or to an authorised disposal facility in accordance with the provisions of these rules. (5) The occupier who intends to get its hazardous and other wastes treated and disposed of by the operator of a treatment, storage and disposal facility shall give to the operator of that facility, such specific information as may be needed for safe storage and disposal. (6) The occupier shall take all the steps while managing hazardous and other wastes to- 6 (a) contain contaminants and prevent accidents and limit their consequences on human beings and the environment; and (b) provide persons working in the site with appropriate training, equipment and the information necessary to ensure their safety.

Table 3-10: Regulatory Clearance Requirement

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
Pre-Construction Stage							
01	Environmental Clearance	EIA Notification, 2006 and Amendment thereof;	MoEF&CC, GoI/ SEIAA	For Category B, Applicable for new State Highway projects and SH expansion projects in hilly terrain (above 1000 MSL) or ecologically sensitive areas as per EIA Notification 2006 & its subsequent amendments – **Not Applicable** Category B to be upgraded to Category A if project falling under general conditions - **Not Applicable**	-	-	-
02	Consent to Establish (CTE)	Water (Prevention and Control of Pollution) Act1974; Air (Prevention and Control of Pollution) Act 1981	Gujarat Pollution Control Board	Applicable	3 Months	Contractor	Engineer
03	Wild Life Clearance	Wild Life Protection Act 1972	MoEF&CC, GoI	Not applicable	-	-	-

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
04	Diversion of forest land for non-forest purpose	Guidelines for diversion of forest lands for non-forest purpose under the Forest (Conservation) Act, 1980 and its amendments;	Western Zone Regional Office MoEF&CC, Bhopal	As per the Gujarat Government Gazattee Notification area along the project road is declared as Protected Forest. Therefore forest land diversion/clearance will be applicable for Limbdi-Dhandhuka road.	12 months	R&B Dept., Govt. of Gujarat Necessary assistance shall be provided by Contractor	R&B Dept., Govt. of Gujarat
05	Permission for felling & trimming of trees	Forest (Conservation) Act, 1980 and its amendments;	State Forest Dept., Gujarat	Permission shall be required from Divisional Forest Department of district Ahmadabad & Surendrnegar	6 months	R & B Dept., Govt. of Gujarat Necessary assistance shall be provided by Contractor.	R& B Dept., Govt. of Gujarat
Construction/Operation Stage							
06	Permission for locating and operating Borrow pits	EIA Notification 2006 and amendments thereof. Mines and Minerals (Development and Regulation) Act, 1957	District Environmental Impact Assessment Authority (DEIAA); (MoEF&CC), Commissioner of Geology and Mining, Local Administration-Municipal Govt. /Panchayat	Applicable	1 Month	Contractor	Engineer
07	Permission for Withdrawal of Ground Water	Environment Protection Act 1986	Central Ground Water Board, West Central Region (WCR), Ahmadabad	Applicable, if withdrawal is proposed	1 month	Contractor	Engineer

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
08	Permission for withdrawal ofSurface Water from River/Irrigation Canals		Irrigation Authorities for use of water from Irrigation Canal. River Board / Authorities for withdrawal of water from Rivers	Applicable if withdrawal is proposed	1 month	Contractor	Engineer
09	Authorization to generate, store, transport and dispose of Hazardous Waste	Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016	Gujarat Pollution Control Board (GPCB)	Applicable, if hazardous waste is generated in the project (disposal of bituminous wastes – verify with GPCB)	2 months	Contractor	Engineer
10	Consolidated Consent and authorization (CCA)	Water (Prevention and Control of Pollution) Act 1974; Air (Prevention and Control of Pollution) Act 1981	Gujarat Pollution Control Board (GPCB)	Applicable	3 Months	Contractor	Engineer
11	Traffic Police Clearance for diversion of routine traffic	Local Traffic Police Regulations and Bye-laws	Traffic Police Department	Applicable	1 Month	Contractor	Engineer
12	NOC from Archaeological Survey of India	The Ancient Monument and Archaeological sites and Remains Act 1958.	Department of Archaeology Govt. of Gujarat	Not Applicable	2 Months	Contractor	Engineer
13	Permission for Sand Mining from river bed	Mines and Minerals (Development and Regulation) Act, 1957	Commissioner of Geology and Mining Govt.of Gujarat	Applicable, if river sand is mined	6 Months	Contractor	Engineer

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
14	Permission for Opening of new Quarry sites	Mines and Minerals (Development and Regulation) Act, 1957; Water (Prevention and Control of Pollution) Act1974; EIA Notification 2006 and amendment thereof. Air (Prevention and Control of Pollution) Act 1981	Commissioner of Geology and Mining, Govt. of Gujarat Gujarat Pollution Control Board	Applicable only if Contractor opens a new quarry site or borrow material from established quarry/third party.	6 Months 3 Months	Contractor	Engineer
15	Registration of Vehicles and Off road equipments; Pollution Under Control Certificate for Contractor Vehicles and Equipments	The Motor Vehicles Act, 1988 and amended 2015, Central Motor Vehicle Rules, 1989	Transport Department, Govt. of Gujarat	Applicable to all Contractor vehicles and off road equipments	1 Month 1 Week	Contractor	Engineer

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
16	Employing Labour	The Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and Central Rules, 1998 The Child Labour (Prohibition & Regulation) Act,1986 & Gujarat Rules 1994 The Minimum Wages Act, 1948 & The Minimum Wages (Gujarat) Rules 1961 The Contract Labour (Regulation & Abolition) Act, 1970 & The Contract Labour (P & R) (Gujarat) Rules 1972 The Work Man Compensation Act. 1923 and its amendments Labour Laws (Gujarat Amendment) Act, 2015	District Labour Commissioner	Applicable	1 Week	Contractor	Engineer

S. No	Regulatory Clearances	Corresponding Regulations	Approving Authority	Applicability to the Project	Typical Time Required	Responsibility for compliance	
						Execution	Supervision
17	Registration of Workers	The Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and Central Rules, 1998	District Labour Commissioner	Applicable	1 Week	Contractor	Engineer

Environmental Construction Guidelines for EMP Implementation

The purpose of the guideline is to guide the bidders/contractor to mitigate the environmental issues that are like to arise during the project construction and operation. Comprehensive Environmental and Social Guidelines for Practices has been prepared. (Refer Appendix 4 of Section VID; Part-2)

Table 3-11: Environmental and Social Guidelines for Practices

ESGP No.	Environmental and Social Guidelines for Practice (ESGP)
ESGP01	Site Preparation
ESGP02	Construction and Labour Camps
ESGP03	Borrow Areas
ESGP04	Topsoil Salvage, Storage and Replacement
ESGP05	Quarry Management
ESGP06	Water For Construction
ESGP07	Slope Stability and Erosion Control
ESGP08	Waste Management and Debris Disposal
ESGP09	Water Bodies
ESGP10	Drainage
ESGP11	Construction Plants & Equipment Management
ESGP12	Labour and Worker's Health and Safety
ESGP13	Cultural Properties
ESGP14	Tree Cutting and Afforestation
ESGP15	Forests and Other Natural Habitats
ESGP16	Air and Noise Pollution
ESGP17	R&R Planning and Rap Framework
ESGP18	Local Traffic Management During Construction
ESGP19	Prior Information and Disclosure to the Public
ESGP20	General Workmanship
ESGP21	Onsite Concrete Preparation
ESGP22	Grievance management
ESGP 23	E&S Regulatory Compliance

Appendix for Environmental Management Plan

Appendix 1: Environmental Monitoring Formats

Format EM1: Selection of Disposal Site Locations

From _____ To_____

(Give chainage and nearest settlements from both ends)

Criteria on which information for each site is to be collected	**Site 1**	**Site 2**	**Site 3**	**Site 4**
Area covered (m2)				
Total Material that can be dumped within the site (m3)				
Depth to which disposal is feasible (m)				
Distance of nearest watercourse (m)				
Nearest Settlement (m)				
Date/s of Community Consultation/s				
Whether the community is agreeable to siting of dumping site (Y/N)				
Date of Permission from Village Council President(VCP)				
Proposed future use of the Site				
Selected Site (tick any one column only)				
Certified that the above information is correct to the best of my knowledge and belief.				
Contractor				
Signed:		Date:		
Name & Designation:				
Recommendation on the suitability of the site				
Decision Taken (tick one):	Approved / Not Approved			
Engineer				
Signed:		Date:		
Name and Designation of Deciding Authority				

Enclosures (Tick as appropriate)		
1	Maps of each location	
2	Photographs	
A	Each disposal location	
B	Each community consultation	
3	Photocopies of permissions from VCPs	

Verified by:	Prepared by:
Signature:	Signature:
Name:	Name:

Signature
Engineer in Change

Format EM2: Construction Camp and Storage Area

Construction Stage: Report - Date____ Month_____ Year_____

(Site Layout of Construction camp and working drawings of dwelling units with allied facilities to be attached with format)

Format to be submitted before target date (decided by PIU) of establishing camps

Location of Camp (km_____)

Sl. No	Item	Unit	Details	Remarks
1	Detail of item camp			
A	Size of Camp	mxm		
B	Area of Camp	sq.m		
C	Distance from Nearest Settlement			
D	Distance from Nearest Water Source	Type/Size/Capacity/Present Use/Ownership		
E	Date of camp being operational dd/mm/yy			
F	Present land use			
G	No other trees with girth > 0.3m.			
H	Details of Storage area(Availability of impervious surface)	mxm		
I	Availability of separate waste disposal from storage area	Cum		
2	Details of top soil stacking			
A	Quantity of top soil removed	Cum		
B	Detail of storage of topsoil	Describe stacking arrangement		
3	Details of workforce			
A	Total No of Labourers	nos		
B	Total no of Male Workers	nos		
C	No of Male Workers below 18 years of age	nos		
D	Total No of Female Workers	nos		
E	No of Female workers below 18 years of age	nos		
F	No of children	nos		
4	Details of dwelling units			
A	No of dwellings/huts	nos		
B	Minimum Size of Dwelling	mxm		
C	No of openings per dwelling	nos		
D	Minimum size of opening	mxm		
E	Walls	specifications		
F	Roofing	specifications		
G	Flooring	specifications		
H	Drinking Water Tank	specifications		
I	Capacity of Drinking water Tank	cum		
J	Size of Drinking Water Tank	mxmxm		
K	Total no of WC	nos		
L	No of Wcs for female workers	nos		
M	Minimum Size of WC	mxm		
N	Total No of Bathrooms for female workers	nos		
O	Size of septic tank for WC/Baths	mxmxm		
P	Capacity of Water Tank for WCs/ Bathrooms and general purpose			

Q	Fencing around camp	Y/N		
5	Details of facilities			
A	Availability of security guard 24 hrs a day	Yes/No		
B	Details of First Aid Facility	Yes/No		
C	Availability of Day Care Centre	Yes/No		
D	Availability of dust bins (capacity 60 ltr)	nos		

Certified that the furnished information is correct the quality of work is as per god practice and all relevant information as required is attached

Verified by:	Prepared by:
Signature:	Signature:
Name:	Name:

Signature
Engineer in Change

Format EM3: Reporting for Borrow Area

Construction Stage Report: Date ____ Month_____ Year_____ Site Layout of Borrow Area and Proposed Borrow Area Redevelopment Plan to be attached with format Format to be submitted before target date as (decided by PIU) for establishing Borrow Areas Borrow Area No. BA_____ Location of Borrow Area (Km_____)

Sl. No	Item	Unit	Details	Remarks
1	Details of Borrow Area			
A	Date of Borrow Area becoming operational dd/mm/yy			
B	Current Land use			
C	Distance from Nearest Settlement	Km		
D	No of settlements within 200m of Haul Road	No.		
E	No of settlements within 500m of Borrow Area	No.		
F	Total Capacity	cum		
G	No of Trees with girth more than 0.3 m	No.		
H	Length of Haul Road	km		
I	Width of Haul road	M		
J	Type of Haul Road	metal/dirt		
K	Size of Borrow Area	sqkm		
L	Area of Borrow Area	km x km		
M	Quantity Available	cum		
N	Distance of Nearest Water Source	Type/Size/Capacity/Present Use/Ownership		
O	Quantity of top soil removed	cum		
P	Detail of storage of topsoil			
Q	Daily/occasional use of the Borrow Area by the community, if any	-		
R	Probable reuse of Borrow pit-ask community	-		
S	Drainage channels/slope/characteristics of the area	-		
2	Enhancement Elements			
A	Quantity of top soil removed	sq.m		
B	Detail of storage of topsoil	sq.m		
C	Adjoining land use/Natural elements			
D	Nearby catchment for storing water			
E	Erosion Control Programme			
F	Preventive measures for			
I	Leaching			
Ii	Mosquito Breeding			
Iii	Water run-off/contamination			
Iv	Any other environmental degradation			
3	Details of workforce			
A	Total No of Labourers	No.		
B	Total no of Male Workers	No.		
C	No of Male Workers below 18 years of age	No.		
D	Total No of Female Workers	No.		
E	No of Female workers below 18 years of age	No.		
4	Details of redevelopment, Plan to be			

Sl. No	Item	Unit	Details	Remarks
	enclosed			

Certified that the furnished information is correct the quality of work is as per good practice and all relevant information as required is attached.

Verified by:	Prepared by:
Signature:	Signature:
Name:	Name:

Signature
Engineer in Change

EM 4 Topsoil Conservation Monitoring

Contract _____
Report No. _____ Date_____

Location (Chainage)	Original Use of Topsoil removed	Measures for preventing spillage of topsoil on Haul Roads (Earthen/ Metalled)	Present Method of Storage	Anticipated period of Storage (Months)	Distance of nearest Water course (m)	Present Slope of Pile (V: H)	Whether silt fencing provided?	Is any other covering /measure provided? If yes, what is it?	Improvements required	Extent of Compliance as on date of report

Certified that the furnished information is correct the quality of work is as per good practice and all relevant information as required is attached.

Verified by:	Prepared by:
Signature:	Signature:
Name:	Name:

Signature
Engineer in Change

EM 5 Redevelopment of Borrow Areas

Operation Stage: Report: Date ____ Month_____ Year_____

Details of remarks to be appended wherever necessary

Sl. No.	Activity	Drawbacks Identified			Improvements Required		
		Particulars	Financial	Others (Ask Community)	Technical	Financial	Remarks/ Suggestions
1	Details of Borrow area and Surrounding Land use						
2	End use of the borrow area						
3	Whether rehabilitation has been carried out in line with owners request						
4	Erosion Control Measures						
5	Number of trees planted						
6	Reuse of topsoil						
7	Preventive measures taken for -Mosquito Breeding -Water runoff / contamination -Other Environmental Degradation						
8	Any problems faced by owner						
9	Any problems faced by the local community						
10	If it has been developed as a fish pond,						
a	Details of available catchment for storing water						
b	Economic Benefits/Utility						
11	If it has been developed as an orchard						
a	Details of suitability of soil and water.						
B	Type of Plantation						

c	Economic Benefits/Utility						
12	Any Other End use						
a	Particulars						
b	Economic Benefits/Utility						

Certified that the furnished information is correct the quality of work is as per good practice and all relevant information as required is attached.

Verified by:	Prepared by:
Signature:	Signature:
Name:	Name:

Signature
Engineer in Change

EM 6 Checklist for Construction Safety

Sl. No.	Safety Issues	Yes	No	Non compliance	Corrective Action	Remarks
1	Appointment of qualified Construction safety officers					
2	Approval for Construction Safety Management Plan by the Engineer.					
3	Approval for Traffic Management/control Plan in accordance with IRC: SP: 55-2014					
4	Maintenance of the existing road stretches handed over to the Contractor.					
5	Provision of Temporary Traffic Barriers/Barricades/caution tapes in construction zones					
6	Provision of traffic sign boards					
7	Provision for flags and warning lights					
8	Provision of metal drum /empty bitumen drum delineator, painted in circumferential strips of alternate black and white 100mm wide 2 coats fitted with reflectors 3 Nos. of 7.5cm diameter					
9	Providing plastic crash barrier					
10	Provision of adequate staging, form work and access (ladders with handrail) for works at a height of more than 3.0 m					
11	Provision of adequate shoring / bracing / barricading / lighting for all deep excavations of more than 3.0 m depth.					
12	Demarcations (fencing, guarding and watching) at construction sites					
13	Provision for sufficient lighting especially for night time work					
14	Arrangements for controlled access and entry to Construction zones					
15	Safety arrangements for Road users / Pedestrians					
16	Arrangements for detouring traffic to alternate facilities					
17	Regular Inspection of Work Zone Traffic Control Devices by authorized contractor personnel					

Sl. No.	Safety Issues	Yes	No	Non compliance	Corrective Action	Remarks
18	Construction Workers safety - Provision of personnel protective equipment's					
	A. Helmets					
	B. Safety Shoe					
	C. Dust masks					
	D. Hand Gloves					
	E. Safety Belts					
	F. Reflective Jackets					
	G. Earplugs for labour					
19	Workers employed on bituminous works, stone crushers, concrete batching plants etc. provided with protective goggles, gloves, gumboots etc.					
20	Workers engaged in welding work shall be provided with welder protective shields					
21	All vehicles are provided with reverse horns.					
22	All scaffolds, ladders and other safety devices shall be maintained in as safe and sound condition					
23	Regular health check-up for labour / Contractor's personnel					
24	Ensuring the sanitary conditions and all waste disposal procedures & methods in the camps.					
25	The Contractor shall provide adequate circuit for traffic flow around construction areas, control speed of construction vehicles through road safety and training of drivers, provide adequate signage, barriers and flag persons for traffic control					
26	Provision for insurance coverage to the contractor's personnel					

Certified that the furnished information is correct the quality of work is as per good practice and all relevant information as required is attached.

Verified by:	Prepared by:
Signature:	Signature:
Name:	Name:

Signature
Engineer in Change

Format EC 1: Target Sheet for Pollution Monitoring

Construction Stage: Report - Date_____ Month____ Year_____
(Locations at which monitoring to be conducted as per EMP or any change/ Modification with the approval by the Engineer)

Sl. No	Chainage	Details of Location	Duration of Monitoring	Instruments Used	Completion Target		Reason for Delay if any
					Target Date	Date of Completion if task completed	
Air Monitoring							
1							
2							
3							
4							
5							
Water Monitoring							
1							
2							
3							
4							
5							
Noise Monitoring							
1							
2							
3							
4							
5							

Certified that the furnished information is correct the quality of work is as per good practice and all relevant information as required is attached.

Verified by:	Prepared by:
Signature:	Signature:
Name:	Name:

Signature
Engineer in Change

Appendix 2: Contractor's Checklist on Environmental and Social Issues

Project Name: _____ Contract /Road No._____
Contractor Details: _____
Project Description: _____

Questions		Response (See note at the end of the checklist)
Activities		
1.	List the activities you will be undertaking during the works such as rock breaking, blasting, laying asphalt, establishing camp and plants etc.	
Responsibilities		
2.	Do you have any qualified/experienced person on environmental management? If not, how are you going to manage the environment and Social aspects?	
Materials		
3.	What base materials will you transport to the site such as stone, borrow soil, diesel, lubricant?	
4.	Where will you source these materials from (non-manufactured material such as sand, soil and stone)?	
5.	Where will you store these materials?	
6.	How will you ensure materials brought to site will be stored and handled with care to avoid contamination of soil and water, reduce dust, and minimize disruption of traffic, not impairing public safety?	
Emissions to water, soil and air (Pollutants)		
7.	How will you ensure that any construction materials and works will: Not restrict access to properties and carriageways. Not damage existing trees. Be protected from rain to reduce the loss of soil and materials washing down roads and entering drains and waterways. Be stored to reduce leaks (such as Diesel) into the soil or waterways. Not generate dust or cause nuisance air emissions.	
8.	How will you ensure proper drainage from the works so that water does not pond and become a hazard to health?	
9.	How will you reduce sediment from the construction activities?	
Fauna and Flora		
10.	No trees shall be felled as part of Construction/ Maintenance activity. How will you protect existing trees from construction activities?	
Waste Management		

Questions		Response (See note at the end of the checklist)
11.	How do you plan to store and dispose of: Construction debris? Workers refuse and effluent? General litter?	
Noise and Vibration		
12.	Will you be using any noisy equipment that may cause nuisance?	
13.	Are your works close to a school, or hospital or other place where people may be affected by noise?	
14.	What will you do to reduce noise and vibration impacts?	
15.	What will be your working hours?	
Construction Camp / Workers' Camp		
16.	Where you are planning to set up construction and workers camp?	
17.	Does it meet the stipulated siting criteria?	
18.	How you are going to control pollution from contraction plan and equipment?	
19.	What facilities you will provide at camp for workers?	
Community, Awareness, Consultation, Co-ordination		
20.	How will you keep owners and occupants of shops and residences and other people of the adjoining villages and road users, who are affected, informed about the works?	
21.	How will you ensure all the sub-contractors, supervisor and others on the site, are aware of these environmental and social aspects?	
22.	How will you co-ordinate with utility works (such as electricity, telephone, cable)?	
23.	Can you satisfy the special regulations or environmental conditions identified in the contract for this project?	
24.	Have you attended any training course on environment, health and safety for similar construction project?	
Safety		
25.	What activities could cause harm to people or property?	
26.	How will you reduce the risk of impact on people or their property?	
27.	How will you reduce potential injury to your workers and subcontractors?	

Note:

The Contractor shall fill this Checklist road-wise based on ESMF and Contract stipulation.

This checklist shall serve as Contractor's road specific environmental management plan and serves as basis for subsequent implementation of the safeguard measures by the Contractor and monitoring the same by the EE, SRP Division.

This checklist should be filled up during initial road inventory by the Contractor i.e. before any physical works begins / starts.

Verified by:	Prepared by:
Signature:	Signature:
Name:	Name:

Signature
Engineer in Change

Appendix 3: Proposed Schematic Enhancement Drawings

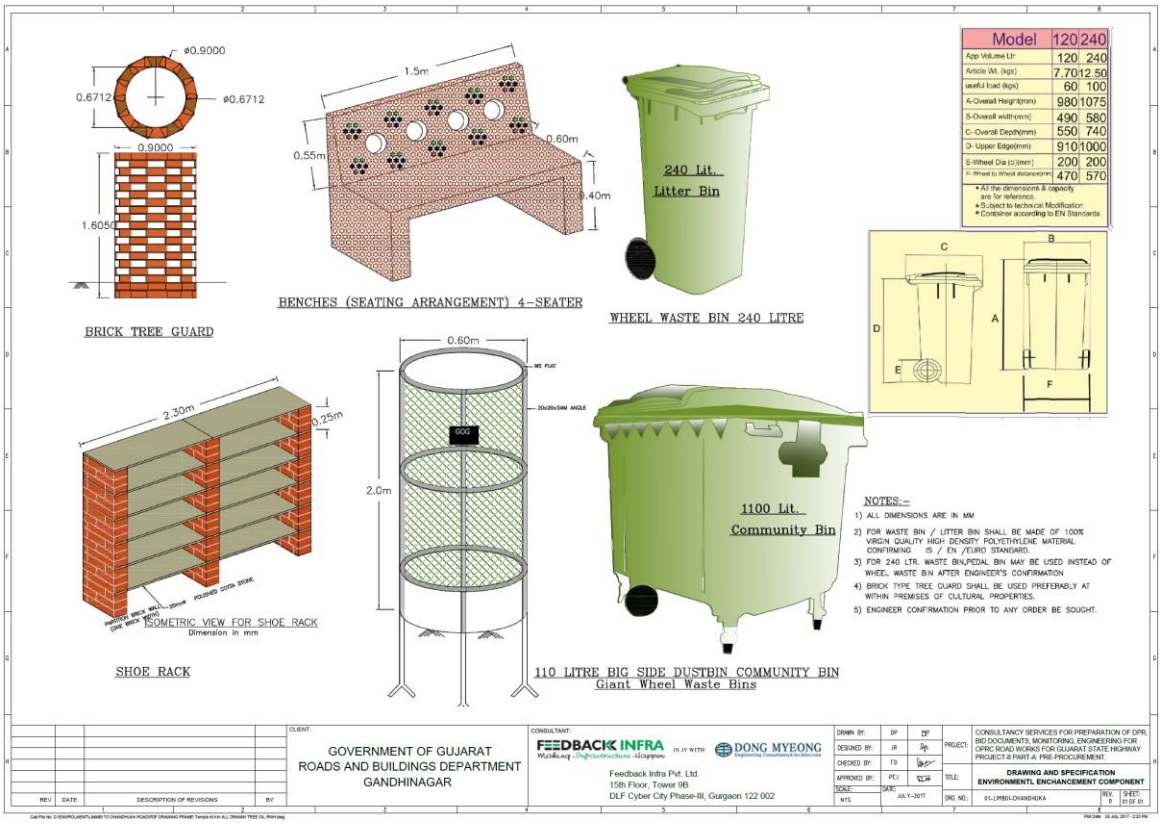


Figure G: General Specification for Enhancement

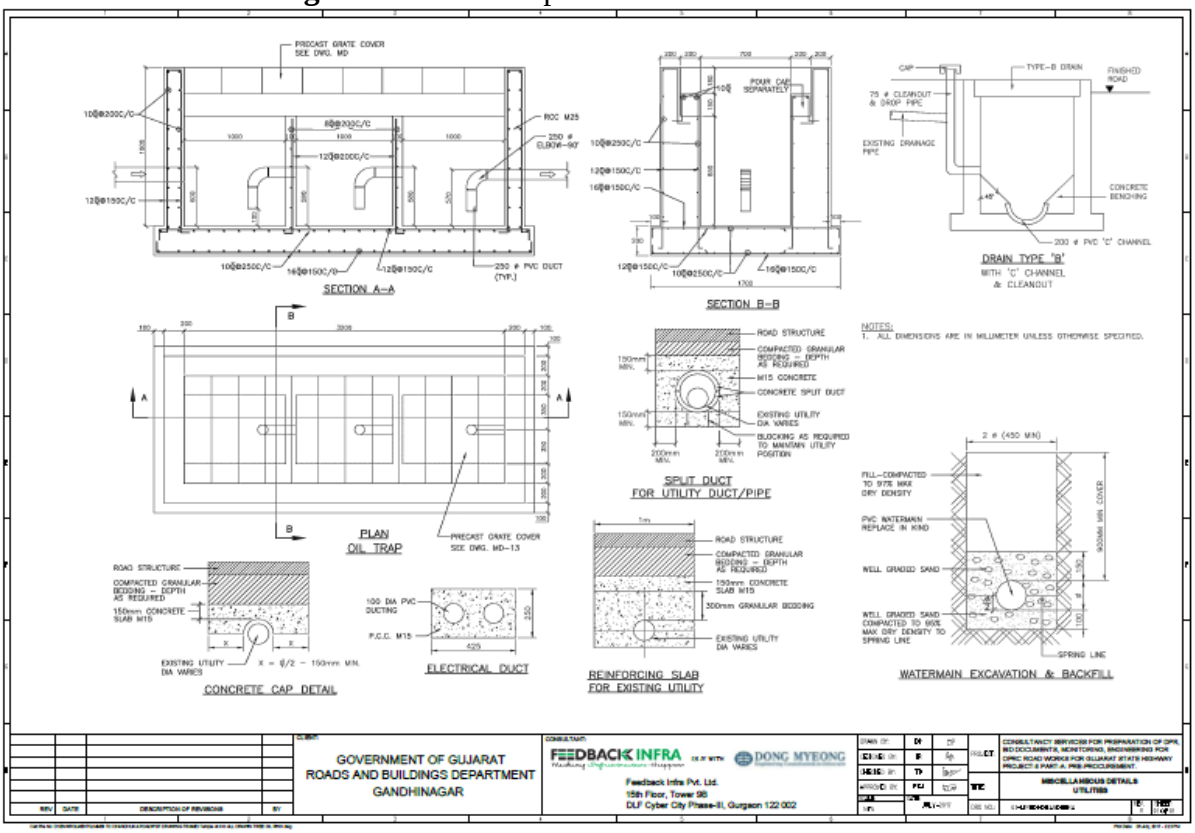


Figure H: Typical drawing for Oil Interceptor

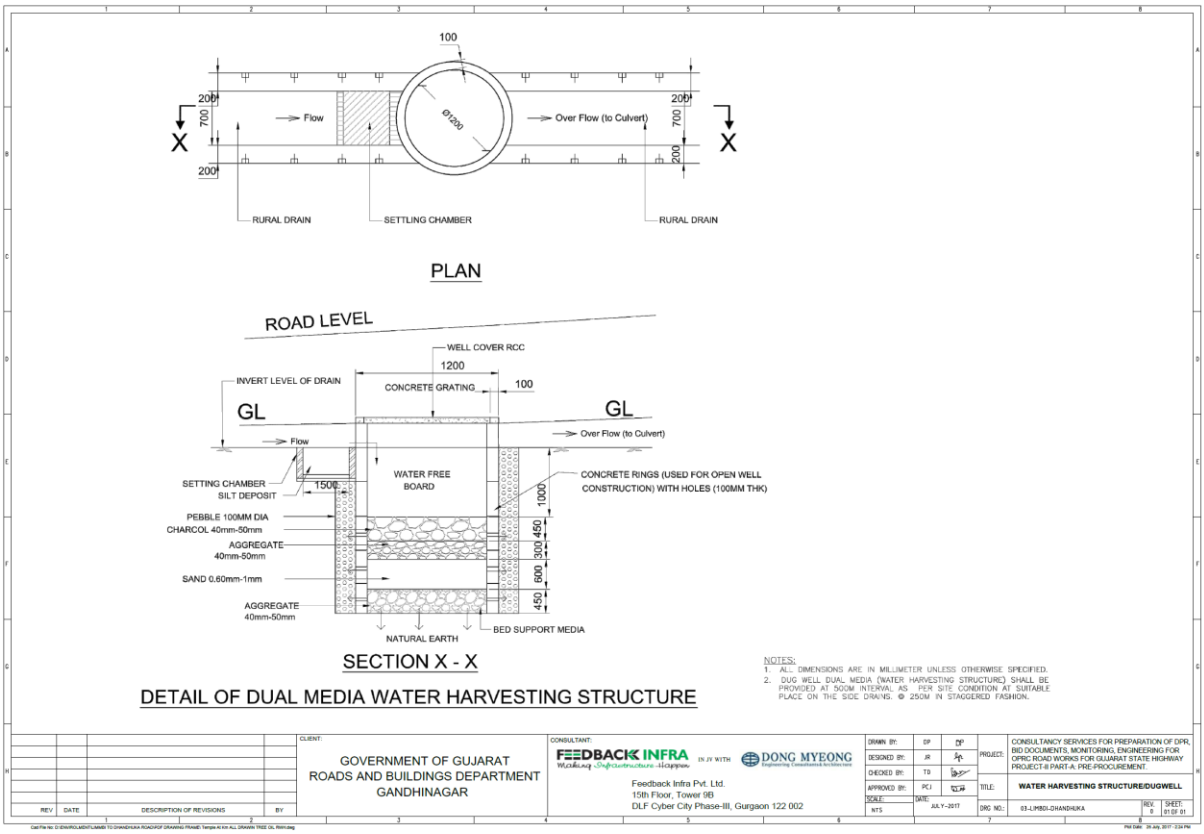


Figure I: Typical Drawing for Rain Water Harvesting Structure

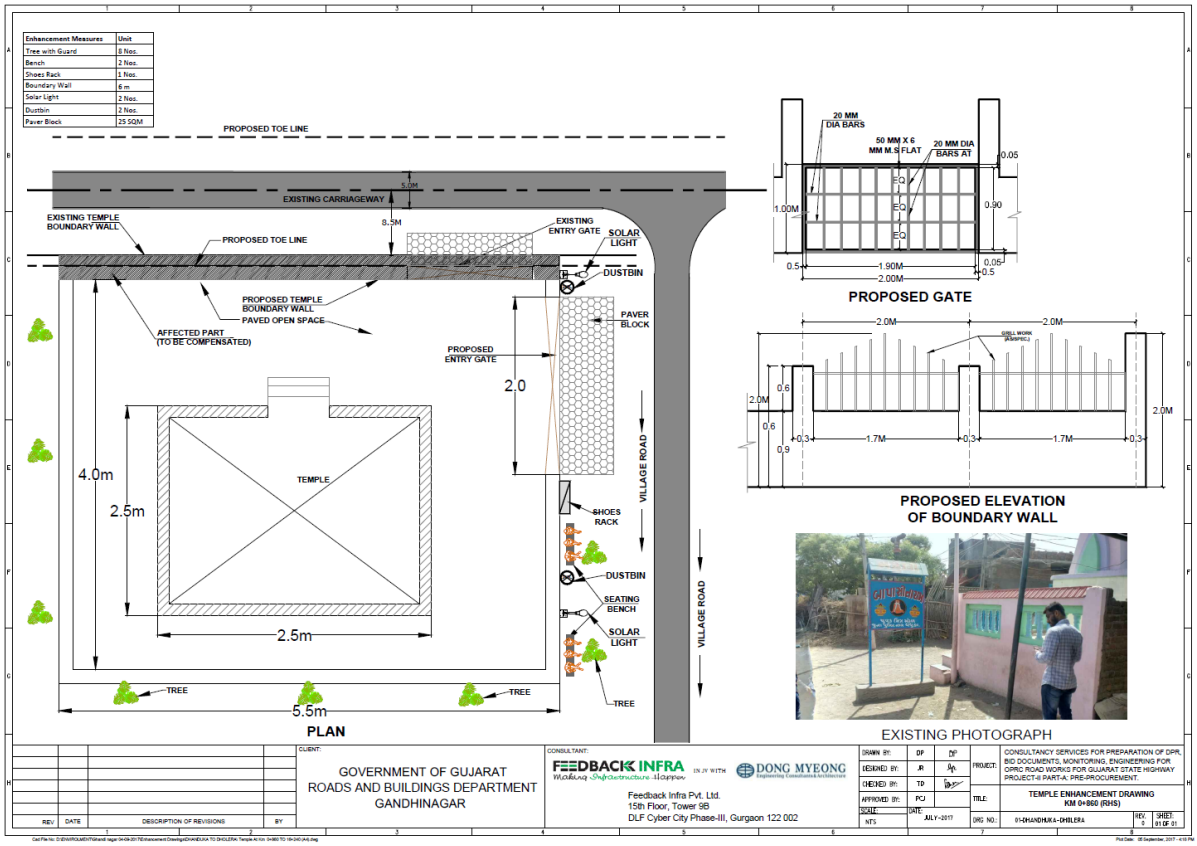


Figure J: Schematic Drawing of Jogni Mata Temple at Ch. 0+860 (RHS)

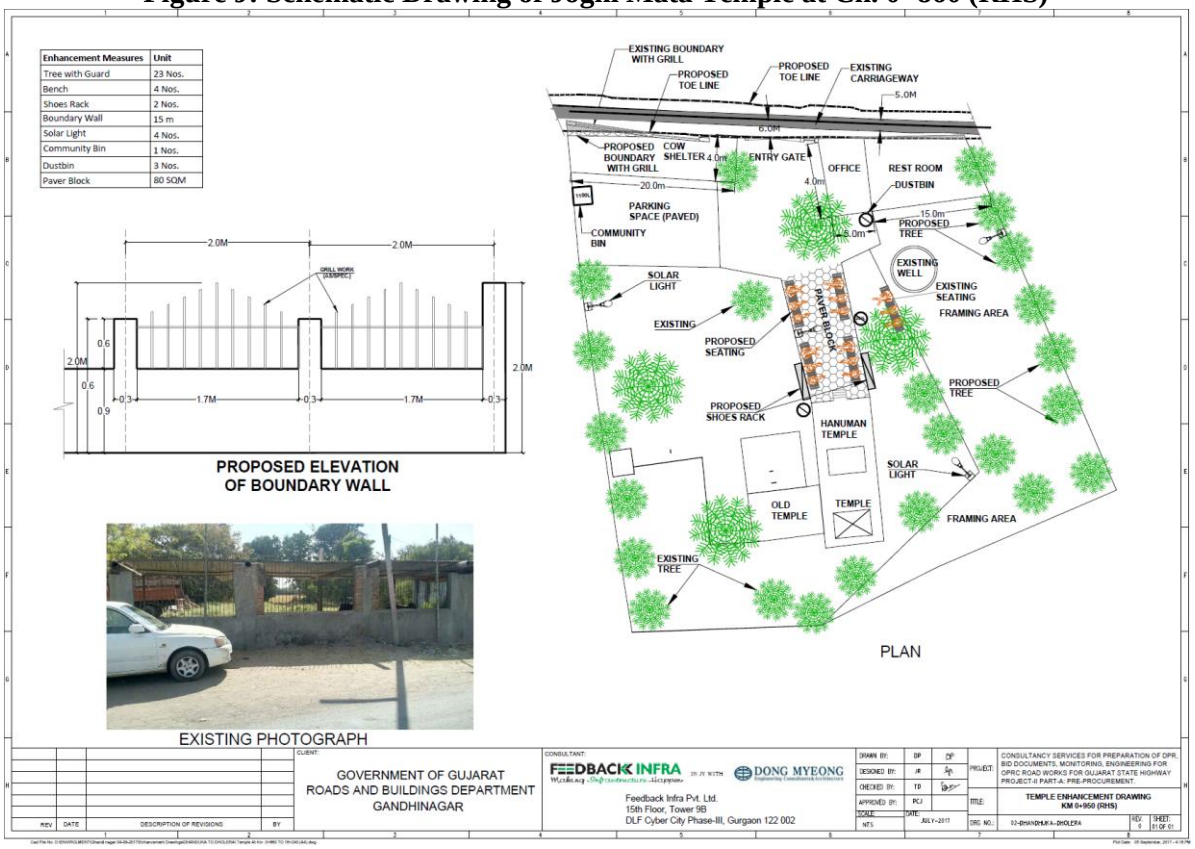


Figure K: Schematic Drawing of Hanuman Temple at Ch. 0+950 (RHS)

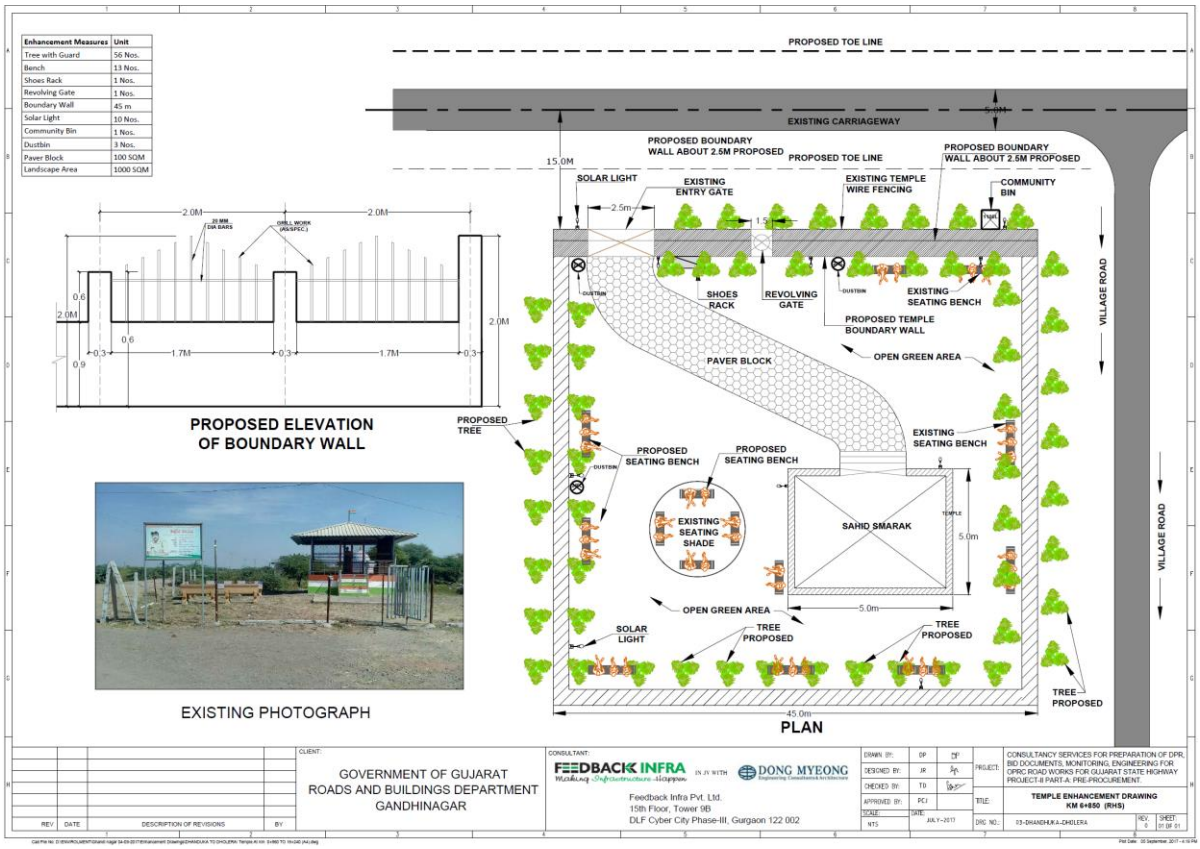


Figure L: Schematic Drawing of Shahid Smarak at Ch. 6+850 (LHS)

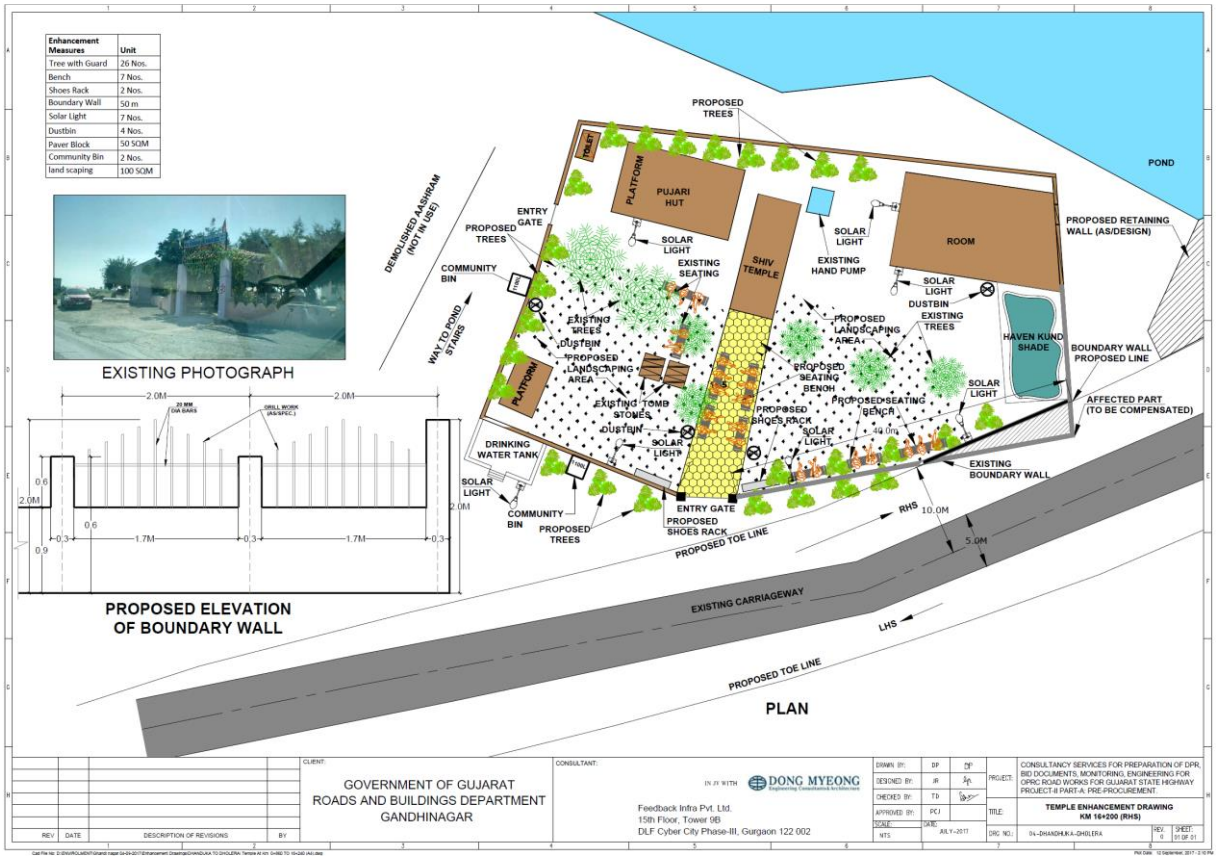


Figure M: Schematic Drawing of Shiva Temple at Ch. 16+200 (RHS)

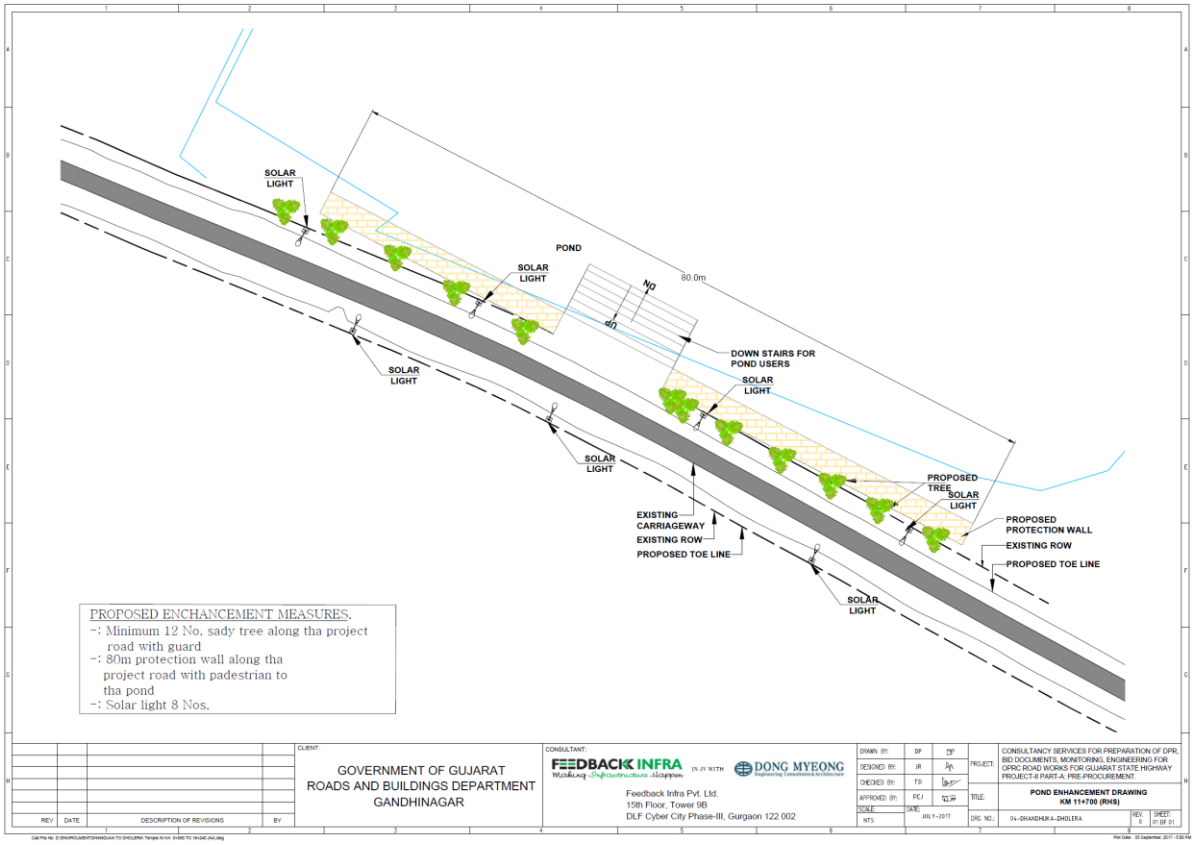


Figure N: Schematic Drawing of Pond at Ch. 11+700 (RHS)

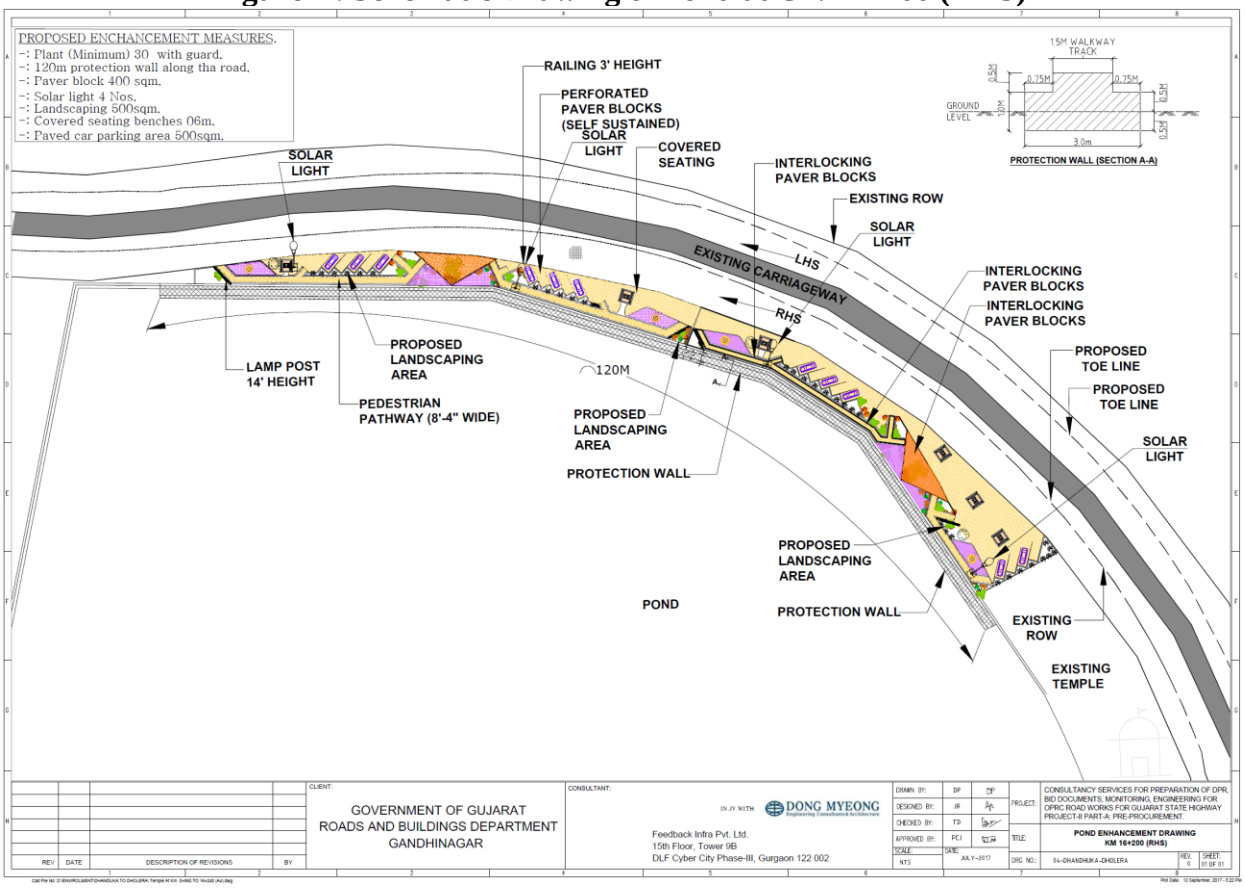


Figure O: Schematic Drawing of Pond at Ch. 16+200 (RHS)

Schematic Enhancement Drawings for Dhandhuka - Paliyad Corridor

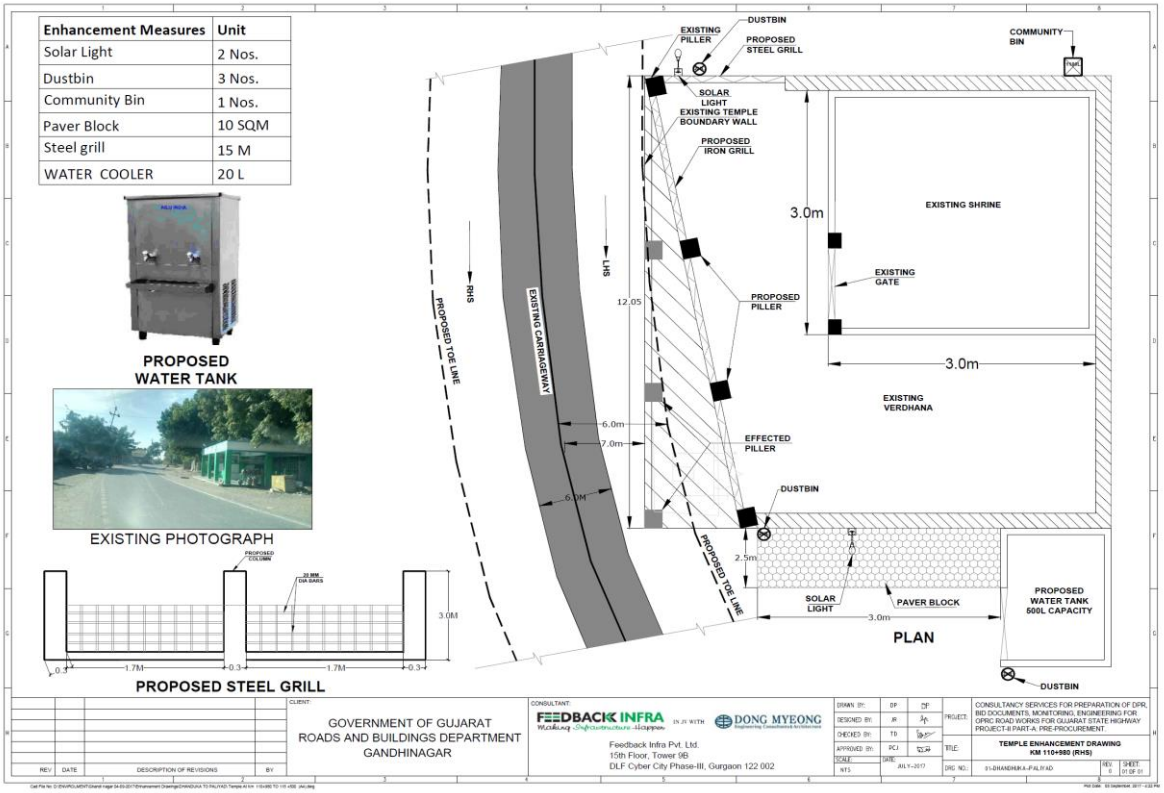


Figure P: Schematic Drawing of Shrine at Ch. 110+980 (RHS)

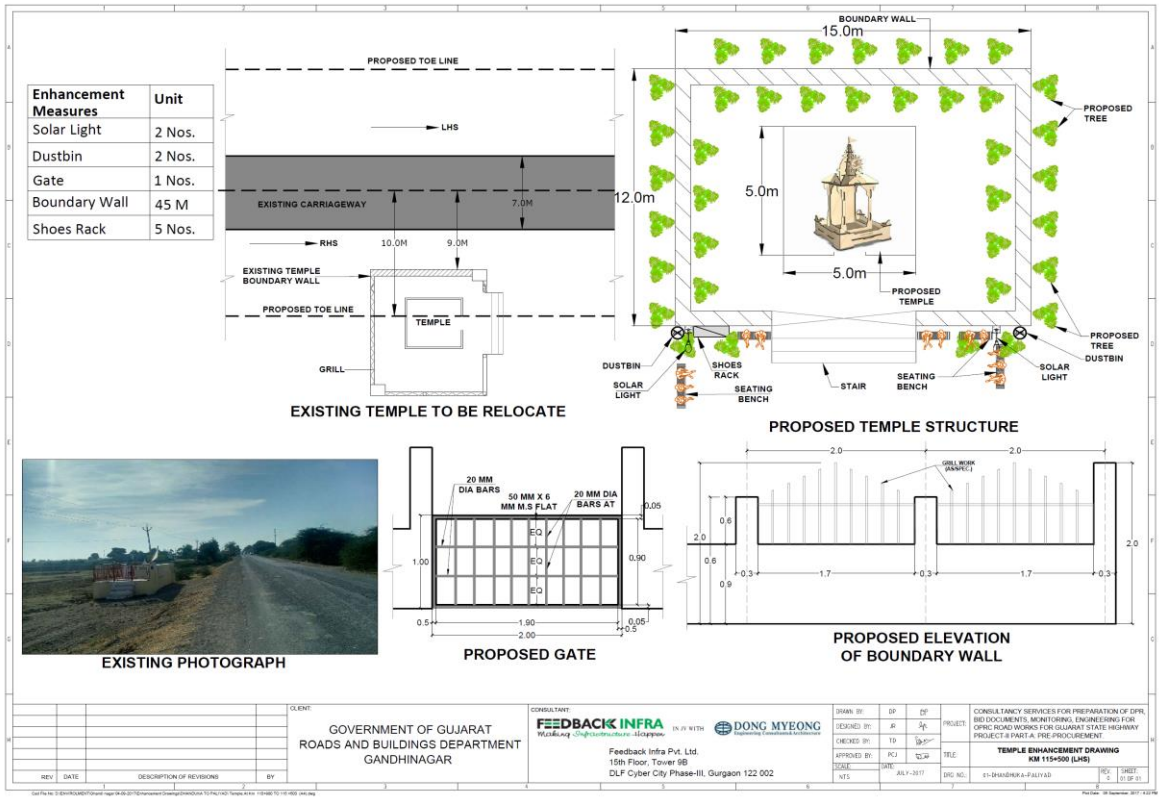


Figure Q: Schematic Drawing of Temple at Ch. 115+500 (LHS)

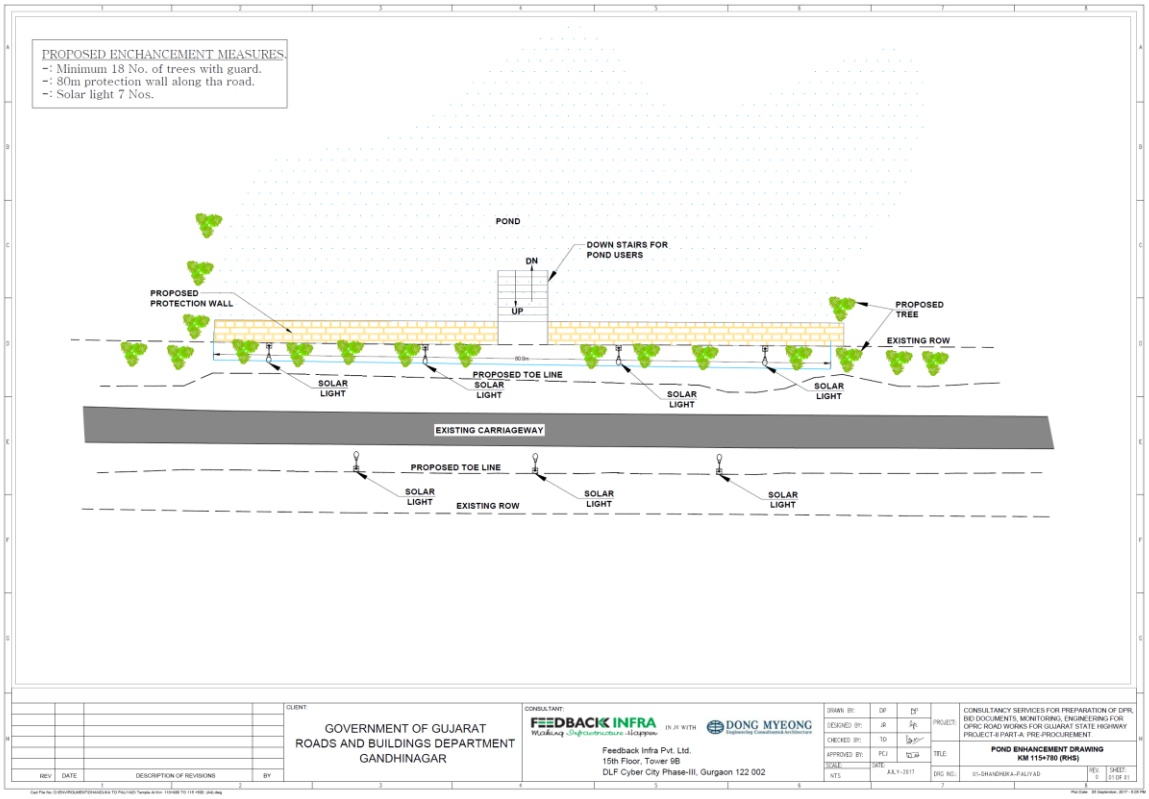


Figure R: Schematic Drawing of Pond at Ch. 115+780 (RHS)

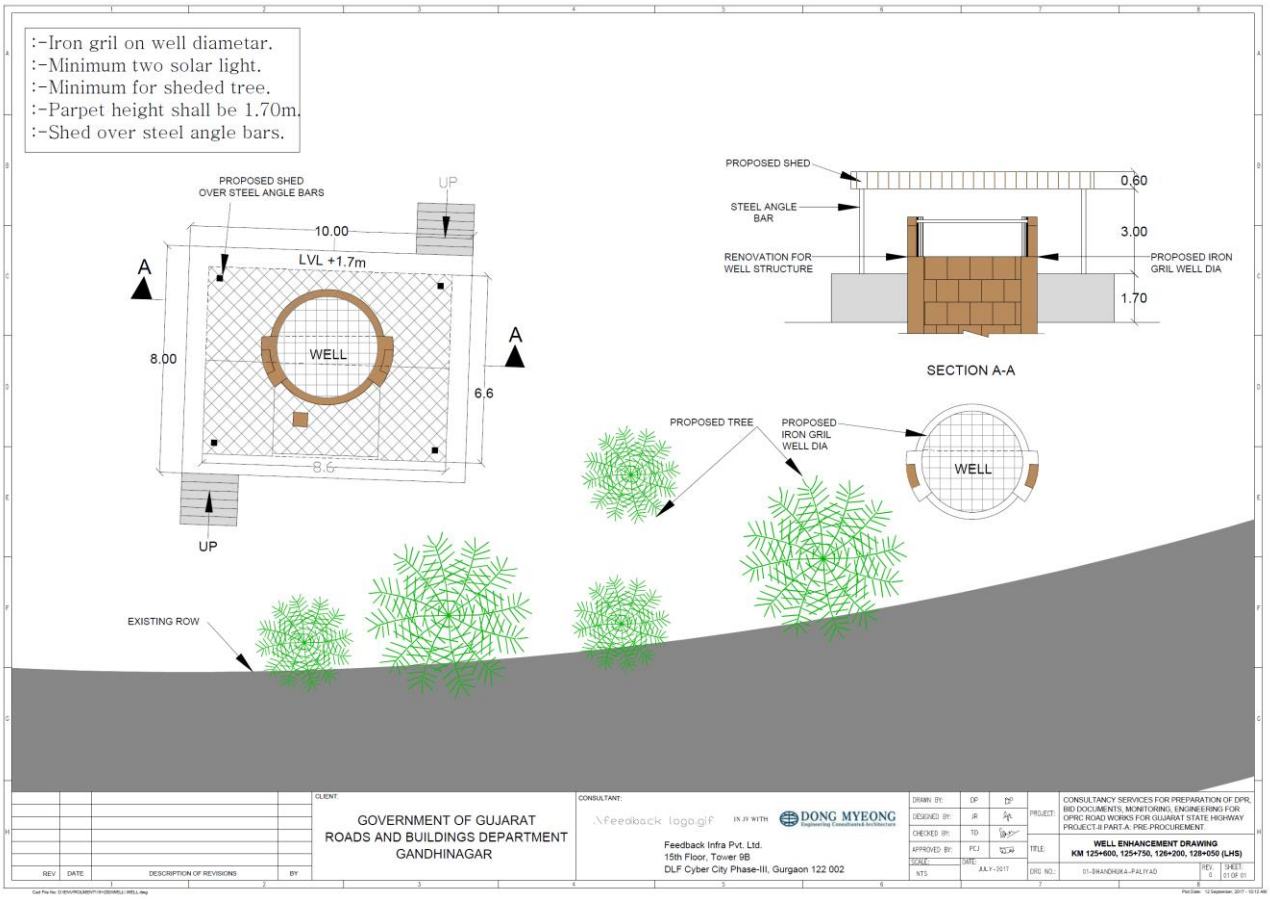


Figure S: Schematic Drawing of Well at Ch. 125+600, 125+750, 126+200, 128+050 (LHS)

Schematic Enhancement Drawings for Limbdi - Dhandhuka Corridor

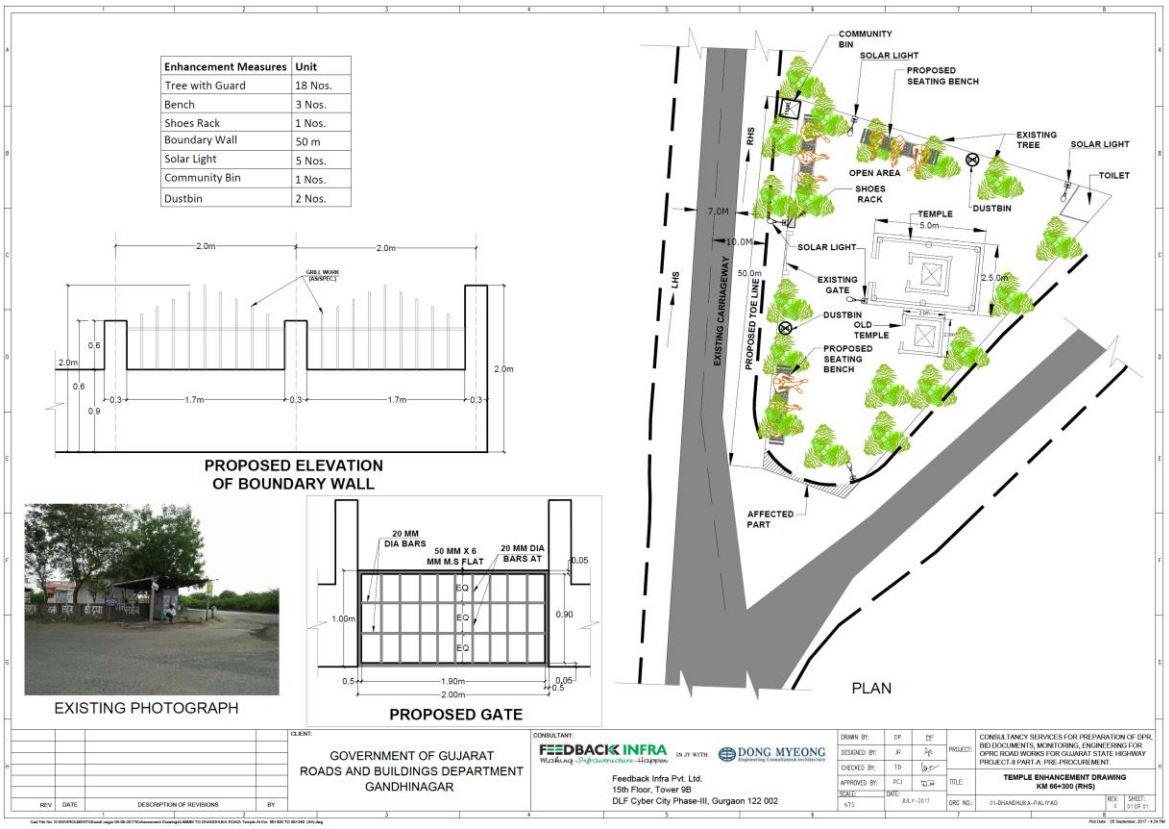


Figure T: Schematic Drawing of Temple at Ch. 66+300 (RHS)

Figure U: Schematic Drawing of Temple at Ch. 72+280 (LHS)

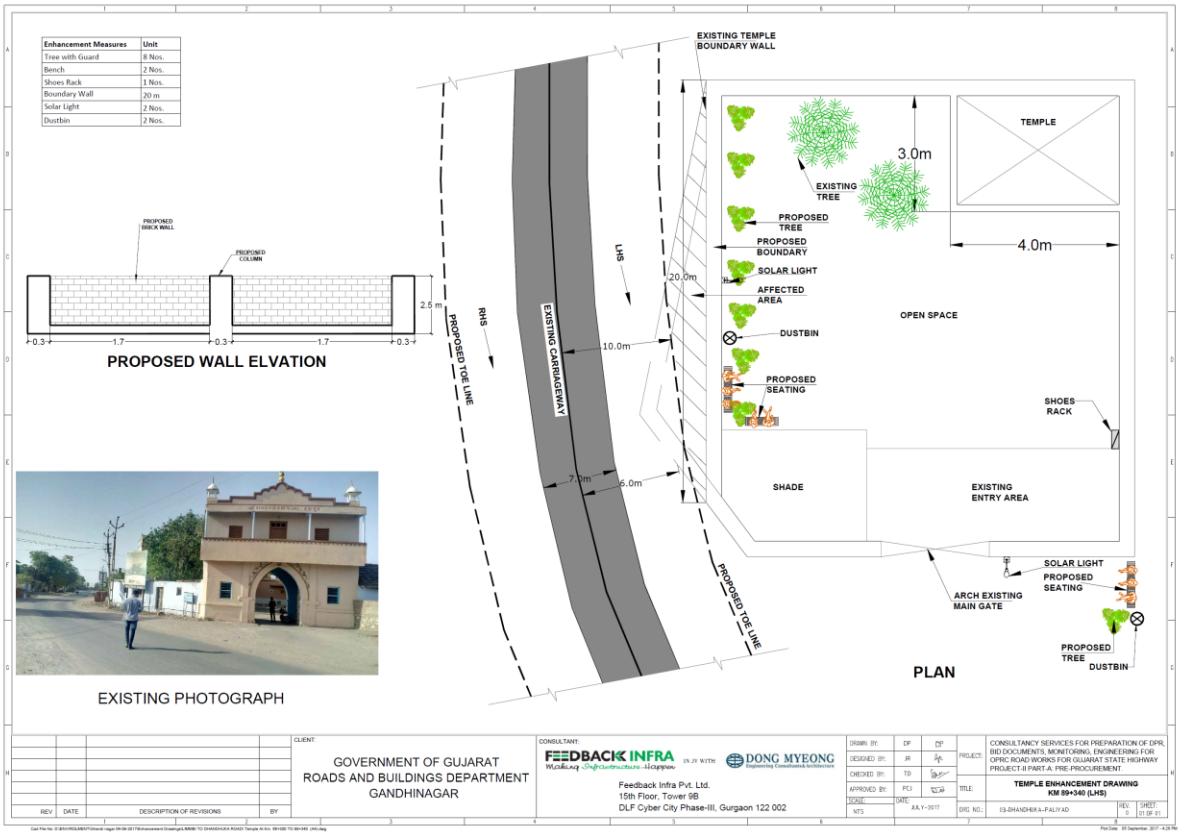


Figure V: Schematic Drawing of Temple at Ch. 89+340 (LHS)

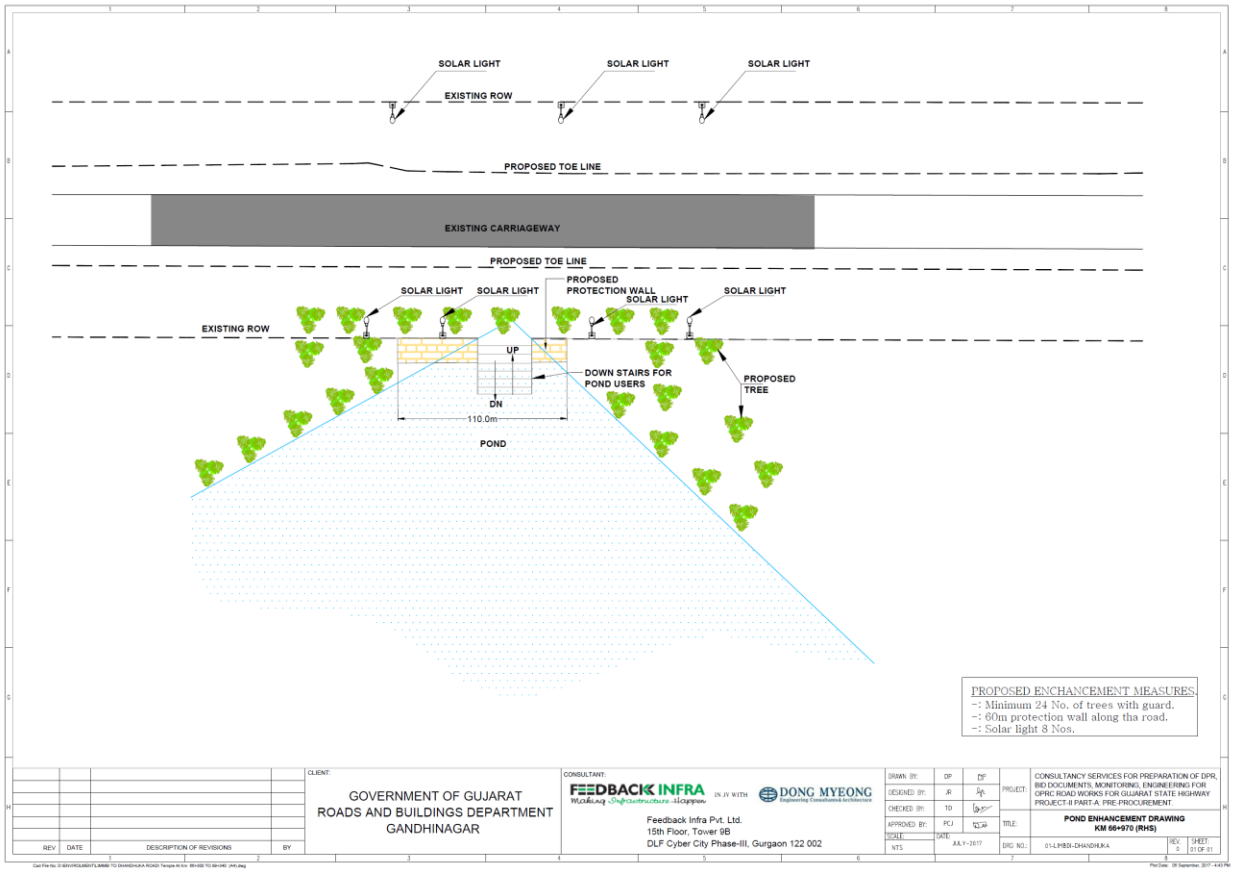


Figure W: Schematic Drawing of Pond at Ch. 66+970 (RHS)

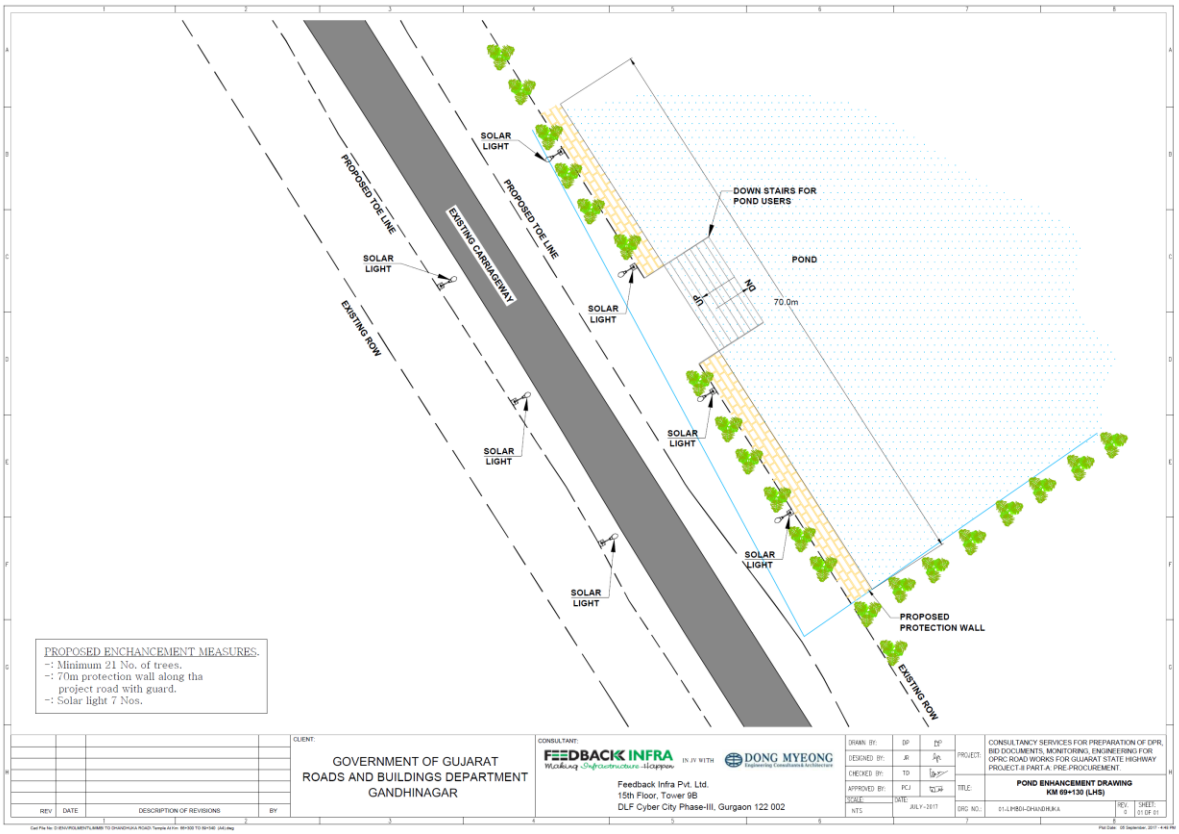


Figure X: Schematic Drawing of Pond at Ch. 69+130 (RHS)

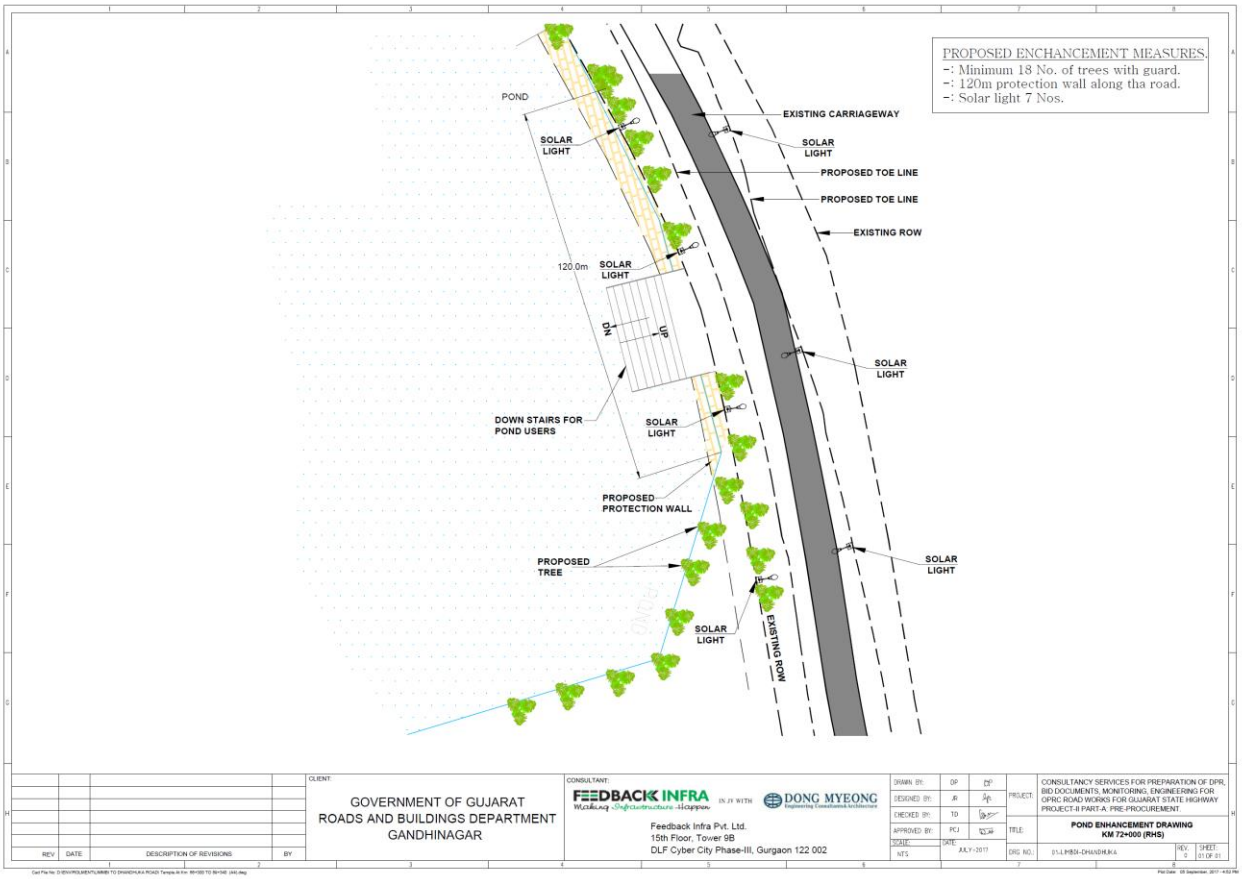


Figure Y: Schematic Drawing of Pond at Ch. 72+000 (RHS)

Appendix 4: Environmental and Social Guidelines for Practices

These Environmental and Social guidelines practices are part of the Environmental Management Plan (EMPs) provided vide Table 1.2, 2.1 and 3.1 for Dhandhuka- Dholera, Dhandhuka- Paliyad and Limbdi-Dhandhuka roads respectively, mandatory in nature to follow by the civil works construction agency at OPRC GSHP II (i.e. Contractor) and contractor is bound adhered to each of the specifications provided there in for the protection of the environment and safeguarding the environment. Any deviation from here will attract penalties or contract covenant actions against the contractor as mentioned in EMPs.

ESGP-01: SITE PREPARATION

1. GENERAL

The preparation of site for construction involves: (i) clearing of land required for construction; and (ii) management of activities such as traffic during construction. These activities have been detailed out for road construction activities separately.

2. ROAD CONSTRUCTION

2.2 Site Preparation Activities

After obtaining the consent of the community on the alignment, the Project Implementation Unit (PIU) of the Divisional Office shall be responsible to stake out the alignment by establishing working benchmarks on ground. It shall be the responsibility of the PIU to take over the possession of the proposed RoW and hand over the land width required clear of all encumbrances to the Contractor. Activities pertaining to the clearance of land and relocation of utilities need to be initiated by the PIU well in advance to avoid any delays in handing over of site to the Contractor. Assistance of the Revenue Department shall be sought in accomplishing the task. To summarize, the PIU's responsibilities before handing over the site to the contractor include:

- Clearance of encroachments within proposed RoW;
- Initiation of process for legal transfer of land title;
- Alignment modification or Relocation of utilities in consultation with the various government departments; and
- Obtain clearances required from government agencies for cutting of trees and diversion of forest land.

2.2 Site Preparation Activities by the Contractor

Site preparation shall involve formation of the road base wherein it is ready for construction of protective/drainage works, carriageway, shoulders, parapets and other road furniture. The PIU shall transfer the land for civil works to the Contractor after peg marking of the alignment.

The Contractor shall verify the benchmarks soon after taking possession of the site. The Contractor, prior to initiation of site preparation activities, shall highlight any deviations/discrepancies in these benchmarks to the Engineer in writing. The contractor shall submit the schedules and methods of operations for various items during the construction operations to the Engineer for approval. The Contractor shall commence operations at site only after the approval of the schedules by the Engineer.

The activities to be undertaken by the contractor during the clearing and grubbing of the site are as follows:
The clearance of site shall involve the removal of all materials such as trees, bushes, shrubs, stumps, roots, grass, weeds, part of topsoil and rubbish. Towards this end, the Contractor shall adopt the following measures: (i) Limiting the surface area of erodible earth material exposed by clearing and grubbing; (ii) Conservation of top soil and stock piling as per the measures suggested as part of **ESGP-04**, "Top Soil

Salvage Storage and Replacement"; and (iii) Carry out necessary backfilling of pits resulting from uprooting of trees and stumps with excavated or approved materials to the required compaction conforming to the surrounding area.

To minimize the adverse impact on vegetation, only ground cover/shrubs that impinge directly on the permanent works shall be removed. Cutting of trees and vegetation outside the working area shall be avoided under all circumstances. In case the alignment passes through forest areas, The Forest Ranger shall be consulted for identification of presence of any rare/endangered species within the proposed road way. Protection of such species if found shall be as per the directions of the Forest Department.

The locations for disposal of grubbing waste shall be finalized prior to the start of the works on any particular section of the road. The selection of the site shall be approved by the Engineer - in - charge. The criteria for disposal of wastes shall be in accordance with the measures given in Guideline on, "Waste Management and Debris Disposal" (**ESGP-08**).

In locations where erosion or sedimentation is likely to be a problem, clearing and grubbing operations should be so scheduled and performed that grading operations and permanent erosion and sedimentation control features can follow immediately, if the project conditions permit.

Dismantling of CD structures and culverts shall be carried out in a manner as not to damage the remaining required portion of structures and other surrounding properties. The disposal of wastes shall be in accordance with the provisions given in **ESGP-08**, "Waste Management and Debris Disposal". The following precautions shall be adopted: (i) The waste generated shall not be disposed off in watercourses, to avoid hindrance to the flow, and (ii) All necessary measures shall be taken while working close to cross drainage channels to prevent earthwork, stonework as well as the method of operation from impeding cross drainage at rivers, streams, water canals and existing irrigation and drainage systems.

The designated sites duly approved by Implementing Agency shall be cleared of its existing cover for setting up of the construction sites, camps and related infrastructure facilities, borrow areas and other locations identified for temporary use during construction. The contractor shall comply with all safety requirements in consideration as specified in the **ESGP-12** on, "Labour & Worker's Health and Safety". Before initiation of site preparation activities along these lands to be used temporarily during construction, it shall be the responsibility of the Contractor to submit and obtain approval of the site redevelopment plan from the implementing agency. The letter/contract agreement between the owner(s) of the land parcel for temporary usage shall include site redevelopment to its original status. The guidelines for the same are furnished in the Guideline on, "Construction Plants & Equipment Management"; guideline, "Construction and Labour Camps"; and "Borrow areas".

2.2 Traffic management during construction

Traffic management during construction is an activity specific to the contractors. Contractors must ensure a reasonably smooth flow of traffic during construction. The following are the general principles to be followed for traffic management during construction:

- Partial pavement construction **over long lengths will not be permitted.** The contractor should concentrate his activities over sections such that he can complete continuous fronts of up to a maximum of 1 km before starting the adjacent front. The contractor may open more than one continuous 1 km front provided that he has the separate resources to do so. The resources working on a 1 km front may not be shifted to another front until no longer required on that front.

- The construction activities should be staggered over sub-sections to the extent that the use of plant and equipment is optimized to maximum efficiency and to avoid idling. For road widening operations, excavation **adjacent to the existing road shall not be permitted on both titles simultaneously.** Earthworks must be completed to the level of the existing road before excavation work on the opposite

side will be permitted.

- The construction operations taking place on a particular front must be managed efficiently such that delays between successive pavement layers are minimized.

- Before the start of the monsoon season (June) the contractor shall ensure that the pavement over any front is complete, full width, at least upto Dense Bituminous Macadam, DBM level, but preferably with Asphaltic Concrete, AC wearing course. The contractor **should not start any sections of pavement that he cannot complete by the start of the monsoon season.**

- In the absence of permanent facilities, temporary drainage and erosion control measures, as required by the Specifications, are to be implemented prior to the onset of the monsoon.

In cases where separate traffic diversions are not essential or cost effective the construction methodology should be in accordance with the guidelines following:

On a 1km section, the pavement construction (except new alignments) should be limited to 500m sub-sections with a minimum of 1 to 1.5 km between successive sub-sections to ease traffic management and safety issues. The earthworks in the widening portions are not limited in, this respect. Excavation on both sides of the existing, road over the same sub-section simultaneously shall not be permitted for reasons of safety to the traffic, particularly at night.

Sub-Sections longer than 500 m may be authorized by the Engineer, if two-way traffic flow can be comfortably managed and the Contractor **can demonstrate his ability to maintain dust control, proper road edge delineation, proper signage and traffic control.** Where single file traffic is permitted ('only applicable to final wearing course operations), the sub-sections shall be reduced to a maximum length whereby safe traffic regulation can be physically managed. Single file traffic may not be permitted at certain locations or times of the day when traffic volumes are such that excessive congestion shall occur.

ESGP-02: CONSTRUCTION AND LABOUR CAMPS

1. INTRODUCTION

The scope of this guideline pertains to the siting, development, management and restoration of construction and labour camps to avoid or mitigate impacts on the environment. The area requirement for the construction camp shall depend upon the size of contract, number of labourers employed and the extent of machinery deployed. The following sections describe the siting, construction, maintenance, provision of facilities in the camps and finally rehabilitation of the construction and labour camps. These are described in three stages, pre-construction, construction and post-construction stage. The issues related to construction camps are similar in the case of road construction and hence have been taken together.

2. PRE-CONSTRUCTION STAGE

Identification of site for construction and labour camps is the first task. The Contractor shall identify the site for construction camp in consultation with the individual owners in case of private lands and the concerned department in case of Government lands. The suitable sites shall be selected and finalized in consultation with the Engineer. **Table 2-1** gives the lands that could be avoided for construction camps and conversely those that could be preferred.

Table 2-1: Selection Criterion for Construction Camps.

Avoid the following …	Prefer the following …
• Lands close to habitations. • Irrigated agricultural lands. • Lands belonging to small farmers. • Lands under village forests. Lands within 100m of community water bodies and water sources as rivers. • Lands within 100m of watercourses. • Low lying lands. • Lands supporting dense vegetation. • Grazing lands and lands with tenure rights. • Lands where there is no willingness of the landowner to permit its use.	• Waste lands. • Waste Lands belonging to owners who look upon the temporary use as a source of income. • Community lands or government land not used for beneficial purposes. • Private non-irrigated lands where the owner is willing. • Lands with an existing access road.

The contractor will work out arrangements for setting up his facilities during the duration of construction with the land owner/concerned department. These arrangements shall be in the form of written agreement between the contractor and the land owner (private/government) that would specify:

a) photograph of the proposed camp site in original condition;
b) activities to be carried out in the site;
c) environmental mitigation measures to be undertaken to prevent land, air, water and noise pollution;
d) detailed layout plan for development of the construction and labour camp that shall indicate the various structures to be constructed in the camp including temporary, drainage and other facilities (**Figure Z** gives a layout plan for a construction camp); and
e) Restoration plan of camp site to previous camp conditions.

The arrangements will be verified by the Engineer to enable redressal of grievances at a later stage of the project.

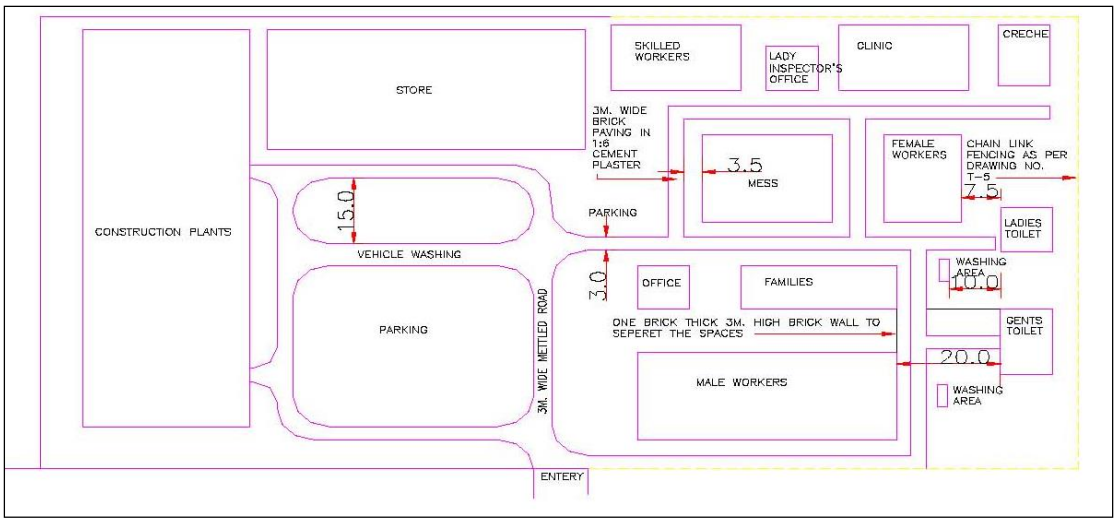


Figure Z: Layout Plan for Construction Camp

2.2 Setting up of labour camp

The contractor shall provide, free of cost in the camp site, temporary living accommodation to all the migrant workers employed by him for complete construction/maintenance work is in progress. A minimum area of 6 SQM per person shall be provided. The rooms of labour shall be well lighted and ventilated. The facilities to be provided for the labour are discussed below:

a) Drinking Water

Towards the provision and storage of drinking water at the construction camp, the contractor shall ensure the following provisions

- The contractor shall provide for a continuous and sufficient supply of potable water in the camps, in earthen pots or any other suitable containers.

- The contractor shall identify suitable community water sources for drinking. Only in the event of non-availability of other sources of potable water, the Contractor shall obtain water from an unprotected source only after the testing for its portability. Where water has to be drawn from an existing open well, the well shall be properly chlorinated before water is drawn from it for drinking. All such wells shall be entirely closed in and be provided with dust proof trap door.

- Every water supply or storage shall be at a distance of not less than 15m from any wastewater / sewage drain or other source of pollution. Water sources within 15m proximity of toilet, drain or any source of pollution will not be used as a source of drinking water in the project.

- A pump shall be fitted to covered well used as drinking water source, the trap door shall be kept locked and opened only for cleaning or inspection, which shall be done at least once a month.

b) Washing and Bathing Facilities

In every site, adequate and suitable facilities for washing clothes and utensils shall be provided and maintained for the use of contract labor employed therein. Separate and adequate bathing shall be provided for the use of male and female workers. Such facilities shall be conveniently accessible and shall be kept in clean and hygienic conditions.

c) Toilets Facilities

Sanitary arrangements, latrines and urinals shall be provided in every work place separately for male and female workers. The arrangements shall include:

- A latrine for every 15 females or part thereof (where female workers are employed).
- A latrine for every 10 males.
- Every latrine shall be under cover and so partitioned as to secure privacy, and shall have a proper door and fastenings.
- Where workers of both sexes are employed, there shall be displayed outside each block of latrine and urinal, a notice in the language understood by the majority of the workers "For Men Only" or "For Women Only" as the case may be.
- The latrines and urinals shall be adequately lighted and shall be maintained in a clean sanitary condition at all times and should have a proper drainage system;
- Water shall be provided in or near the latrines and urinals by storage in suitable containers.

d) Waste Disposal

- Disposal of sanitary wastes and excreta shall be into septic tanks.
- Kitchen waste water shall be disposed into soak pits/kitchen sump located preferably at least 15 meters from any water body. Sump capacity should be at least 1.3 times the maximum volume of wastewater discharged per day. The bottom of the pit should be filled with coarse gravel and the sides shored up with board, etc. to prevent erosion and collapse of the pit. New soak pits shall be made ready as soon as the earlier one is filled.
- Solid wastes generated in the kitchen shall be reused if recyclable or disposed off in land fill sites.

e) Medical and First Aid Facilities

Medical facilities shall be provided to the labour at the construction camp. Visits of doctor shall be arranged twice a month wherein routine checkups would be conducted for women and children. A separate room for medical checkups and keeping of first aid facilities should be built. The site medical room should display awareness posters on safety facilitation hygiene and HIV/AIDS awareness.

- First Aid Box will be provided at every construction campsite and under the charge of a responsible person who shall always be readily available during working hours. He shall be adequately trained in administering first aid-treatment. Formal arrangement shall be prescribed to carry injured person or person suddenly taken ill to the nearest hospital. The first aid box shall contain the following.
- 6 small sterilized dressings
- 3 medium size sterilized dressings
- 3 large size sterilized dressings
- 3 large sterilized burns dressings
- 1 (30 ml) bottle containing 2 % alcoholic solution of iodine
- 1 (30 ml) bottle containing salvolatile
- 1 snakebite lancet
- 1 (30 gms) bottle of potassium permanganate crystals
- 1 pair scissors
- Ointment for burns
- A bottle of suitable surgical antiseptic solution

In case, the number of labour exceeds 50, the items in the first aid box shall be doubled.

f) Provision of Shelter during Rest

The work place shall provide four suitable sheds, two for meals and two for rest (separately for men and women). The height of the shelter shall not be less than 3.0m from the floor level to the lowest part of the roof. These shall be kept clean.

g) Crèches

In case 20 or more women workers are employed, there shall be a room of reasonable size for use of children under the age of six years. The room should have adequate light and realization. A caretaker is to be appointed to look after the children. The use of the room shall be restricted to children, their mothers and the caretaker.

2.2 Storage of Construction Material in Construction Camps

For storage of Petrol/Oil/Lubricants, brick on edge flooring or sand flooring will be provided at the storage places of Petrol/Oil/Lubricants to avoid soil and water contamination due to spillage. These should be kept away from labour residential areas. The storage of cement shall be at Damp-proof flooring, as per IS codes. All materials shall be stored in a barricaded area. In case of electrical equipments, danger signs shall be posted. The batch mix plant is to be located away from the residential area and not in the wind direction. Separate parking areas for vehicles and also workshop areas need to be provided.

2.2 Fire fighting arrangement

- The following precautions need to be taken:
- Demarcation of area susceptible to fires with cautionary signage;
- Portable fire extinguishers and/or sand baskets shall be provided at easily accessible locations in the event of fire;
- Contractor shall educate the workers on usage of these equipments.

2.2 Interactions with host communities

To ensure that there is no conflict of the migrant labor with the host communities, the contractor shall issue identity cards to labourers and residents of construction camps.

3. CONSTRUCTION STAGE

Construction camps shall be maintained free from litter and in hygienic condition. It should be kept free from spillage of oil, grease or bitumen. Any spillage should be cleaned immediately to avoid pollution of soil, water stored or adjacent water bodies. The following precautions need to be taken in construction camps.

- Measures to ensure that no leaching of oil and grease into water bodies or underground water takes place.
- Wastewater should not be disposed into water bodies.
- Regular collection of solid wastes should be undertaken and should be disposed off safely.
- All consumables as the first aid equipment, cleaning equipment for maintaining hygiene and sanitation should be recouped immediately.
- The debris/scrap generated during construction should be kept in a designated and barricaded area.

The Engineer will monitor the cleanliness of construction campsites and ensure that the sites are properly maintained throughout the period of the contract.

4. POST CONSTRUCTION STAGE

At the completion of construction, all construction camp facilities shall be dismantled and removed from the site. The site shall be restored to a condition in no way inferior to the condition prior to commencement of the works. Various activities to be carried out for site rehabilitation include:

- Oil and fuel contaminated soil shall be removed and transported and buried in waste disposal areas.
- Soak pits, septic tanks shall be covered and effectively sealed off.
- Debris (rejected material) should be disposed off suitably (Refer ESGP-10 on "Waste Management and Debris Disposal").
- Ramps created should be levelled.
- Underground water tank in a barren/non-agricultural land can be covered. However, in an agricultural land, the tank shall be removed.
- If the construction camp site is on an agricultural land, top soil can be spread so as to aid faster rejuvenation.
- Proper documentation of rehabilitation site is necessary. This shall include the following: −Photograph of rehabilitated site;
- Land owner consent letter for satisfaction in measures taken for rehabilitation of site;
- Undertaking from contractor; and
- Certification from Engineer in-charge.

In cases, where the construction camps site is located on a private land holding, the contractor would still have to restore the campsite as per this guideline. Also, he would have to obtain a certificate for satisfaction from the landowner.

ESGP-03: BORROW AREAS

1. INTRODUCTION

Embankment fill material is to be procured from borrow areas designated for the purpose. Borrow areas cause significant adverse environmental impacts if appropriate mitigation measures are not taken. The scope of this guideline includes measures that are required during project planning and design stage, pre-construction, construction stage and post construction stage. Borrow areas are related only to road construction activities.

2. PROJECT PLANNING AND DESIGN STAGE

Design measures for reduction in the quantity of the earthwork will have to be undertaken to reduce the quantity of material extracted and consequently decrease the borrow area requirement. Borrow area siting should be in compliance with IRC: 10-1961. The DPR shall contain (i) Guidelines for locating site of borrow areas and borrow material specifications.

3. PRE-CONSTRUCTION STAGE

The contractor shall identify the borrow area locations in consultation with the individual owners in case of private lands and the concerned department in case of government lands, after assessing suitability of material. The suitable sites shall be selected and finalized in consultation with the Engineer. Borrowing to be avoided on the following areas:

- Lands close to toe line.
- Irrigated agricultural lands (In case of necessity for borrowing from such lands, the topsoil shall be preserved in stockpiles. The subsequent Guidelines discuss in detail the conservation of topsoil.
- Grazing land.
- Lands within 0.8 km of settlements.
- Environmentally sensitive areas such as Reserve Forests, Protected Forests, Sanctuary, wetlands. Also, a distance of 1000 m should be maintained from such areas.
- Designated protected areas/forests.
- Unstable side-hills.
- Water-bodies.
- Streams and seepage areas.
- Areas supporting rare plant/animal species;
- Ensure unsuitable soft rock is not prominent within the proposed depth of excavation which will render rehabilitation difficult.

3.1 Arrangements for Borrow Area

The Contractor will work out arrangements for borrowing with the land owner/concerned department. The arrangements will include the redevelopment after completion of borrowing. The arrangements will be verified by the Engineer to enable redressal of grievances at a later stage of the project. The Engineer shall approve the borrow area after inspection of the site to verify the reclamation plan and its suitability with the contractor and landowner. The contractor shall commence borrowing soil only after the approval by the Engineer. The contractor shall submit to the Engineer the following before beginning work on the borrow areas.

- Written No-objection certificate of the owner/cultivator;
- Estimate extent of earth requires;
- Extent of land required and duration of the agreement;
- Photograph of the site in original condition; and

- Site redevelopment plan after completion.

The depth of excavation should be decided based on natural ground level of theland and the surroundings, and rehabilitation plan. In case higher depth of excavation is agreed with backfilling by unsuitable excavated soil (from roadway), then filling should be adequately compacted except topsoil, which is to be spread on the top most layer (for at least 20m thick). The guidelines for location, depth, size and shape of the borrow areas are available in the following:

- Clause 305.2.2.2 of MoRTH specification for roads and bridge works;
- IRC SP 108-2015: Guidelines on EMP
- IRC SP 93-2011: Guidelines on Requirement for EC for Road Projects
- IRC: 10-1961-Recommended practice for borrow pits for road embankments constructed by manual operations, as revised in 1989;
- IRC SP: 58-2001 guideline for use of fly ash in road construction;
- EIA Guidance Manual for Highways prepared by Administrative Staff College of India, February 2010
- Fly Ash Notification 2009 and its amendment on 25th January 2016

3.2 Documentation of Borrow Pit

The contractor must ensure that following data base must be documented for each identified borrow areas that provide the basis of the redevelopment plan.

- Chainage along with offset distance;
- Area (Sq.m);
- Photograph of the pit from all sides;
- Type of access/width/kutcha/pucca etc from the carriageway;
- Soil type;
- Slope/drainage characteristics;
- Water table of the area or identify from the nearest well, etc;
- Existing landuse, for example barren/agricultural/grazing land;
- Location/name/population of the nearest settlement from borrow area;
- Present usage of borrow area; and
- Community facility in the vicinity of borrow pit.

3.3 Redevelopment Plans for Borrow Pits

The following checklist provides guidelines in order to ensure that redevelopment of borrow areas must comply with MoRTH, clause 305.2.2.2 and EMP requirement. Borrow areas can be developed as:

- Ponds (various types) (eg: Drinking Water only; Washing and for other Domestic Chores; Only for Cattle; Mixed Uses etc.) (a large pond can be divided into two parts - each having a defined use)
- Farmland submission
- Water Recharging Zones
- Pastureland
- Fish Ponds (pissiculture)
- Waste disposal Sites (depending upon the location, distance from settlements, pollution risks, safety, associated environmental risks and hazards, regulations/ permissions of appropriate authority and other such factors)
- Plantation Zones
- Recreational Zones (depending upon location, size, potential of the site, willingness of the local bodies to develop it)
- Wildlife Refuge and Drinking Area (applicable only in case of sensitive environs with appropriate planning and understanding including regulation of depth for safety of animals etc.)

The rehabilitation measures for the borrow areas shall be dependent on the following factors:

- Land use objectives and agreed post-borrowing activities;
- Physical aspects (landform stability, erosion, re-establishment of drainage);
- Biological aspects (species richness, plant density,) for areas of native re vegetation;
- Water quality and soil standards; and
- Public safety issues.

Rehabilitation should be simple and maintenance free. Depending on the choice of the individual land owner/community, the contractor shall prepare redevelopment plans for the borrow areas. The options can be: (i) Restoring the productive use of the land (ii) Development of detention ponds in barren areas.

Option I: Suitable in locations with high rainfall and productive areas

Topsoil must be placed, seeded, and mulched within 30 days of final grading if it is within a current growing season or within 30 days of the start of the next growing season. Vegetative material used in reclamation must consist of grasses, legumes, herbaceous, or woody plants or a combination thereof, useful to the community for the fuel and fodder needs.

Plants must be planted during the first growing season following the reclamation phase.

Selection and use of vegetative cover must take into account soil and site characteristics such as drainage, pH, nutrient availability, and climate to ensure permanent growth. The vegetative cover is acceptable if within one growing season of seeding, the planting of trees and shrubs results in a permanent stand, or regeneration and succession rate, sufficient to assure a 75% survival rate.

Option II: In barren land, the borrow areas can be redeveloped into detention ponds.

These will be doubled up as water bodies and also for removal of sediment from runoff flowing through the ponds. Design of the detention basin depends upon the particle size, settling characteristics, residence time and land area. A minimum of 0.02 mm size particle with a settling velocity of 0.02 cm/sec (assuming specific gravity of solids 2.65) can be settled in the detention basin.

Following parameters are to be observed while setting up a detention pond:

- Pond should be located at the lowest point in the catchment area. Care should be taken that the horizontal velocity should be less then settling velocity to prevent suspension or erosion of deposited materials.
- Minimum Effective Flow Path: 5 times the effective width
- Minimum Free Board: 0.15 m
- Minimum Free Settling Depth: 0.5 m
- Minimum Sediments Storage Depth: 0.5 m
- Maximum interior slope: 2H : 1V
- Maximum exterior slope: 3H : 1V
- The inlet structure should be such that incoming flow should distribute across the width of the pond. A pre-treatment sump with a screen should provide to remove coarse sediments. Settled sediment should be removed after each storm event or when the sediment capacity has exceeded 33% of design sediment storage volume. Accumulated sediment must be disposed of in a manner, which will prevent its re-entry into the site drainage system, or into any watercourse.

4. CONSTRUCTION STAGE

No borrow area shall be operated without permission of the Engineer. The procurement of borrow material should be in conformity to the guidelines laid down in IRC: 10-1961. In addition, the contractor should adopt precautionary measures to minimise any adverse impacts on the environment. Checklists for monitoring borrow areas operation and management has been prepared (**Table 3-1**).

Table 3-1: Checklist for Monitoring Borrow Area Operation and Management

Attributes	Requirements
Access Road	Access road shall be used for hauling only after approved
Top soil preservation	To soil, if any, shall be stripped and stored at corners of the area before the start of excavation for material collection; Top soil should be reused / re-laid as per agreed plan; In case of riverside, 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. In no case shall be borrow pit be within 1.5m from the Toe line of the proposed embankment.
Depth of excavation	For agricultural land, the total depth of excavation should be limited to 150cm including top 30 cm for top soil preservation; For river side borrow area, the depth of excavation shall be regulated so that the inner edge of any borrow pit, should not be less than 15m from the toe of the bank and bottom of the pit should not cut the imaginary line of 1:4 projected from the edge of the final section of the embankment. 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.
Damage to surrounding land	Movement of man and machinery should be regulated to avoid damage to surrounding land. To prevent damages to adjacent properties, the Contractor shall ensure that an undisturbed buffer zone exists between the distributed borrow areas and adjacent land. Buffer zone shall be 3 m wide or equal to the depth of excavation whichever is greater.
Drainage control	The Contractor shall maintain erosion and drainage control in the vicinity of all borrow pits and make sure that surface drains do not affect the adjacent land or future reclamation. This needs to be rechecked by the Engineer.
Dust Suppression	Water should be sprayed on kutcha haul road twice a day or as may be required to avoid dust generation during transportation of material; Depending on moisture content, 0.5 to 1.5% water may be added to excavated soil before loading during dry weather to avoid fugitive dust emission.
Covering material for transport material	Material transport shall be provided with tarpaulin cover
Personal Protective Equipment	Workers should be provided with helmet, gumboots and air mask and their use should be strictly enforced.
Redevelopment	The area should be redeveloped within agreed timeframe on completion of material collection as per agreed rehabilitation plan.

5. POST CONSTRUCTION STAGE

All reclamation shall begin within one month of abandonment of borrow area, in accordance with the redevelopment plan. The site shall be inspected by the Engineer after implementation of the reclamation plan. Certificate of Completion of Reclamation is to be obtained by the Contractor from the landowner that "the land is restored to his satisfaction". The final payment shall be made after the verification by Engineer.

6. CHECKLIST FOR INSPECTION OF REHABILITATION AREA

Inspection needs to be carried out by the Engineer for overseeing the redevelopment of borrow areas as per the plan. The checklist for the inspection by the Engineer is given below.

- Compliance of post-borrowing activities and land use with the restoration plan;
- Drainage measures taken for inflow and outflow in case borrow pit is developed as a detention pond;
- Leveling of the bottom of the borrow areas;
- In case the borrow area is on private property, the contractor shall procure written letter from landowner for satisfaction on rehabilitation. In case of no rehabilitation is desired by the landowner, the letter should include statement "no responsibility of R&BD on contractor in the event of accident.
- Condition of the reclaimed area in comparison with the pre-borrowing conditions.

ESGP-04: TOPSOIL SALVAGE, STORAGE AND REPLACEMENT

1. INTRODUCTION

Loss of topsoil is a long term impact along roads due to (i) site clearance and widening for road formation (ii) development of borrow areas (iii) temporary construction activities such as construction camps, material storage locations, diversion routes etc. The environmental measures for both these activities during all stages of construction activity are discussed in the subsequent sections.

2. PROJECT PLANNING & DESIGN STAGE

At the project preparation stage, the following shall be estimated: (i) Extent of loss of top soil due to widening and siting of construction activities (ii) Estimates of borrow area requirements and (iii) Area requirement for topsoil conservation. The bid document shall include provisions that necessitate the removal and conservation of topsoil at all locations opened up for construction by the Contractor.

3. PRE-CONSTRUCTION STAGE

The arrangements for temporary usage of land, borrowing of earth and materials by the Contractor with the land owner/concerned department shall include the conservation / preservation of topsoil.

4. CONSTRUCTION STAGE

It shall be the responsibility of the Contractor to strip the topsoil at all locations opened up for construction. The stripped topsoil should be carefully stockpiled at suitable accessible locations approved by the Engineer. At least 10% of the temporarily acquired area shall be earmarked for storing topsoil. In case of hilly and desert areas, topsoil with humus wherever encountered while opening up the site for construction shall be stripped and stockpiled. The stockpiles shall be located at:

- Areas away from Grade, Subsoil & Overburden materials;
- Areas away from pit activities and day-to-day operations;
- Areas that do not interfere with future pit expansion; and
- Areas away from drainage paths and uphill of sediment barriers.

The stockpiles for storing the topsoil shall be designed such that the slope should not be less than 1:2 (Vertical to horizontal), and the height of the pile is restricted to 2m. A minimum distance of 1m is required between stockpiles of different materials.

In cases where the topsoil has to be preserved for more than a month, the stockpile is to be stabilised within 7 days of forming. The stabilization shall be carried out through temporary seeding. It consists of planting rapid-growing annual grasses or small grains, to provide initial, temporary cover for erosion control.

After spreading the topsoil on disturbed areas, it must be ensured that topsoil is seeded, and mulched within 30 days of final grading. During construction, if erosion occurs from stockpiles due to their location in small drainage paths, the sediment-laden runoff should be prevented from entering nearby watercourses. The Contractor shall preserve the stockpile material for later use on slopes or shoulders as instructed by the Engineer.

Vegetative material for stockpile stabilisation…

Must consist of grasses, legumes, herbaceous, or woody plants or a mixture thereof • Selection & use of vegetative cover to take into account soil and site characteristics such as drainage, pH, nutrient availability, and climate to ensure permanent growth

Vegetative material for stockpile stabilisation…

Stockpiles will not be surcharged or otherwise loaded and multiple handling will be kept to a minimum to ensure that no compaction will occur.

Divert runoff around stockpiles unavoidably located in drainage paths using a perimeter bank uphill.

The stockpiles shall be covered with gunny bags or tarpaulin immediately in case they are not stored for periods longer than 1 month

5. POST CONSTRUCTION STAGE

The topsoil shall be re-laid on the area after taking the borrow earth to maintain fertility of the agricultural field, finishing it to the required levels and satisfaction of the farmer. The area to be covered with vegetation shall be prepared to the required levels and slope as detailed in the DPR. The stockpile material shall be spread evenly to a depth of 5-15cm to the designed slopes and watering the same as required. The growth of the vegetation shall be monitored at frequent intervals. All temporary arrangements made for stockpile preservation and erosion control are to be removed after reusing the stockpile material. The top soil can also be used for the following purposes:

a. Covering the borrow areas;
b. Embankment and turfing;
c. Median; and
d. Rehabilitation of construction and labour camp.

ESGP-05: QUARRY MANAGEMENT

1. INTRODUCTION

This guideline pertains to the measures to be taken to address environmental concerns in quarry areas. The general practice adopted is to procure materials from existing quarries operating with the requisite permits. The measures to be taken for operation and management for quarries during all stages of construction have been discussed in this Guideline.

2. PROJECT PLANNING AND DESIGN STAGE

The PIU shall provide in the DPR/bid document, a list of licensed quarries operating within the district and adjoining districts. In addition, the DPR shall contain the following: (i) Quantity of materials available in quarries (ii) Lead from the various existing quarries and (iii) Adequacy of materials for the project in these quarries. **Table 5-1** and **5-2** give the format for preparing a list of quarries.

Table 5-1 Details of Sand Quarry

Sample No.	Source of Sand	Name of quarry area	Site Identification/ Location			Approximate Quantity (cum)	Approximate basic cost of the material (Rs.)	Remarks
			Nearest Chainage (Km.)	Left/Right	Offset from nearest chainage (km)			

Table 5-2 Details of Quarry Area for Aggregates

Sample No.	Chainages (Km.)	Left/ Right	Name of Quarry Area	Name of Crusher	Lead from nearest chainage (Km.)	Basic cost of the material (Rs.)	Available land/ terrain	Surrounding land Terrain	Remarks

Only in the event of non-availability of existing quarries, the Contractor shall open a new quarry in accordance with Mines and Minerals (Development & Regulation) Act, 1957. The bid document shall include the exhaust quarry reclaim plan per needs of the landowner / community.

3. PRE-CONSTRUCTION STAGE

The Contractor shall select an existing licensed quarry identified in DPR for procuring materials. The Contractor shall establish a new quarry with the prior consent of the Engineer only in cases when: (i) Lead from existing quarries is uneconomical and (ii) Alternative material sources are not available. The Contractor shall prepare a Redevelopment Plan for the quarry site and get it approved by the Engineer.
The construction schedule and operations plans to be submitted to the Engineer prior to commencement of work shall contain a detailed work plan for procuring materials that includes procurement, transportation and storage of quarry materials.

4. CONSTRUCTION STAGE

4.1 Development of Quarry Area

To minimize the adverse impact during excavation of material following measures are need to be undertaken:

- Adequate drainage system shall be provided to prevent the flooding of the excavated area
- At the stockpiling locations, the Contractor shall construct sediment barriers to prevent the erosion of excavated material due to runoff.
- Construction of offices, laboratory, workshop and rest places shall be done in the up-wind of the plant to minimize the adverse impact due to dust and noise.
- The access road to the plant shall be constructed taking into consideration location of units and also slope of the ground to regulate the vehicle movement within the plant.
- In case of storage of blasting material, all precautions shall be taken as per The Explosive Rules, 1983 and its amendments.

4.2 Setting up of Crushers and other equipments

The following measures shall be undertaken for setting up of crushers are other equipments.

- The contractor shall obtain "No Objection Certificate (NoC)" from the Gujarat State Pollution Control Board.
- All vehicles must possess Pollution Under Control (PUC) Certificate and shall be renewed accordingly
- All machinery, equipments, and vehicles shall comply with existing CPCB noise and emission norms.
- The Engineer must ensure that contractor shall submit the copy of NoC and PUC Certificate before the start of work.

4.3 Quarry operations

The followings precautions shall be undertaken during quarry operations. vii) Overburden shall be removed and disposed as per **ESGP 08** "Waste Management and Debris Disposal".

- During excavation slopes shall be flatter than 20 degrees Guideline 8 on to prevent their sliding
- In case of blasting, the procedure and safety measures shall be taken as per Explosives Act, 1884and its amendments and Rules, 1983 and its amendments.
- The Contractor shall ensure that all workers related safety measures shall be done as per measures for, "Labour & Workers Health & Safety" (**ESGP 12**).
- The Contractor shall ensure maintenance of crushers regularly as per manufacturer's recommendation.
- Stockpiling of the excavated material shall be done as per stockpiling of topsoil explained in **ESGP 04**, "Topsoil Salvage, Storage& Replacement."
- During transportation of the material, measures shall be taken as per **ESGP 11** "Construction Plants and Equipment Management" to minimize the generation of dust and to prevent accidents
- The Engineer and the concerned authority shall review the quarry site for the management measures during quarry operation, including the compliance to pollution norms.

5. POST CONSTRUCTION STAGE

A quarry redevelopment plan shall be prepared by the Contractor. All haul roads constructed for transporting the material from the quarries to construction site shall be restored to their original state.
The Engineer and the concerned authority shall be entrusted the responsibility of reviewing the quarry site for the progress of implementation of Redevelopment Plan.

The plan shall include:

- Photograph of the quarry site prior to commencement
- The quarry boundaries as well as location of the materials deposits, working equipments, stockpiling, access roads and final shape of the pit.
- Drainage and erosion control measures at site
- Safety measures during quarry operation
- Design for redevelopment of exhaust site.

Two options for redevelopment of quarry areas are given below:

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

Option B: Developing 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 areas/ natural drainage slopes towards it.

ESGP-06: WATER FOR CONSTRUCTION

1. INTRODUCTION

The scope of this guideline includes the procurement of water required for construction of roads. Except bituminous works, water is required during all stages of road construction such as Embankment Sub-Grade; Granular sub-base (GSB) and Water Bound Macadam (WBM). Management of water in various stages of construction is given in the following sections.

2. PROJECT PLANNING & DESIGN STAGE

- The Detailed Project Report for both road constructions shall contain the following information:
- Estimate of water requirement during different seasons based on construction schedule of various stages of construction.
- Identification of potential sources of water for construction,
- Arrangements to be worked out by the contractor with individual owners, when water is obtained from private sources, and
- Whether scarcity of water would have any impact on schedule of construction.

In water-scarce regions, provide the following additional information in Project Reports…
• Exploring possibilities for use of existing perennial sources, through interactions with water user groups as the villagers, relevant Government Departments, keeping in view that the water extraction does not infringe upon the usufruct rights of the existing water users. • Identification of potable water source for domestic use of workers and for use in cement - based construction such as cement concrete roads, culverts and other cross drainage works. • Identification of alternate water sources, water-harvesting techniques will be explored to avoid water extraction from the existing community sources.

In water scarce regions, if water-harvesting structures are to be constructed, suitable locations and mechanism for siting these structures will be identified. These are envisaged to be permanent water tanks for collection of stream water. Detailed drawings of water harvesting structures based on site conditions will need to be worked out and presented in the DPR. No extra payment shall be generally made for these works and the Contractor has to include the cost of these items in his offer while quoting his tendered rate.

Scheduling Construction in Water Scarce Areas: As part of the project preparation, the Engineer shall conduct an assessment of water requirement and availability in water scarce regions. As far as possible, schedule for construction in these water scarce areas shall be prepared such that earthwork for embankment is carried out just before monsoon, so that water requirement for subsequent construction works such as granular sub-base and water bound macadam are met in monsoon and post monsoon season. Carrying out these activities even during the monsoon is possible as the rainfall may not be high enough to disrupt construction.

3. PRE-CONSTRUCTION STAGE

Prior to commencement of extraction of water for construction, the contractor shall work out arrangements as specified in the DPR.

In water-scarce regions, provide the following additional information in Project Reports…

- Exploring possibilities for use of existing perennial sources, through interactions with water user groups as the villagers, relevant Government Departments, keeping in view that the water extraction does not infringe upon the usufruct rights of the existing water users.
- Identification of potable water source for domestic use of workers and for use in cement - based construction such as cement concrete roads, culverts and other cross drainage works.
- Identification of alternate water sources, water-harvesting techniques will be explored to avoid water extraction from the existing community sources.

CONSTRUCTION STAGE

During construction, the Contractor shall be responsible to monitor the following:

- The arrangements worked out with the Panchayat/individual land owners for water extraction is adhered to;
- Extraction of water is restricted to construction requirement and domestic use of construction workers;
- Water requirement for curing of concrete shall be minimized by pooling of water over the concrete or by covering with wet gunny bags; and
- The potable water used for drinking purposes of construction workers shall be as per the Indian Standard for Drinking Water IS: 10500, 1991.

from any septic tank/soak pit or other source of pollution.

- **In case of water harvesting structures** (if required), the Contractor shall in consultation with the residents, identify suitable locations for siting the structure and construct the same.
- **In case of perennial sources,** the Contractor shall adhere to all administrative procedures pertaining to procurement of water from such sources.

ESGP-07: SLOPE STABILITY AND EROSION CONTROL

1. INTRODUCTION

Stability of slopes is a major concern in locations of high embankment. In cases of high embankment, water retention at the embankment base initially causes toe failure and subsequently failure of the whole embankment. Soil erosion is consequent to high runoff on hill slopes. Embankments made up of silty and sandy soils get eroded, in the absence of vegetative cover, when the slopes are steep say more than 20 Degree.

The scope of this guideline includes measures to minimize the adverse environmental impacts due to slope instability and soil erosion. The adverse environmental impact can be: (i) Damage to adjacent land, (ii) Silting of ponds and lakes disturbing the aquatic habitat (iii) Erosion of rich and top fertile top layer of soil (iv) Contamination of surface water bodies and (v) Reduction in road formation width due to erosion of shoulders/berms.

2. PROJECT PLANNING AND DESIGN STAGE

During the detailed project preparation phase, the following investigations shall be carried out prior to finalization of alignment.

- Topographical;
- Hydrological;
- Geo-technical; and
- Geological Investigation (in case of roads in hill areas and areas of high seismic activity)

In addition to the slope stability analysis the alignment should be such that (i) steep as well as heavy cuts are avoided, (ii) Flora and fauna of the area are not disturbed and (iii) Natural drainage pattern is not obstructed. For high embankments, geo-technical investigations (determination of C, φ, density etc.) of the available material need to be done to check its suitability as fill material.

In case of the CD structures, measures for preventing siltation and scouring shall be undertaken as per Guideline on, "Drainage".

Following guidelines shall be followed in desert areas while using cohesion-less soils for embankment construction.

- The alignment should follow the natural ground level to the extent possible and the embankment shall be restricted to minimum to achieve ruling grades.
- Slope of the embankment should be 3 (H): 1(V) or flatter.
- The corners of the embankment should be rounded for better aerodynamic performance.

3. PRE-CONSTRUCTION STAGE

Interceptor ditches are constructed along hilly slopes or areas with high rainfall to protect the road bench and hillside slope from erosion due to heavy rainfall and runoff. Interceptor ditches are very effective in the areas of high intensity rainfall and where the slopes are exposed. These are the structures designed to intercept and carry surface run-off away from erodible areas and slopes, thus reducing the potential surface erosion. The Engineer must ensure that the layout and siting of ditches is as per specifications.

4. CONSTRUCTION STAGE

When alternative material such as fly ash is used for embankment formation, it needs to be ensured that sufficient filter bed is provided along with the top cap. All tests as per IS: 2720 (Parts: 4, 5, 8 & 40) and IRC: SP: 20-2002 are to be conducted on the embankment to keep a check on the compaction achieved. Slope stabilization techniques and erosion control measures such as vettiver grass, stone pitching, use of geotectile and turfing.

Box-1: Detailed specifications for Vegetative cover

Description:

The vegetative cover should be planted in the region where the soil has the capacity to support the plantation and at locations where meteorological conditions favours vegetative growth.

Site Preparation:

- To prevent the seeds from being washed away subsequent to sowing, the area should be protected with surface roughening and diversions.
- Soil samples should be taken from the site and analysed for fertiliser and lime requirements.

Seed Application:

- The seed should be sown uniformly as soon as preparation of the seedbed has been completed.
- No seed should be sown during windy weather. The best time for needing would be during monsoon.

Maintenance:

During first six weeks, the planting should be inspected by the PIC, to check if the growth is uniform and dense. Appropriate moisture levels shall be maintained. There may be requirement of watering the plantings regularly during the dry seasons.

5. POST CONSTRUCTION STAGE

All the exposed slopes shall preferably be covered with vegetation using grasses, brushes etc. Locally available species possessing the properties of (i) good growth (ii) dense ground cover and (iii) deep root shall be used for stabilization.

In case of steep and barren slopes, in order to retain the seedling to the ground asphalt mulch treatment shall be given. Seedling are covered with asphalt emulsion and spread into a thin layer. The asphalt film gradually disintegrates and a carpet of green vegetation and deep-rooted species of grass and clovers, takes its place. Anchoring shall be carried out as per IRC: SP: 48-1998.

Regular inspection of check dams and repositioning/replacement of dislodged or stolen stones need to be carried out.

Repair and maintenance of eroded side drain inverts is to be done in order to arrest retrogation of levels in side drains. Slopes of high embankment can give a fertile base for growth of vegetative cover / sodding.

In arid areas, in order to avoid the deposition of sand over or near the road surface, shrubs are to be planted at an appropriate distance from the formation. The shrubs should not be abutting the road and the distance for carrying out plantation shall be determined based on prevalent wind speeds as well as quantity of sand being carried amongst various other factors. There should be a clear gap between the roadway and shrubs to allow the wind to pick up its velocity and carry along with it any sand that is deposited.

ESGP-08: WASTE MANAGEMENT AND DEBRIS DISPOSAL

1. INTRODUCTION

This guidance describes procedures for handling, reuse and disposal of waste materials during road construction. The Guideline describes waste management measures in all stages of construction. Also, the Guideline discusses the measures to be taken for debris disposal.

2. PROJECT PLANNING AND DESIGN STAGE

As part of DPR preparation, the Engineer shall carry out the following measures

- Finalize road design and alignment to minimize waste generation through balancing of cut and fill operations and minimizing excess cuts requiring disposal.
- Identify the type of wastes as well as sources of waste during construction and suggest options for possible reuse
- Provide guidelines to the contractor for locating waste disposal sites for non-toxic wastes
- Identify existing landfill sites if available for disposal of toxic materials.
- Incase no existing landfill sites are available, identification of landfill site as well as identification of the clearance requirements.
- Identify sites of disposal of debris.

3. PRE-CONSTRUCTION STAGE

The contractor shall identify the activities during construction, that have the potential to generate waste and work out measures for reducing, reusing and proper disposing of the generated waste in the construction schedule to be submitted to the Engineer. A sequential listing of the activities during road construction and the nature of wastes together with the possible options for reuse are specified in **Table 8-1**. For the disposal of excess cut and unsuitable (non-toxic) materials, the contractor shall identify the location for disposal in consultation with the community / concerned department. Any toxic materials shall be disposed in existing landfill sites that comply with legislative requirements. Prior to disposal of wastes onto private/community land, it shall be the responsibility of the Contractor to obtain a No-objection Certificate (NOC) from the land owner/community. The NOC shall be submitted to the Engineer prior to commencement of disposal.

Practices to avoid – waste disposal …
•Tipping of waste into stream channels, water bodies, forests and vegetated slopes
•Non-cleaning of wastes after day's work
•Leaching of wastes
•Littering in construction camps / sites
•Storing wastes on private land

The Contractor shall educate his workforce on issues related to disposal of waste, the location of disposal site as well as the specific requirement for the management of these sites.

4. CONSTRUCTION STAGE

The contractor shall either reuse or dispose the waste generated during construction for roads depending upon the nature of waste, as specified in **Table 8-1**. The reuse of waste shall be carried out by the contractor only after carrying out the specific tests and ascertaining the quality of the waste materials used, and getting the same approved by the Engineer. Wastes that were not reused shall be disposed off safely by the contractor. The contractor shall adopt the following precautions while disposing wastes:

- Bituminous wastes shall be disposed off in 60mm thick clay lined pits and covered with 30cm good earth at top, so as to facilitate growth of vegetation in long run.
- In case of filling of low-lying areas with wastes, it needs to be ensured that the level matches with the surrounding areas. In this case care should be taken that these low lying areas are not used for rainwater

storage

- In case oil and grease are trapped for reuse in a lined pit, care shall be taken to ensure that the pit should be located at the lowest end of the site and away from the residential areas.

The waste management practices adopted by the Contractor, including the management of wastes at construction camps etc shall be reviewed by the Engineer and the Pollution Control Board (PCB) during the progress of construction.

5. POST CONSTRUCTION STAGE

On decommissioning of construction sites, the Contractor shall hand over the site free of all debris/wastes to the satisfaction of Engineer. In case of any temporary disposal of wastes on private land, certificate of Completion of Reclamation is to be obtained by the Contractor from the landowner that "the land is restored to his satisfaction". The same is to be submitted to the Engineer before final payment is claimed.

Table 8-1: Type of wastes and scope for reuse- road construction

S. No	Activity	Type of waste	Scope for possible reuse	Disposal of waste
I	**CONSTRUCTION WASTES**			
1.	Site Clearance and grubbing	Vegetative cover and top soil	Vegetating embankment slopes	
		Unsuitable material in embankment foundation	Embankment Fill	Low lying areas Land fill sites
2.	Earthworks			
a)	Overburden of borrow areas	Vegetative cover and soil	Vegetating embankment slopes	
b)	Overburden of quarries	Vegetative cover and soil	Vegetating embankment slopes	
		Granular material	Embankment Fill, Pitching	
c)	Accidental spillages during handling	Dust		
d)	Embankment construction	Soil and Granular Material	Embankment Fill	
e)	Construction of earthen drains	Soil	Embankment Fill	
3.	Concrete structures Dust			
a)	Storage of material	Dust, Cement, Sand	Constructing temporary structure, embankment fill	
		Metal Scrap		Scrap Yard
b)	Handling of materials	Dust		
c)	Residual wastes	Organic matter	Manure, Revegetation	
		Cement, sand	Constructing temporary structure, embankment fill	
		Metal scrap	Diversion sign, Guard Rail	
4	Reconstruction works			
a)	Dismantling of existing pavement	Bitumen Mix, granular material	sub-base	
		Concrete	Road Sub-base, reuse in concrete, fill material and as rip	

S. No	Activity	Type of waste	Scope for possible reuse	Disposal of waste
			rap on roads	
		Guard rail sign post, guard stone	Reuse for same	
b)	Dismantling of cross drainage structures	Granular material & bricks	Constructing temporary structure, embankment fill	
		Metal scrap	Diversion sign, Guard Rail Culvert	
		Pipes	Culvert	
5	Decommissioning of sites			
a)	Dismantling of temporary structures	Granular material and bricks	Constructing temporary structure, embankment fill	
6	Maintenance operation			
a)	Desilting of side drains	Organic matter and soil	Revegetation	
II	**OIL AND FLUIDS**			
1	Construction machinery – maintenance and refueling	Oil and Grease	Incineration, Cooking, Illumination	
2	Bituminous works			
a)	Storage	Bitumen	Low Grade Bitumen Mix	
b)	Mixing and handling	Bitumen	Low Grade Bitumen Mix	
		Bitumen Mix	Sub-base, Paving access & cross roads	
c)	Rejected bituminous mix	Bitumen Mix	Sub-base, Paving access & cross roads	
III	**DOMESTIC WASTES**			
1	Construction camps	Organic waste,	Manure	
		Plastic and metal scrap		Scrap Yard
		Domestic effluent	Irrigation	

6. Disposal of Debris

For the purpose of disposal of debris, dumping sites need to be selected. The criteria for selection of dumping sites include:

- No residential areas are located downwind side of these locations;
- Dumping sites are located at least 1000 m away from sensitive locations;
- Dumping sites do not contaminate any water sources, rivers etc; and
- Dumping sites have adequate capacity equal to the amount of debris generated;
- Public perception about the location of debris disposal site has to be obtained before finalizing the location;
- Permission from the Village Panchayat is to be obtained for the dumping site selected;
- Productive lands are avoided; and
- Available waste lands shall be given preference

ESGP-09: WATER BODIES

1. INTRODUCTION

Water bodies may be impacted when the road construction is adjacent to it or the runoff to the water body is affected by change of drainage pattern due to construction of embankment. The following activities are likely to have an adverse impact on the ecology of the area:

- Earth moving;
- Removal of vegetation;
- Vehicle/Machine operation and maintenance;
- Handling and laying of asphalt; and
- Waste disposal from construction camps.

Impacts on water bodies impairs …

- Change in Catchment area of the water body
- Drainage system
- Flood level and water logging
- Flora and fauna dependant on the water body
- Ground water recharging
- Animal husbandry as water bodies are used by animals
- Water quality &
- Runoff (increase/ decrease)

2. PROJECT PLANNING AND DESIGN STAGE

All efforts are to be taken to avoid the alignments passing adjacent or close to water bodies. Where possible, it should be realigned away from the water body without cutting its embankment, decreasing the storage area or impairing the catchment area. Adequate drainage arrangements as per IRC guidelines have to be provided. Stream bank characteristics and hydrology of the area are to be studied before finalizing the alignment, the profile and cross-drainage structures.
Complete filling of water body with soil is not contemplated in the project. The DPR and its cost estimates have to accommodate costs of rehabilitation (to be estimated as lump sum at DPR stage) of water bodies impacted by the project. Water body rehabilitation shall be as per the Rehabilitation Plan prepared by the Contractor which should have approval of the Engineer. Details of the tasks to be performed as per the sequence of activities during the project planning and design are as follows:

- Consultations with the people regarding alternate routes that were devised to avoid the pond. If alternate routes are not available, consent of the villagers is to be sought for affecting the pond and also the measures that would be taken to mitigate the impacts.
- Final design is to be prepared indicating the pond location in the alignment drawings.
- If impacting the pond, the extent of impact is to be clearly indicated on a separate drawing showing blown up portion of the pond. The drawing should aid the contractor in setting up exact lines for cutting the pond.
- All necessary measures for mitigation of impacts and precautionary measures while working close to the water body are to be incorporated into the DPR and cost estimates. The measures to be incorporated shall be as per this guideline.

PRE-CONSTRUCTION STAGE

The Contractor after an assessment of the likely impacts on the water body and review of the provisions of this guideline shall prepare a detailed work plan at the pre-construction stage. The Contractor shall prepare a Rehabilitation Plan for rectifying the likely impact to be caused and approval of Engineer shall be sought prior to commencement of work. The Rehabilitation Plan should include:

- Locations of erosion protection works and silt fencing to prevent sediment laden runoff entering the water body;
- Location of side drains (temporary or otherwise) to collect runoff from the embankment before entering

the water body in accordance with IRC guidelines;
- Work program in relation to the anticipated season of flooding/overflowing of the water body;
- Obstructions likely to cause temporary flooding and information to seek clearance to remove the obstruction; and
- Drawings in Rehabilitation Plan should indicate the landscape details along with species to be planted in the surrounding environs of the water body.

The rehabilitation of water body should be with the objective of restoring it to its original state or to a better state with necessary enhancement of its environs. Rehabilitation Plan shall include:

- Reconstruction and stabilization of embankment in case it is impacted;
- If storage area is lost, then the water body is to be deepened to regain an equivalent volume;
- Further enhancement of the water body as a focal point with place for seating and provision of shade; and
- Costs of rehabilitation

Concurrence of the community has to be sought on the Rehabilitation Plan prepared by the Contractor. Concerns of the community have to be incorporated into the plan before submitting it for approval of the Engineer -.

The Engineer shall scrutinize the Rehabilitation Plan, verify the implementation on site and finally approve the plan. The Rehabilitation Plan should be implemented by the Contractor immediately after completion of construction at the stretch near the water body.

When there is interruption to regular activities of villagers near water body due to construction or rehabilitation work, following are the Contractor's responsibilities:

Working near Water Bodies – Precautions

- Avoid locating roads on pond embankment
- Collect road runoff before entering the water bodies
- Runoff to be filtered of sediments before letting into water bodies
- Avoid debris disposal into water bodies
- Avoid disposal of oil/grease/other contaminants into water bodies

- Restriction on use of water, if any, should be intimated to the community in advance;
- Alternate access to the water body is to be provided in case there is interruption to use of exiting access. The access provided should be convenient for use of all the existing users whether community or cattle; and
- If the water body affected is a drinking water source for a habitation, alternate sources of water are to be provided to the users during the period for which its use is affected.

3. CONSTRUCTION STAGE

It should be ensured by the contractor that the runoff entering the water body is free from sediments
Silt fencing and/or brush barrier shall be installed in the drainage channels for collecting the sediments before letting them into the water bodySilt/sediment should be collected and stockpiled for possible reuse as surfacing of slopes where they have to be revegetated.Cutting of embankment reduces the water retention capacity and also weakens it, hence:

- The contractor should ensure that the decrease in water retention should not lead to flooding of the construction site and surroundings causing submergence and interruption to construction activities.
- Any perceived risks of embankment failure and consequent loss/damage to the property shall be assessed and the contractor should undertake necessary precautions as provision of toe protection, erosion protection, sealing of cracks in embankments. Failure to do so and consequences arising out of embankment failure shall be the responsibility of the contractor. The Engineer shall monitor regularly whether safe construction practices near water bodies are being followed.

Alternate drain inlets and outlets shall be provided in the event of closure of existing drainage channels of the water body. Movement of machinery and workforce shall be restricted around the water body, and no waste from construction camps or sites shall be disposed into it.

4. POST CONSTRUCTION STAGE

With the completion of construction, the Engineer has to ensure implementation of rehabilitation/restoration plan for the water body, as indicated by the Contractor in the bid submission. The precincts of the water body have to be left clean and tidy with the completion of construction. Drainage channels of adequate capacity shall be provided for the water body impacted.

ESGP-10: DRAINAGE

1. INTRODUCTION

Inadequate and faulty drainage arrangements during road construction result in obstruction to natural drainage pattern. The problem is further aggravated in the low-lying areas and flood plains receiving high intensity rainfall, which can lead to the instability of embankment, damage to pavement, sinking of foundation, soil erosion, safety hazards and disruption in traffic. Provision of cross-drainage and longitudinal drainage increases the life of the road and consequently reduces water logging and related environmental impacts. The functioning of the drainage system is therefore a vital condition for a satisfactory road.
However, construction or upgradation of CD structures and longitudinal drains is likely to increase sediments, scour the banks, change water level and flow, and also affect the ecology of the surrounding area. The guideline shall address the environmental concerns related to drainage aspects during different stages of the project execution.

2. PROJECT PLANNING AND DESIGN

Drainage shall be broadly divided as (i) Cross-Drainage and (ii) Longitudinal Drainage both surface & sub-surface drainage. The alignment shall be routed such that minimum drainage crossings are encountered. Also the geometric design criteria as per IRC 73, guidelines for effective surface drainage should be ensured.

All drains crossing the alignment shall be identified on site and marked on map while undertaking transect walk. Basic information on the width of channel, frequency of traffic holdup and flow would provide inputs into screening of alternate alignments as well as fixing the alignment. Consultations with the community shall provide information on the HFL in the area.

In areas of high and medium intensity rainfall (>400 mm/year), flood prone areas and hilly areas, detailed hydrological studies will need to be conducted. The studies shall be conducted as per IRC: SP-13: 1973 “Guidelines for the Design of Small Bridges & Culverts” and IRC: SP-33:1989 “Guidelines on Supplemental Measures for Design, Detailing & Durability of Important Bridge Structures”.

Design of cross-drainage structures shall be based on the inputs from the hydrological studies as per clause 12.2.3 and in other areas, the C-D structure design shall be as per IRC: SP-13. Design of C-D structure shall be such that:

- Normal alignment of the road is followed even if it results in a skew construction of culverts and stream bank protections are incorporated.
- Afflux generated is limited to 30 cm in plains with flat land slopes.
- It is fish friendly – fish passage is not interrupted either in upstream or downstream direction.
- Adequate scour protection measures for stream bank, roadway fill as head walls, wing walls and aprons are included.
- Reinforced road bed (of concrete or rock) for protection against overflow in case of low water crossing (floods/causeways) is included.
- The design of C-D structure (minor and major bridge) should have stairs leading to the bed of the drainage channel, for regular inspection of the sub-structure.
- Schedule of construction of C-D structures should be confined to dry months to avoid contamination of streams.

Longitudinal drains are to be designed to drain runoff from highest anticipated rainfall as per rainfall data for the past 20 years or 50 years as per hydrological analysis in high rainfall areas (annual rainfall > 1000 mm) and hill areas. For design of longitudinal drains in other areas, the design shall be as per IRC: SP-20:2002.

Outfall of the roadside drains shall be into the nearby stream or culvert. The outfall should be at such a level that there would be no backflow into the roadside drain. Wherein pond/low lying areas exist in the vicinity, the flow may be diverted into them after removal of sediment for possible ground water recharge.

In case of high embankment (>1.0m) or bridge approaches, lined channels shall be provided to drain the surface runoff, prevent erosion from the slopes and avoid damage to shoulders and berms. Detailed specifications shall be as per IRC: SP-20:2002. The type of drains that can be constructed include bricklined, pucca with RCC, covered drain with RCC slabs and piped drain.

3. PRE-CONSTRUCTION STAGE

Following measures are to be undertaken by the contractor prior to the commencement of CD/Bridge construction:

- The downstream as well as upstream user shall be informed one month in advance
- The contractor shall schedule the activities based on the nature of flow in the stream.
- The contractor should inform the concerned departments about the scheduling of work. This shall form part of the overall scheduling of the civil works to be approved by Engineer.
- Erosion and sediment control devises are to be installed prior to the start of the civil works.
- Interceptor drains to be dug prior to slope cutting to avoid high runoff from slopes entering construction sites in case of hill roads
- Runoff from temporary drains and interceptor drains to be directed into natural drains in hill roads
- In case of up-gradation of the existing CD Structures, temporary route / traffic control shall be made for the safe passage of the traffic, depending upon the nature of the stream
- All the safety/warning signs are to be installed by the contractor before start of construction

In case of utilization of water from the stream, for the construction of the CD structures, the contractor has to take the consent from the concerned department (refer Guideline on "Water for Construction")

4. CONSTRUCTION PHASE

Drainage structures at construction site shall be provided at the earliest to ensure proper compaction at the bridge approach and at the junction of bridge span and bridge approach. Velocity of runoff to be controlled to avoid formation of rills/gullies as per guideline, "Slope stability & erosion control"
While working on drainage channels, sediment control measures shall be provided. Silt fencing (as per the detailed specifications of guideline, "Slope Stability & Erosion Control") shall be provided across the stream that carries sediment.

The sediments collected behind the bunds shall be removed and after drying, can either be reused or disposed off as per guideline, "Waste Management and Debris Disposal". Safety devises and flood warning signs to be erected while working over streams and canals.

5. POST CONSTRUCTION

Inspection and cleaning of drain shall be done regularly to remove any debris or vegetative growth that may interrupt the flow. HFL should be marked as per hydrological data on all drainage structure. Temporary structure constructed during construction shall be removed before handing over to ensure free flow through the channels. The piers and abutments should be examined for excessive scour and make good the same if required. The upstream and downstream areas should be cleared of all CD works.

In case of Causeway following aspect shall be taken into consideration:

- Dislocation of stones in stone set pavements, scouring of filler material due to eddy currents.
- Floating debris block the vents. Incase of large amount of floating material, debris arrestor shall be provided in upstream side.
- Damage to guide stones, information board shall be inspected and replaced accordingly.

Schedule of Inspection shall be drawnup for checking cracks, settlements and unusual backpressures. It must be ensured that all the rectification shall be undertaken as and when required. Following are broadly the items to be checked:

- Settlement of piers/abutments & settlement of approach slabs have to be checked;
- Cracks in C-D structures or RCC slabs;
- Drainage from shoulders to be ensured;
- Ditches & drains to be kept clean of debris or vegetation growth; and
- Repairs to parapet of culverts whenever required are to be undertaken.

ESGP-11: CONSTRUCTION PLANTS & EQUIPMENT MANAGEMENT

1. GENERAL

During execution of the project, construction equipments, machinery and plants are likely to cause adverse impact on the environment. The impact can be due to the emissions, dust, noise and oil spills that concern the safety and health of the workers, surrounding settlements and environment as a whole. This guideline describes the activities during the project stages where pollution control measures are required.

2. PROJECT PLANNING AND DESIGN STAGE

Selection criteria for setting up a plant area and parking lot for equipments and vehicles shall be done as per siting criteria for construction camp specified in Guideline on "Construction and Labour Camps".

3. PRE-CONSTRUCTION STAGE

The Contractor must educate the workers to undertake safety precaution while working at the plant / site as well as around heavy equipments. Before setting up the crusher, hot-mix plant and generator, the Contractor shall acquire "No Objection Certificate (NOC)" from the GujaratState Pollution Control Board for the same. The Contractor shall ensure all vehicles must possess Pollution under Control (PUC) Certificate, which and shall be renewed regularly. The Contractor must ensure that all machinery, equipments, and vehicles shall comply with the existing Central Pollution Control Board (CPCB) noise and emission norms. The Engineer must ensure that the Contractor shall submit a copy of the NOC and PUC Certificates before the start of work. The Contractor shall design the service road with protection measures as black topping at vulnerable points as in low lying areas.

4. CONSTRUCTION STAGE

The Contractor shall undertake measures as per **Table 11-1** to minimize -the dust generation, emissions, noise, oil spills, residual waste and accidents at the plant site as well as during transportation of material to construction site.

Table 11-1: Measures at Plant Site

Concern	Causes	Measures
Dust Generation	Vehicle Movement	•Water sprinkling •Fine Materials shall be Transported in Bags or Covered by Tarpaulin during Transportation •Tail board shall be properly closed and sealed to be spill proof
	Crushers	• Regular Water Sprinkling to keep the dust below visibility level
	Concrete-Mix Plant	• Educate the workers to follow/adopt good engineering practices while material handling
Emissions	Hot-Mix Plant	•Site Selection as per Clause 6.5.2, Section 6.5, IRC's Manual for Construction & Supervision of Bitumen Work •Regular maintenance of Dust Collector as per manufacture's recommendations
	Vehicles	• Regular maintenance as per manufacture's recommendation
	Generators	• Exhaust vent of long length and emission to confirm to PCB norms.
	Heavy Load Vehicles	• Exhaust silencer, Regular maintenance as per manufacture schedule
Noise	Crushers	• Siting as per guideline, "Construction and Labour Camps"
	Generators	• All generators should have mandatorily acoustic enclosures and confirms to PCB norms.

Concern	Causes	Measures
Oil Spills	Storage and Handling	• Good practice, guideline, "Waste Management and Debris Disposal"
Residual waste	Dust Collector and Pits	• Guideline , "Waste Management and Debris Disposal"
Concrete waste	Concrete-Mix plant	• Guideline, "Waste Management and Debris Disposal"
Bitumen and bitumen mix	Hot-mix Plant	• Guideline, "Waste Management and Debris Disposal"
Stone chips	Crushers	• Guideline, "Waste Management and Debris Disposal"
Safety	Trajectory of Equipments	• No worker shall be present in the vicinity of the equipments
	Movable Parts of Equipments	• Caution Sign, awareness among workers
	Plant Area / Site	• Caution Sign, Safety Equipments
	Accidents / Health	•First Aid Box, Periodic Medical Checkup Break down of
	Break down of vehicles	• Arrangement for towing and bringing it to the workshop

During site clearance, all cut and grubbed materials shall be kept at a secured location so that it does not raise any safety concerns. During excavation, water sprinkling shall be done to minimize dust generation. Frequent water sprinkling shall be done on the haul roads to minimize dust generation. In case of loose soils, compaction shall be done prior to water sprinkling. Cautionary and informatory sign shall be provided at all locations specifying the type of operation in progress. The contractor must ensure that there is minimum generation of dust and waste while unloading the materials from trucks. The construction waste generated shall be disposed as per Guideline on, "Waste Management and Debris Disposal". The equipments, which are required to move forward and backward, shall be equipped with alarm for backward movement. It shall be ensure that the workers shall remain away from the working areas at such times. Also, equipments at construction camp should be barricaded and kept away from residential quarters of workers.

The Engineer shall carry out periodic inspections to ensure that all the pollution control systems are appropriately installed and comply with existing emission and noise norms.

Safety Measures During Bitumen Construction Work…

- The Contractor shall ensure that bitumen storing, handling as well as mixing shall be done at hot-mix plant or designated areas[1] to prevent contamination of soil and ground water.
- Skilled labour shall be used while hand placing the pre-mixed bitumen material. The hand placing of pre-mixed bituminous material shall be done only in following circumstances:
  - For laying profile corrective courses of irregular shape and varying thickness
  - In confined spaces where it is impracticable for a paver to operate and
  - For filling potholes
- The Contractor shall provide safety equipments i.e. gumboots and gloves to the workers while handling bitumen.
- While applying Tack Coat, spraying of bitumen shall be done in the wind direction. The labour shall wear jacket while spraying the bitumen.
- All the bituminous work shall be done as per IRC's Manual for Construction and Supervision of Bituminous Works.

5. POST-CONSTRUCTION STAGE

The Engineer shall ensure that all the haul roads are restored to their original state. Incase any inner village road is damaged while transporting the procured material; the contractor shall restore the road to its original condition. The Engineer must ensure that the decommissioning of plant shall be done in environmentally sound fashion and the area to bring its original state.

Designated area refers to paved surfaces and barren parcels of land, with adequate drainage and disposal system. It must be ensure that these are away from agriculture land, water body and other sensitive areas.

ESGP-12: LABOUR AND WORKER'S HEALTH AND SAFETY

1. INTRODUCTION

The safety and health concerns of the workers and the community are impacted due to the hazards created during the construction of road. **Box: 1** gives the safety concerns during construction. This Guideline describes the hazards and measures that need to be taken to mitigate the impacts.

2. PROJECT PLANNING AND DESIGN STAGE

To address health and safety concerns, the DPR shall contain selection criteria for setting up:

- Construction Camps (as per guideline);
- Borrow Areas (as per guideline); and
- In case of opening new quarry areas (as per guideline).

To address the safety concerns to road user during operational phase, the DPR shall contain the following:

- Selection and location of regulatory as well as informatory signs as per IRC: 67-2001, depending upon the geometry of the road.
-

Box 1: Safety Concerns during Construction

Community due to:

- Improper scheduling of construction activities especially ne
- Parking of equipments and vehicles at the end of the day li during night hours;
- Transportation of uncovered loose material or spillage of users and surrounding settlements.

Workers due to:

- Improper handling of materials like bitumen, oil and oth cause safety concerns to the workers;
- Lack of safety measures such as alarm, awareness and saf with or around heavy machinery / equipments.

Public due to:

- Unhygienic conditions due to water logging (improper drainage of waste water), either by improper decommissioning of Construction Camps and parking lots, or improper disposal of construction wastes, leading to the breeding of vectors that are likely to impact the health of the general public
- Interaction between workers and host community is likely to increase the risk of spread of communicable diseases.

Workers due to:

- Low quality drinking water as well as inappropriate storage of drinking water likely to cause water borne diseases among workers.
- Absence of proper sanitary facility likely to act as a breeding ground for vectors raising health concerns among workers.

PRE-CONSTRUCTION STAGE

In order to incorporate public health and safety concerns, the Engineer and the Contractor shall disseminate the following information to the community:

- Location of construction camps, borrow areas and new quarry areas;

- Extent of work;
- Time of construction;
- Diversions, if any;
- Precaution measures in sensitive areas;
- Involvement of local labours in the road construction;
- Health issues - water stagnation, exposure to dust, communicable disease; and
- Mechanism for grievances.

The information dissemination could be through the local newspaper, billboards, panchayats meetings, etc.

The Contractor must educate the workers to undertake the health and safety precautions. The contractor shall educate the workers regarding:

- Awareness on HIV/AIDS awareness and usage of safety measures such as condoms;
- Awareness on hygienic sanitary practices;
- Personal safety measures and location of safety devices;
- Interaction with the host community;
- Protection of environment with respect to:
- Trampling of vegetation and cutting of trees for cooking;
- Restriction of activities in forest areas and also on hunting;
- Water bodies protection;
- Storage and handling of materials;
- Disposal of construction waste.

3. CONSTRUCTION STAGE

During the progress of work, following are the safety requirements that need to be undertaken by the contractor at the construction site:

- Personal Protective Equipments (PPE) for the workers. **Table 12-1** gives the safety gear to be used by the workers during each of the construction activities.
- All measures as per bidding document shall be strictly followed.
- Additional provisions need to be undertaken for safety at site:
- Adequate lighting arrangement;
- Adequate drainage system to avoid any stagnation of water;
- Lined surface with slope 1:40 (V:H) and provision of lined pit at the bottom, at the storage and handling area of bitumen and oil, as well as at the location of generator (grease trap); and
- Facilities for administering first aid.

FIRST AID FACILITIES

- First Aid Kit, distinctly marked with Red Cross on white back ground and shall contain minimum of following:
  - 6 small-sterilized dressings
  - 3 medium and large sterilized dressings
  - 1 (30 ml.) bottles containing 2 % alcoholic solution of iodine
  - 1(30 ml) bottle containing salvolatile
  - 1 snakebite lancet
  - 1 pair sterilized scissors
  - 1 copy of first-aid leaflet issued by the Director General, Factory Service & Labour Institute, Government of India
  - 100 tablets of aspirin
  - Ointment for burns
  - A suitable surgical antiseptic solution
- Adequate arrangement shall be made for immediate recoupment of the equipments, whenever necessary.
- A trained personnel incharge of first aid treatment to be readily available during working hours at construction site
- Suitable transport to the nearest approachable hospital should be made available.
- Tetanus injection must be made compulsory for all workers every 6 months.

Table 12-1: Worker Safety Measures

Sl. no.	Activity	Safety Requirement
1.	Setting out and levelling	• Luminous jackets; • Helmets; • Boots for protection against insect bite; and Dust Mask
2.	Tree cutting	• Helmet Boots • Luminous safety jackets
3	Reinforced yard/ carpentry/ reinforcement cutting/ bending work.	• Hand gloves
4.	Shuttering work	• Goggles Hand gloves
5.	Plant and Machinery	• Hand gloves • Boots • Helmets • Dust Mask
6.	Material handling	• Hand gloves • Dust mask
7.	Batching plant	• Goggles • Hand gloves • Dust mask
8.	Weeding	• Goggles
9.	Binding reinforcement	• Safety belt • Boots
10.	Manual concrete laying	• Gum boots • Hand gloves • Helmet
11.	Piling	• Helmet • Hand gloves, gumboots.

The following measures need to be adopted by the contractor to address public safety concerns:

- The Contractor shall schedule the construction activities taking into consideration factors such as:
- Sowing of crops;
- Harvesting;
- Local hindrances such as festivals etc.; and
- Availability of labour during particular periods.
- All the cautionary signs as per IRC: 67-2001 and traffic control devices (such as barricades, etc) shall be placed as soon as construction activity get started and shall remain in place till the activities get completed.
- Following case specific measures need to be followed during the progress of the activity:
- In case of blasting, the Contractor must follow The Explosives Rules, 1983.
- In case of construction activity adjoining the water bodies, measures shall be taken as per measures suggested in Guideline on "Water Body".
- If construction of road is within the settlement, the contractor must ensure that there shall not be any unauthorized parking as well as storage of material, adjacent to road.
- Approved chemicals should be sprayed to prevent breeding of mosquitoes and other disease-causing organisms, at all the water logging areas

The Engineer shall carry out periodic inspections in order to ensure that all the measures are being undertaken as per the guideline.

4. POST-CONSTRUCTION STAGE

During this stage a major concern is on road user safety. Following are the measures that need to be undertaken by the Engineer to ensure safer roads:

- Inspection and maintenance of installed regulatory and informatory signs.
- Ensure that the location of signage does not obstruct the visibility
- In case of hill roads, maintenance of parapet wall as well as of overtaking zones.

The Engineer – In charge must ensure that during the maintenance operation of road, road materials are stored at a location such that they shall not create any risk to road users.
The construction site shall be cleaned of all debris, scrap materials and machinery on completion of construction for the safety of public and road users, as per the measures given in Guideline on "Construction and labour Camp" and "Waste Management and Debris Disposal."

ESGP-13: CULTURAL PROPERTIES

1. INTRODUCTION

The cultural properties located close to the road are likely to be impacted by the road construction. Most of the properties are avoided in general during finalization of alignment. This Guideline discusses the mitigation measures for cultural properties.

2. PROJECT PLANNING AND DESIGN STAGE

Measures for mitigation of impacts on cultural properties during project preparation shall be as per the following steps:

- Identification of locally significant cultural properties should be done;
- Assessment of likely impacts on each cultural property due to project implementation;
- The extent of impact on the identified culture property should be assessed and possible measures for avoidance should be devised based on the site investigation. Incase impact is not avoidable, identification of alternative routes or possibility of relocation of the culture property shall be assessed in consultation with the local public, based on the economic feasibility.

In case of relocation, relocated site should be suggested by the local people and the size of relocated structure should at least be equal to the original structure. A written consent letter is to be obtained from the community regarding the relocation site of the cultural property in the form of resolution on the letter pad of the sarpanch/gram panchayat or with the signatures of community members.

A detailed design for the enhancement structure and its site plan along with the necessary BoQ shall be prepared by the contractor and it must be approved by the Engineer. The relocation and other avoidance measures should be carried out before to start the road work.

Information to be collected…

- Location
- Direction (North/ South/East/West) With Respect to Road
- Distance of the structure from existing centerline of the road
- Type of Property eg: temple/mosque/shrine/dargah etc
- Plan of the structure
- Importance of the structure – historical/social/archeological
- Ownership of the property
- Probable loss to the property
- Specific periods/durations in which large congregations as festivals/mela take place causing hindrance to vehicular movement
- Choice of community, issue of relocation

3. CONSTRUCTION STAGE

Major impacts on the properties during this stage are mainly due to movement of construction machinery as well as due to construction activity in the vicinity of the cultural property. Following are precautionary measures that need to be undertaken by the contractor while working near these structures:

- Restrict movement of heavy machinery near the structure
- Avoid disposal or tipping of earth near the structure
- Access to these properties shall be kept clear from dirt and grit

During earth excavation, if any property is unearthed and seems to be culturally significant or likely to have archeological significance, the same shall be intimated to the Engineer. Work shall be suspended until further orders from Engineer. The State Archeological Department shall be intimated of the chance find and the Engineer shall carry out a joint inspection with the department. Actions as appropriate shall be intimated to the Contractor along with the probable date for resuming the work.

The Engineer must ensure that the contractor implements the precautionary measures as suggested. Also,

the Engineer must conduct monitoring for the cultural property.

ESGP-14: TREE CUTTING AND AFFORESTATION

This Guideline discusses the issue of tree cutting and afforestation. Loss of trees creates adverse environmental impacts. In order to mitigate there impacts, suitable measures have been suggested as part of this Guideline. These measures have been given for each of the stages of the road construction activities.

1. PROJECT PLANNING AND DESIGN STAGE

During alignment finalization, due consideration shall be given to minimise the loss of existing tree cover, encroachment of forest areas / protected areas etc as specified in guideline on**,** "Site preparation". Tree felling, if unavoidable, shall be done only after compensatory plantation of at least three saplings for every tree cut is done.

The plantation/afforestation would be carried out by the forest department. It should be ensured that plantation is carried out only in areas where water can be made available during dry seasons and the plant can be protected during the initial stages of their growth. The species shall be identified giving due importance to local flora (suggested in **Table 14-1**). It is recommended to plant mixed species in case of both avenue or cluster plantation.

The plantation strategy shall suggest the planting of fruit bearing trees and other suitable trees. Development of cluster plantations will be encouraged in the community lands, at locations desired by the community. The choice of species will be based on the preferences of the community. The Engineer shall oversee the plantation to check the following:

- Whether trees are obstructing live of right at junctions;
- Whether trees are at the inside of the junctions;
- Whether trees are within 5 mts of the proposed centerline.

2. POST-CONSTRUCTION STAGE

The maintenance of the saplings (including activities much as weeding, watering, planting of replacement saplings, etc application of manure etc) shall be the responsibility of the forest department. The Engineer shall ensure the following:

- Shoulder of roads to be kept clear of weeds/undesirable undergrowth; and
- Branches of trees do not obstruct clear view of the informatory and cautions signs.

Table 14-1: Endemic Species of Gujarat

Sl.no	Tree Species Endemic species)	Sl.no	Tree Species Endemic species)
1	*Tectonagrandis*	9	*Brideliasquamosa*
2	*Anogeissuspendula*	10	*Emblicaofficinallis*
3	*Boswelliaserratta*	11	*Buteamonosperma*
4	*Acacia nilotica*	12	*Diospyrosmelanoxylon*
5	*Euphorbia caducifolia*	13	*Anogeissuslatifoia*
6	*Flacourtiaindica*	14	*Lanneacoromandelica*
7	*Helicteresisora*	15	*Sterculiaurens*
8	*Holarrhenaantidysentrica*	16	*Mitragynaparviflora*

ESGP-15: FORESTS AND OTHER NATURAL HABITATS

1. INTRODUCTION

This guideline envisages measures to be undertaken during blacktopping / widening of road sections passing through natural habitats. These measures shall be undertaken in addition to the measures laid down in the other Guidelines.

Natural Habitats means…
• National Park
• Reserve Forest
• Sanctuaries
• Notified Wetlands
• Fisheries and Aquatic Habitats

Conservation of natural habitats is essential for long-term sustainable development. A precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development has been adopted for the project.

2. PROJECT PLANNING AND DESIGN

To minimize the adverse impact on the ecology of the natural habitats, selection of alignment should be as per guideline. An officer of at least the rank of a forest ranger shall be deputed for detailed inventory of ecological features along the road. The nature and type of impact on natural habitats due to road construction shall be identified. Magnitude of the impact to the extent feasible on the ecological features shall also be assessed.

Ecological Features…	Adverse Impacts…
• Area of natural habitat; • Type and number of endangered species of flora and fauna; • Stream and water bodies; • Breeding ground and seasons; • Migration season of bird species; and • Animal crossing.	• Diversion of forest land; • Cutting of trees; • Trampling of vegetation; • Contamination of water due to the usage of water from the source within the natural habitat; • Loss of breeding grounds; and • Interruption to animal crossings during the construction.

Impacts identified on the natural habitats shall be minimized to the extent required. Minimization shall be through precautionary measures or through appropriate mitigation measures. Following are the measures should be undertaken along the road passing through natural habitats:

- Constricting the road width to 6.0 m and embankment height to 0.5 m to minimize the extent of diversion of forest land and cutting of trees
- Drainage Structures shall be designed strictly in accordance with guideline on "Drainage".
- Rumble strips shall be provided at every kilometer along the length of the natural habitat and invariably at the start and end of the natural habitat
- Signage (viz. speed limit, animal crossing, switch of headlight etc) shall be provided as per IRC: 67-2001 Code of Practice for road sign (first revision)

In addition to the above measures, specific impacts identified on site shall be mitigated as per the recommendation of the forest department / officer in charge of the identified natural habitat.
In case proposed alignment falls within the catchments of a water body or a stream, a flush causeway shall be constructed without impacting the drainage system. The length of the causeway shall be as per the existing water spread. The causeway shall be strictly in compliance with IRC:SP-20:2002. In no circumstances a water body within the natural habitat shall be cut across or filled for the purpose of laying the road.

3. PRE-CONSTRUCTION STAGE

No Construction Camps, Stockyards, Concrete Batching or Hot Mix Plants shall be located within the natural habitat or within 500m from its boundary.
Contractor in consultation with forest ranger or any other concerned authority shall prepare a schedule of construction within the natural habitat. Due consideration shall be given to the time of migration, time of crossing, breeding habits and any other special phenomena taking place in the area for the concerned flora or fauna.

4. CONSTRUCTION STAGE

Procurement of any kind of construction material (as quarry or borrow material) from within the natural habitat shall be strictly prohibited. No water resources within the natural habitat shall be tapped for road construction. Use of mechanized equipment shall be kept minimum within the natural habitat. Contractor must ensure that there will be no parking of vehicles machine and equipment within the natural habitat. Disposal of construction waste within the natural habitat shall be strictly prohibited and as far as possible reuse shall be undertaken as per **Table 8-1** type of waste of guideline, "Waste Management and Debris Disposal".

5. POST CONSTRUCTION STAGE

The road passing through the natural habitat shall be declared as a silence zone. Compensatory tree plantation within the available Right of Way shall be done in accordance with guideline, on "Tree Cutting and Afforestation". The Engineer must ensure maintenance of drainage structure shall be undertaken as per guideline, "Drainage"

ESGP-16: AIR AND NOISE POLLUTION

1. INTRODUCTION

This guideline deals with the mitigation of adverse impacts due to air and noise pollution. Both of these have been discussed in the subsequent sections respectively.

2. AIR POLLUTION

The types of air pollution due to construction activities might include generation of dust, emission from hot mix plants and batching plants, odour from construction labour camps, emission from construction machinery/vehicles etc. The measures for mitigation of impacts from each of these are given below.

Generation of Dust

- All vehicles delivering materials to the site shall be covered to avoid spillage of materials.
- The Contractor shall take every precaution to reduce the level of dust emission from the hot mix plants and the batching plants up to the satisfaction of the Engineer in accordance with the relevant emission norms.
- All existing highways and roads used by vehicles of the contractor, or any of his sub-contractor or supplies of materials or plant and similarly roads which are part of the works shall be kept clean and clear of all dust/mud or other extraneous materials dropped by such vehicles or their tyres.
- Spillage shall be cleared immediately by manual sweeping and removal of debris or if so directed by the Engineer, by mechanical sweeping and clearing equipment, and all dust, mud and other debris shall be removed completely. Additionally, if so directed by the Engineer, the road surfaces shall be hosed or watered using necessary equipments.
- Plants, machinery and equipment shall be so handled (including dismantling) so as to minimize generation dust.
- All earthwork shall be protected in a manner acceptable to the Engineer to minimise generation of dust.
- The hot mix plant is sited at least 1000m from the nearest habitation. The hot mix plants shall be fitted with dust extraction units in order that the exhausts comply with the requirements of the relevant current emission control legislation.
- Generation of dust should be suppressed during unloading of construction material and also during storage of the construction material.

Emission from Hot-Mix Plants and Batching Plants

- Hot mix plants and batching plants shall be located sufficiently away from habitation, agricultural operations or industrial establishments. Where possible such plants will be located at least 1000m away from the nearest habitation.
- The exhaust gases shall comply with the requirements of the relevant current emission control legislation. All operations at plants shall be undertaken in accordance with all current rules and regulations protecting the environment.

Odour from Construction Labour camps

- Construction labourers camp shall be located at least 500 m away from the nearest habitation.
- The waste disposal and sewerage system for the camp shall be properly designed, built and operated so that no odour is generated. Compliance with the Factory Act, the construction workers (regulation of employment and conditions of service) Act, 1996 and all other relevant legislation shall be strictly adhered to.

Emission from Construction Vehicles, Equipment and Machinery

- The discharge standards promulgated under the Environment Protection Act, 1986 shall be strictly adhered to. All vehicles, equipment and machinery used for construction shall conform to the relevant Indian Standard (IS) norms.
- All vehicles, equipment and machinery used for construction shall be regularly maintained to ensure that pollution emission levels\comply with the relevant requirements of SPCB & the Engineer.

Pollution from Crusher

- All crushers used in construction shall confirm to relevant dust emissions control as legislated. Clearance for siting shall be obtained from the SPCB. Alternatively, only crushers already licensed by the SPCB shall be used.
- Dust screening vegetation will be planted on the edge of RoW for all existing roadside crushers.
- If crusher owned by contractor, the suspended particulate matter contribution value at a distance of 40m from a controlled isolated as well as from a unit located in a cluster should be less than 600 ug/Nm^3. The monitoring is to be conducted at least twice a month for all the 12 months in a year during the crushing operation for the project.

3. NOISE POLLUTION

Noise from Vehicles, Plants and Equipment

- The plants and equipment used in construction (including the aggregate crushing plant) shall strictly conform to the GoI noise standards.
- All vehicles and equipment used in construction shall be fitted with exhaust silences. During routine servicing operations, the effectiveness of exhaust silencers shall be checked and if found to be defective shall be replaced. Notwithstanding any other conditions of contract, noise level from any item of plant(s) must comply with the relevant legislation for levels of sound emission. Non-compliant plant shall be removed from site.
- Noise limits for construction equipment used in this project (measured at one meter from the edge of the equipment in free field) such as compactors, rollers, front loaders, concrete mixers, cranes (moveable), vibrators and saws shall not exceed 75 dB(A), as specified in the Environment (Protection) Rules, 1986.
- Maintenance of vehicles, equipment and machinery shall be regular and proper, to the satisfaction of the Engineer, to keep noise from these at a minimum.
- In construction sites within 150 m of the nearest habitation, noisy construction work such as crushing, concrete mixing and batching, mechanical compaction, etc., will be stopped between 2200 hours to 0600 hours. In silence zone (areas up to 100 m around such premises as hospitals, educational institutional and courts) no hot-mix, batching or aggregate crushing plant will be allowed. No construction shall take place within 100m around hospitals between 21.00 hours to 06.00 hours.
- Workers in vicinity of strong noise, and workers working with or in crushing, compaction, batching or concrete mixing operations shall wear earplugs.

Noise from Blasting (or) Pre splitting Operations

- Blasting shall be carried out only with permission of the Engineer. All the statutory laws, regulators, rules, etc., pertaining to acquisition, transport, storage, handling and use of explosives shall be strictly followed.

Blasting shall be carried out during fixed hours (preferably during mid-day), as permitted by the Engineer. The timing should be made known to all the people within 500m (200m for pre-splitting) from the blasting site in all directions. People, except those who actually light the fuse shall be excluded from the area of 200m (50m for pre-splitting) from the blasting site in all directions at least 10m minutes before the blasting.

ESGP 17: R&R PLANNING AND RAP FRAMEWORK

Brief Description of Activity

This code relates to identification and verification of project affected people, assets and CPRs and a framework for resettlement and rehabilitation of affected people. the entitlement matrix as per the Gujarat State Highway Project II (GSHP II) guidelines is also provided for better understanding of the type of losses and the corresponding compensation that needs to be paid to the PAFs.

Environmental Health Safety & Social (EHS&S) Issues

EHS&S issues that need to be addressed while undertaking R&R measures include the following:

- Inadequate/improper identification of entitled people
- Inadequate or nonpayment of entitlements
- Forceful evacuation of RoW

The Entitlement matrix

The following entitlement matrix is only for the non-titleholder category. For detailed matrix covering titleholders as well the link provided at the end may be visit Policy, Legal and Administrative Framework.
The basic principles that guide this Social Management Framework (SMF) are: Avoidance socially sensitive areas while planning project activities; Minimisation of impacts when project activities occur in socially sensitive areas; Mitigation of any unavoidable negative impacts arising out of its projects; Optimization of land requirement; and Greater transparency through involvement of community and other stake holders.
The policy frame work and entitlements for the project are based on the national law The Right to Fair Compensation and Transference in Land Acquisition, Rehabilitation and Resettlement Act, 2013, (LARR 2013).

A. Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCT in LARR), 2013.

The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (RFCT in LARR Act - 2013) has been effective from January 1, 2014 after receiving the assent of the President of Republic of India. This Act extends to the whole of India except the state of Jammu and Kashmir. The Act replaced the Land Acquisition Act, 1894. 70. The aims and objectives of the Act include: (i) to ensure, in consultation with institutions of local self-government and Gram Sabhas established under the constitution of India, a humane, participative, informed and transparent process for land acquisition for industrialization, development of essential infrastructural facilities and urbanization with the least disturbance to the owners of the land and other affected families; (ii) provide just and fair compensation to the affected families whose land has been acquired or proposed to be acquired or are affected by such acquisition; (iii) make adequate provisions for such affected persons for their rehabilitation and resettlement; (iv) ensure that the cumulative outcome of compulsory acquisition should be that affected persons become partners in development leading to an improvement in their post acquisition social and economic status and for matters connected therewith or incidental thereto.

Section 27 of the Act defines the method by which market value of the land shall be computed under the proposed law. Schedule I outlines the proposed minimum compensation based on a multiple of market value. Schedule II through VI outline the resettlement and rehabilitation entitlements to land owners and livelihood losers, which shall be in addition to the minimum compensation per Schedule I.

The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Amendment) Second Ordinance, 2015: With an intention to overcome the procedural difficulties in land acquisition for important national projects, President of India has issued an amendment ordinance on 30th May 2015. Three main features of the ordinance among others are as following:

I. The Chapter II and III of the RFCT in LARR Act - 2013 regarding determination of social impact assessment and public purpose and special provision to safeguard food security shall not apply to the

project such as (a) vital to national security or defence of India and every part thereof, including preparation for defence or defence production; (b) rural infrastructure including electrification; (c) affordable housing and housing for the poor people; (d) industrial corridors ; and (e) 24 infrastructure and social infrastructure projects including projects under public private partnership where the ownership of land continues to vest with the Government.

II. The five year period set by the principal Act in Section 24 under sub-section (2), for lapse of 1894 Act shall exclude the cases where acquisition process is held up on account of any stay or injunction issued by any court or the period specified in the award of a Tribunal for taking possession.

III. The five year period set by the principal Act for any land acquired and unused is now will be a period specified for the setting up of any project or five years, whichever is later.

ENTITLEMENTS, ASSISTANCE AND BENEFITS

A. Introduction

The project will have three types of displaced persons i.e., (i) persons with formal legal rights to land lost in its entirety or in part; (ii) persons who lost the land they occupy in its entirety or in part who have no formal legal rights to such land, but who have claims to such lands that are recognized or recognizable under national laws; and (iii) persons who lost the land they occupy in its entirety or in part who have neither formal legal rights nor recognized or recognizable claims to such land. The involuntary resettlement requirements apply to all three types of displaced persons and the RP describes provision for all type of DPs and accordingly formulated the entitlement matrix.

B. Cut-off-Date for Entitlement

- In the cases of land acquisition affecting land holders the cut-off date would be the last date of publishing Notification for land acquisition u/s 11 (1) of RTFCTLARR Act, 2013 in the local newspaper. Those without any valid pass, the cut-off date would be the start date of the Census and Socio-Economic survey which is 4th & 5th July 2017. DPs who settle in the affected areas after the cut-off date will not be eligible for compensation. The cut-off date for non-titleholders will be officially declared by the EA along with the disclosure of RP and notified in the project area through newspaper and other methods to ensure people who are illiterate are made aware. They, however, will be given sufficient advance notice, requested to vacate premises and dismantle affected structures prior to project implementation. Their dismantled structures materials will not be confiscated and they will not pay any fine or suffer any sanction.

C. Project Entitlement

In accordance with the R&R measures outlined in the previous chapter, all displaced households and persons will be entitled to a combination of compensation packages and resettlement assistance depending on the nature of ownership rights on lost assets and scope of the impacts including socio-economic vulnerability of the displaced persons and measures to support livelihood restoration if livelihood impacts are envisaged. The displaced persons will be entitled to the following five types of compensation and assistance packages:

a) Compensation for the loss of land, crops/ trees at their replacement cost;
b) Compensation for structures (residential/ commercial) and other immovable assets at their replacement cost;
c) Assistance in lieu of the loss of business/ wage income and income restoration assistance;
d) Assistance for shifting and provision for the relocation site (if required), and
e) Rebuilding and/ or restoration of community resources/facilities.

Entitlement Matrix

Code	Category of PAP	Type of Impact	Unit of Entitlement	Entitlement	Remarks
1A Code	Title holder – Agriculture Land / Non-agriculture land / Homestead Land and assets	Loss of land and assets	Land owner(s)	1. Cash compensation at "actual market values". 2. Option for compensation of residual unviable land parcels[10]. 3. Registration and stamp duty charges (currently applicable) for the land acquired. 4. All fees, taxes and other charges, as applicable under the relevant laws, shall be borne by the project. 5. Replacement of water-yielding bores shall be done subject to availability of water in the remaining landholding or anywhere near the beneficiary land in consultation with the affected community. If water is not available, replacement cost of the bore-well at rates decided on case-by- case (without depreciation) based on Gujarat Water Supply and Sewerage Board (GWSSB) Schedule of Rates. 6. Financial assistance for replacement of Cattle shed: One-time financial assistance of Rs.15000 for displaced households. 7. In case land owners become landless or marginal, financial assistance equivalent to 12 months of minimum agricultural wages of Gujarat (calculated for 25 days in a month), as subsistence allowance. 8. Ex-gratia assistance of Rs.20000 for land owners losing upto 500 sq.m of land in lieu of all other benefits. 9. In case of severance of agricultural land, an additional grant of 10 percent of the amount paid for land acquisition. 10. Advance notice of 4 months to harvest standing crops. 11. Crop/tree damage compensation as assessed by the concerned Government Departments. 12. Right to salvage materials from affected land or structure.	1. Compensation shall be determined as per LA Act, 1894. Difference, if any, between the compensation award as per the LA Act, 1894 and the market value, shall be paid by the project in the form of assistance. The updated Guideline / Jantri values will be adopted for determination of actual market value for the specific land parcel to be acquired. 2. Compensation for Timber Trees shall be decided by Forest Department, Gujarat. Compensation for perennial trees and standing crops shall be decided by Agriculture and Cooperation Department, Government of Gujarat. 3. The rates for determination of assistances and compensation shall be revised annually during the project implementation period. The revision shall be effected from the 1st day of April every year. The real value of monetary compensation and assistance shall be assessed as follows: Compensation for land shall be based on updated Jantri value; (ii) Compensation for structures/assets shall be based on updated Schedule of Rates; and (iii) Allowances and assistances shall be based on Consumer Price Index (CPI), updated 1st of April every year. In case, if Jantri Value or Schedule of Rates is not updated by the 1st of April, compensation and assistance shall be provided based on existing rates. Differences if any, between the existing rates and the updated rates will be provided by the project after publication of the updated rates.

Code	Category of PAP	Type of Impact	Unit of Entitlement	Entitlement	Remarks
1B	Titleholder – Residential Structure	Loss of structure	Land / structure owner(s)	1. Compensation at replacement cost determined on the basis of R&BD Schedule of Rates as on date without depreciation. 2. Affected structures of size less than 20 sq.m., which are fully affected or if rendered unviable, shall have option to compensation equivalent to cost of provision of residential structure of size 20 sq.m. 3. Shifting Allowance: One-time financial assistance of Rs. 10,000. 4. Transitional allowance of Rs.10,000 towards temporary arrangements and rentals during the transition period. 5. Right to salvage materials from affected land or structure.	1. Cost equivalent to the area mentioned in Para-2 shall be estimated based on R&BD Schedule of Rates without depreciation.
1C Code	Titleholder-Commercial/ industrial Structure	Loss of structure	Land / structure owner(s)	1. Compensation at replacement cost determined on the basis of R&BD Schedule of Rates as on date without depreciation. 2. Affected structures of size less than 10 sq.m which are fully affected, or rendered unviable, shall have option to compensation equivalent to cost of provision of commercial structure, of size 10 sq.m. 3. Shifting Allowance: One-time financial assistance of Rs. 10,000. 4. Transitional allowance of Rs.10,000 towards temporary arrangements and rentals during the transition period. 5. Right to salvage materials from affected land or structure.	1. Cost equivalent to the area mentioned in Para-2 shall be estimated based on R&BD Schedule of Rates without depreciation.
1D	Titleholder-Residential-cum-commercial/ industrial structure	Loss of structure	Land / structure owner(s)	1. The entitlement provisions that shall be higher among 1B and 1C shall be provided.	

Code	Category of PAP	Type of Impact	Unit of Entitlement	Entitlement	Remarks
2A Code	Tenants-Residential / commercial / industrial Structure	Loss of structure	Individual / Household	1. For tenants (residential category) requiring relocation, rental allowance for 6 months at the rate of Rs.1000/month in rural areas and Rs.1500/month in urban areas, if the structure is fully affected or the unaffected part of the structure is unviable. 2. For tenants (commercial/industria l category), requiring relocation, rental allowance for 6 months at the rate of Rs.1500/month in rural areas and Rs.2000/month in urban areas, if the structure is fully affected or the unaffected part of the structure is unviable. 3. Shifting Allowance: One-time financial assistance of Rs. 5000. 4. For impacts to structures constructed by the EP, compensation at replacement cost determined on the basis of R&BD Schedule of Rates as on date without depreciation. 5. Right to salvage materials from affected land or structure.	
3A	Squatter-Residential / Commercial / Residential-cum-commercial	Loss of structure	Individual / Household	1. Compensation for impacted structures at replacement cost determined on the basis of R&BD Schedule of Rates as on date without depreciation (or) 2. (i) Costs towards land and house construction (of area as applicable to EWS housing scheme in Gujarat), for residential squatters (ii) Costs towards land and shop construction (of 100 sq ft area) for commercial squatters, whichever is higher among 3A.1 and 3A.2. 3. Shifting Allowance: One-time financial assistance of Rs. 5000. 4. Training Assistance for Income Generation: Training in opted areas to any one member of the household losing livelihood. Training cost upto a maximum of Rs. 15000 shall be borne by the project implementation authority.	1. Training programmes will be offered in coordination with any of the following agencies; o Education Department, Govt. of Gujarat (self employment programmes for women). o Tribal Development Department, Govt. of Gujarat (Vanbandhu Kalyan Yojana). o Department of Social Justice and Empowerment; Scheduled Caste Economic Development Corporation (Economic Upliftment Schemes for Scheduled Castes and women). o Commissionerate of Rural Development, Govt. of Gujarat. 2. PIU will carry out periodic review to assess the efficacy of training programmes and suggest corrective measures including need for inter-departmental coordination, as required.
3B	Encroachers	Loss of Assets	Household	1. Ex-gratia for impacted assets at replacement cost. 2. Encroachers shall be given advance notice of 4 months in which to remove assets (except trees), and harvest standing crops, if any	

Code	Category of PAP	Type of Impact	Unit of Entitlement	Entitlement	Remarks
4A Code	Additional support to vulnerable groups		Individual / Household	1. Training Assistance for Income Generation: Training in opted areas to any one member of the household losing livelihood. Training cost upto a maximum of Rs. 15000 shall be borne by the project implementation authority (or) 2. Lump sum amount of Rs.15000 as grant to those who cannot be provided with alternative livelihood sources.	1. Training programmes will be offered in coordination with any of the following agencies; o Education Department, Govt. of Gujarat (self employment programmes for women). Tribal Development Department, Govt. of Gujarat (Vanbandhu Kalyan Yojana). o Department of Social Justice and Empowerment; Scheduled Caste Economic Development Corporation (Economic Upliftment Schemes for Scheduled Castes and women). o Commissionerate of Rural Development, Govt. of Gujarat o 2. PIU will carry out periodic review to assess the efficacy of training programmes and suggest corrective measures including need for inter-departmental coordination, as required.
5A	Employees in shops, agricultural laborers, sharecroppers	Loss of livelihood	Individual	1. Training Assistance for Income Generation: Training in opted areas to any one member of the household losing livelihood. Training cost upto a maximum of Rs. 15000 shall be borne by the project implementation authority. (or) 2. Lump sum Financial assistance equivalent to 6 months of minimum agricultural wages of Gujarat (calculated for 25 days in a month), to those who cannot be provided with training on alternative livelihood opportunities.	1. Training program will be offered in coordination with any of the following agencies; o Education Department, Govt. of Gujarat (self employment program for women). o Tribal Development Department, Govt. of Gujarat (Vanbandhu Kalyan Yojana). o Department of Social Justice and Empowerment; Scheduled Caste Economic Development Corporation (Economic Upliftment Schemes for Scheduled Castes and women). o Commissionerate of Rural Development, Govt. of Gujarat. 2. PIU will carry out periodic review to assess the efficacy of training programmes and suggest corrective measures including need for inter-departmental coordination, as required.
6A Code	Community	Loss of	Community	1. Resources such as cultural properties and community assets	

Code	Category of PAP	Type of Impact	Unit of Entitlement	Entitlement	Remarks
	Assets	community assets		shall be conserved (by means of special protection, relocation, replacement, etc.) in consultation with the community. 2. Adequate safety measures, particularly for pedestrians and children, landscaping of community common areas, improved drainage, roadside rest areas, etc shall be provided in design of the highways.	
7A	Scheduled Tribes	Loss of land, structure or both	Household	1. Cash compensation at the actual market value based on the latest Jantri values. In the event of the latest Jantri values not being equivalent to market rates due to lack of evidence of recent land transactions, enhanced cash compensation for land equivalent to 1.5 times of latest Jantri value of affected tribal land parcel. 2. Entitled for assistance applicable for vulnerable groups. 3. Additional one-time financial assistance equivalent to 500 days minimum agricultural wages towards the loss of customary rights/usages of forest produce.	
8A	Disruption	Temporary Impact	Owner(s)	1. Compensation for temporary use of land or structures outside Right of Way for construction activities shall be made by the Contractor. The use of such land or structure, compensation for the temporary occupation/use of lands and restoration post completion of the occupation shall be through written agreement between land/structure owner and the contractor. 2. Temporary access would be provided, where necessary.	As laid down in Clause 111 on Precautions for safeguarding the environment, Technical Specifications in the Bid Document.
9A Code	Unforeseen impacts Category of PAP	Type of Impact	Unit of Entitlement	1. Any unforeseen impacts shall be Entitlement documented and mitigated in accordance with the principles and objectives of the Policy.	

TERMS AND DEFINITIONS

a) **Agricultural land** means land being used for the purpose of: (i) agriculture or horticulture; (ii) raising of crops, grass or garden produce; and (iii) land used by an agriculturist for the grazing of cattle, but does not include land used for cutting of wood only;

b) **Assistance** refers to the support provided to PAPs in the form of ex-gratia payments, loans, asset services, etc. in order to improve the standard of living and reduce the negative impacts of the project.

c) **Below poverty line or BPL Family** means below poverty line families as defined by the Planning Commission of India, from time to time, and those included in the State BPL list in force.

d) **Compensation** refers to the amount paid under Consent Award as part of The Land Acquisition Act, 2013. For private property, structures and other assets acquired for the project, it refers to the amount as given in the Entitlement Matrix for the project.

e) **Cutoff Date:** In the cases of land acquisition affecting land holders the cut-off date would be the last date of publishing Notification for land acquisition u/s 11 (1) of RTFCTLARR Act, 2013 in the local newspaper. Those without any valid pass, the cut-off date would be the start date of the Census and Socio-Economic survey.

f) **Encroachers** are those person/family, who transgresses into the public land (prior to the cut-off date), adjacent to his/her own land or other immovable assets and derives his/her additional source of shelter/livelihood.

g) **Family** includes a person, his or her spouse, minor children, minor brothers, and minor sisters, dependent on him or her for their livelihood.

h) **Government** refers to the Government of Gujarat.

i) **Land acquisition** means acquisition of land under the Land Acquisition Act, 2013, as amended from time to time.

j) **Marginal farmer** means a cultivator with an un-irrigated land holding up to one hectare or irrigated land holding up to one-half hectare;

k) **Non-Perennial Crop:** Any plant species, either grown naturally or through cultivation that lives for a season and perishes with harvesting of its yields has been considered as a non-perennial crop in the project. For example, paddy, sugarcane, groundnut, etc.

l) **Notification** means a notification published in the Gazette of India, or as the case may be, the Gazette of State and expression 'notify 'shall be construed accordingly;

m) **Perennial Crop:** Any plant species that live for years and yields its products after a certain age of maturity is a perennial crop. Generally trees, either grown naturally or by horticultural and yield fruits or timber have been considered as perennial crop in the project. For example, tamarind, coconut, mango, etc. are perennial crops.

n) **Project Affected Family (PAF)** means- (i) a family whose primary place of residence or other property or source of livelihood is adversely affected or involuntarily displaced by the acquisition of land for the project (ii) any tenure holder, tenant, lessee or owner of other property, who on account of acquisition of land in the affected area of otherwise, has been involuntarily displaced from such land or other property; (iii) any agricultural or non-agricultural labourer, landless person (not having homestead land or agricultural land) rural artisan, small trader or self-employed person; who has been residing or engaged in any trade, business, occupation or vocation in the affected area, and who has been deprived of earning his livelihood or alienated wholly or substantially from the main source of his trade, business, occupation or vocation because of the acquisition of land in the affected area or being involuntarily displaced for any other reason.

o) Project Affected Household (PAH): A social unit consisting of a family and/or non- family members living together, and is affected by the project adversely and/or positively.

p) Project Affected Persons (PAPs), any persons who have economic interests or residence within the project impact corridor and who may be adversely affected directly by the project. PAP include those losing commercial or residential structures in whole or part, those losing agricultural land or homestead land in whole or part, and those losing income sources as a result of project action. PAPs would be of two broad categories, 'PAPs with Major Impact' and 'PAPs with Minor Impact'.

q) **Major Impact (Fully):** those properties where the major part of the structure/land is affected and becomes untenable and the affected party is unable to live/do business in the unaffected portion of the property, OR, 25% or more portion of the property is affected.

r) **Minor Impact (Partial):** all other impacts other than major impact will be treated as minor impacts, OR, those properties where a part of the structure/land is acquired and the remaining portion is intact

and the affected party can continue to live/do business in the unaffected portion of the property.

s) **Replacement Cost** of the acquired assets and property is the amount required for the affected household to replace/reconstruct the lost assets through purchase in the open market. Replacement cost will be calculated at R&BD current Schedule of Rates without depreciation. Replacement cost shall be in line with the provisos of the Entitlement Matrix of the project.

t) **Small farmer** means a cultivator with an un-irrigated land holding upto two hectares or with an irrigated land holding upto one hectare, but more than the holding of a marginal farmer.

u) **Squatter** means a person/family that has settled on the public land without permission or has been occupying public building without authority prior to cut-off date and is depending for his or her shelter or livelihood and has no other source of shelter or livelihood.

v) **Tenants** are those persons having bonafide tenancy agreements, written or unwritten, with a private property owner with clear property titles, to occupy a structure or land for residence, business or other purposes.

w) **Vulnerable Persons:** persons who are physically challenged, widows, persons above sixty years of age, below-poverty line households and woman-headed household.

x) **Woman-Headed Household:** A household that is headed by a woman who is the major bread-earner of the household. This woman may be a widow, separated or deserted person.

References and Recommended further reading:

1. GSHP-II Resettlement Policy Frame Work

***2.* Land Acquisition, Rehabilitation and Resettlement Act (RFCT in LARR), 2013.**
http://WWW.R&B Dept, GoG.gov.in/files/Acts/R&R%20Policy_eng.pdf

ESGP 18: LOCAL TRAFFIC MANAGEMENT DURING CONSTRUCTION

Brief Description & Scope of Activity

This code relates to making arrangements for maintaining traffic movement along part of the existing carriageway under improvement, rehabilitation, up-gradation and or routine maintenance works or making arrangements for traffic movement along a temporary diversion.

Environmental Health Safety & Social (EHS&S) Issues

EHS&S issues that are anticipated during the activity include the following:

- Fugitive dust emission
- Traffic congestion and incessant traffic snarls
- Traffic induced high noise levels
- Pedestrians and public transport commuters exposed to hazardous conditions/safety risks
- Hazardous conditions for night time traffic movement

If traffic is diverted along newly constructed diversion roads, following additional issues will have to be addressed while selecting the alignment at design/ preparation phase:

- Surrounding land use such as residential area, industrial or commercial areas
- Presence of sensitive receptors such as schools, hospitals, educational institutes, religious sites, prayer halls etc.
- Duration of diversion road in operation and reinstatement of land after dismantling Safe pedestrian and commuter movement

ESGP 19 for prior information and disclosure to the public shall also be referred and construed along with this ESGP

Policy and Legal requirements, if any

There are no policies to be complied during execution of the activity. In an urban area, any change to traffic scheme has to be effected after consultation and approval from city traffic police department. In rural areas, the concerned R&B Dept, office shall be consulted for undertaking such diversions or change to normal traffic scheme. Besides, Clause 112 of MoRT&H specifications and IRC SP 55 2014 govern this activity.

Recommended Environmental Practice/ Management Measures

Traffic Management Plan: OPRC Contractor shall be responsible for analysing viable options for local traffic management and a final traffic management plan after having discussions with Traffic Police Department/ local PWD officials or other appropriate stakeholders such as Mandi Board and local community.

The plan shall be assessed from environmental perspective. The plan shall include methods and procedures to be adopted to control: fugitive dust emission, traffic congestion, traffic induced high noise levels, pedestrian & commuter movement, and night-time driving safety. The items that will be required to implement the plan shall be included in the bill of quantities of the intended work and budgeted.

Traffic Police/ R&B Dept, Approval: The Contractor as part of his work programme submission to Monitoring Consultant, R&B Dept, shall include final traffic management plan. Contractor shall develop the plan based on stakeholder consultations and intended work schedule. The environmental and safety issues referred earlier shall be included in the final plan and methodology for their management shall be presented in detail. Contractor's traffic management plan shall comply with minimum provisions of MoRT&H clause 112. The detailed traffic management plan after review by Monitoring Consultant, R&B Dept, shall be submitted to concerned Traffic Police department/ local PWD office, for review and approval. Only after receiving such approval, the work shall start.

Traffic along temporary diversion: In case the traffic needs to be diverted along a temporary diversion, the OPRC contractor will be responsible for: identifying such diversion route alignments; conducting stakeholder consultation; addressing environment, health and safety issues along diversion alignment; propose traffic management plan including recommendation for managing construction stage environmental issues; Plan shall be reviewed and approved by Monitoring Consultant, R&B Dept,. The plan shall meet the minimum provisions of Clause 112.3 of MoRT&H Specification.

Traffic Management Plan Implementation: During implementation, the road users shall be informed of traffic plan suitably by placing information/sign boards at appropriate locations as identified in the plan. In case of temporary diversion of traffic off the project area, the plan shall be communicated prior through advertisements in local newspapers and placing sign boards. The sign boards and other devices shall be maintained throughout construction stage or till such required time as per Clause 112.5 of MoRT&H.

Traffic safety and control: The provisions of Clause 112 of MoRT&H shall be included in the intended work scheduled by OPRC contractor. The contractor shall adhere to the provision of Clause 112 of MoRT&H Specification to ensure traffic safety and control in addition to the practices recommended by traffic police/ local PWD office in their approval letter.

Construction Equipments Movement: Whenever construction machinery, equipments and vehicles movement is expected to occur, the following practices shall be adopted to the extent possible:

- Planning the movement during non-peak hours or during clear traffic flow through the road.
- Slow moving equipments and machinery shall be escorted by at least three men at front, rear and side respectively to guide the traffic and driver & the Construction machinery.
- The escorting men shall wave red flags in day time or red lanterns in night to warn the traffic on the road about the movement.

Construction vehicles and lorries: The vehicles such as lorries, vans and other fast moving construction vehicles shall be maintained in good operational condition. Headlamps, turning indicators, parking rights, and other such accessories shall be maintained in operational condition. The drivers of the vehicle shall be trained for traffic safety rules, sober driving and need to maintain cool head at all times.

Vehicle movement if significant in numbers from or to construction site such as debris removal, construction material supply, Hot Mix/RMC delivery etc. shall be preferred during non-peak hours. During peak hours and night time, the vehicle movement shall be guided by red flag/red lantern holding helpers on the road to avoid traffic congestion, if needed.

The entire stretch where traffic is allowed on part of existing carriageway or through temporary diversion, a 7m wide strip (for a 2-lane traffic) shall be maintained free of hawkers, 3- wheeler/taxi or private vehicles parking and any other obstruction to free flow of traffic. In this regard the traffic police/local police help shall be sought.

Special provisions and arrangements shall be provided for public transport commuters in consultation with Public Transport Authorities and local Traffic Police/ Police. In a constricted carriageway, the commuter shall be provided with temporary bus bays and a safe walking strip of at least 0.5 m width off the road edge to avoid accidents. Shifting existing bus stations (stops) to nearest convenient points or providing speed breakers (humps) on either side of bus stops to aid commuters cross the road etc can be some of the measures that can be implemented.

Near residential, commercial and industrial areas where pedestrian movement could be in large numbers, provision for safe movement along constricted carriageway and access to areas/properties shall be planned and provided

References and Recommended further reading

Clause 112 of MoRT&H specifications for road and bridge works, 2013

ESGP 19: PRIOR INFORMATION AND DISCLOSURE TO THE PUBLIC

Brief Description of Activity

This code relates to informing the general public as well as PAPs in advance, about any activity related to road up gradation or maintenance to be undertaken by the contractor so as to minimise inconvenience that may be caused due to the activities to be undertaken

Environmental, Health and Safety (EHS&S) Issues

EHS&S issues that are addressed by prior information and disclosure include:

- Public inconvenience and nuisance
- Reduced damages to public and private property
- Disclosure about R&R activities
- Participation in resettlement planning

Policy and Legal requirements, if any

There is no legal requirement for any prior information or disclosure to local community about any activity under the OPR contract, except for undertaking R&R activities or blasting operations, if required. However, as a good practice and in long term interest of the project, the contractor should undertake the following recommended measures.

Recommended Measures

Any intervention under the OPR contract, for up-gradation or general maintenance works will lead to temporary detouring of the traffic and chances of damages to private property and CPRs. Therefore, it will cause certain level of inconvenience to general public and road users depending on the duration of activities.

The contractor and its team shall therefore, inform the local community about their entry and range of activities they would undertake. The contractor shall also inform the local community about the measure s/he will adopt in order to reduce the inconvenience including presence of his team to ease the traffic. This prior information will also allow the local community in helping the contractor avoid any damages to private property or CPRs. The local community will get time to relocate their assets as well.

In addition, the prior information and disclosure to public in cases of major road work involving more than 2 days of work on site and thus diversion of traffic etc, shall be by way of display of information at prominent places so that the intended audience gets the information. Also the information about grievance redressal system shall be made to general public and local community along with introducing the team of LO/CRM (refer ESGP 22 for Grievance Management)

In cases other than where emergency services are required, the contractor shall visit the site at least three days in advance and inform the local community about the planned intervention/ maintenance two days later.

ESGP 20: GENERAL WORKMANSHIP

Brief Description of Activity

This code of practice relates to general workmanship that is to be followed during execution of road and bridge works. This practice specifically covers the following works:

- Providing and laying interlocking concrete blocks in footpath and medians
- Providing and fixing chequered tiles in traffic island
- Road markings - Providing and laying hot applied thermoplastic road marking compound for centre/edge line, pedestrians, chevrons, directional arrows etc marking
- Traffic signs and road furniture
- Providing and applying one coat of zinc-rich epoxy primer and coal tar epoxy on cement surfaces
- Providing and applying epoxy Phenolic primer and epoxy Phenolic coating
- Providing and compacting sand in footpath and median
- Landscaping and other vegetation works
- Onsite bitumen Hot Mix/concrete mixing plant operations

Environmental Health Safety & Social (EHS&S) Issues
EHS&S issues could arise during execution of various activities listed above. Some of the issues which need to be considered include the following:

- Good workmanship
- Location of stockpiles of sand and other material
- Removal of excess material
- Health and safety of workers
- Clearing and cleaning work site after work is completed

Policy and Legal requirements, if any
There are no policy or legal requirements to be complied during execution of this practice. The general workmanship expected of and recommended in various clauses of MoRT&H specifications shall however be applicable and specifically the following:

Good Workmanship: Good quality of work as expected/specified in contract documents, concerned MoRT&H specifications etc. shall be achieved in each of the works carried out by the contractor. Good workmanship greatly enhances aesthetic value of the project. Contract Manager or his site incharge shall be responsible to approve completion of activities after field staff achieves minimum required workmanship as specified in project specifications and concerned MoRT&H clauses.

Location of Material Stockpiles: Location of material stockpiles, temporary tents, labour resting areas shall be in such a way that health and safety of workers as well as traffic is not compromised. Stockpiles shall be periodically checked for integrity and any slump towards carriageway shall be corrected immediately. Sand and other fine material stocks shall not be located near drainage channels or drain openings. Stockpiles shall not cause any obstruction to traffic flow or pedestrian/commuter movement. All the activities shall be executed within the time allowed and if delayed for some reasons by more than three months, the stockpiles shall be removed from the site. Contract Manager or his site incharge shall be responsible for periodically supervising such minor activities at least once in three days and instruct the field staff.

Excess Material: Any excess material or any material that has been brought to site and has not been used shall be removed and disposed off immediately. Materials should be removed, howsoever, small or meagre quantity is left at site. Contract Manager or his site incharge shall thoroughly inspect the project site and get cleared all the excess material found within RoW and outside RoW. The areas where stockpiles were located or any spill on carriageway shall be cleaned by brooming or other appropriate methods. Similarly, while erecting traffic signs, light poles or any other information boards etc, excavated earth from pits shall be stored, collected, transported and disposed as per ESGP 20. If poles are grouted using cement mortar or concrete, practices as per recommended guidelines. Contract Manager or his site incharge shall check each location where poles have

been erected for compliance to this measure before approving the work. A layer of sand or other fine earth material on carriageway is a traffic hazard.

The project site shall be taken over by Contract Manager or his site incharge after getting every inch of space cleared and cleaned by field staff. Especially the following works, after completion shall be cleared off all debris and excess material:

- Providing and laying interlocking concrete blocks
- Providing and laying interlocking concrete blocks in footpath and medians
- Providing and fixing chequered tiles in traffic island
- Road markings - Providing and laying hot applied thermoplastic road marking compound for centre/edge line, pedestrians, chevrons, directional arrows etc marking
- Traffic signs and Road furniture
- Providing and applying one coat of zinc-rich epoxy primer and coal tar epoxy on cement surfaces
- Providing and applying epoxy Phenolic primer and epoxy Phenolic coating
- Providing and compacting sand in footpath and median
- Landscaping and vegetation works
- Routine maintenance works involving patchwork or potholes filling on pavement; road embankment strengthening; storm drain cleaning; and shoulder repair and strengthening etc.

Health and Safety of workers: All the activities listed in this ESGP shall be carried out with due care and attention to health and safety of workers. Many of the activities listed under this ESGP may be scheduled for execution after opening new carriageway or infrastructure to traffic. Small segments of road area shall be taken up at a time for execution of various activities. The work area shall be adequately barricaded as per Clause 112.4 of MoRT&H Specification. One experienced worker or supervisor shall be deployed to oversee workers straying outside barricaded region and onto traffic carriageway.

References and Recommended further reading

Specifications for Road and Bridge Works, 5th Revision, MoRT&H, 2013

ESGP 21: ONSITE CONCRETE PREPARATION

Brief Description of Activity

This activity relates to concrete preparation at site either manually or using mechanical mixers which are diesel engine driven and tyre mounted. Scope of this practice covers the procedures to be followed during execution of the activity.

Environmental Health Safety & Social (EHS&S) Issues

EHS&S issues that are anticipated during execution of the activity include the following:

- Noise pollution form mechanical mixers
- Air emission form diesel engine
- Wash water discharge
- Location of material stockpiles
- Spillage of concrete while transport
- Oil, fuel and lubricant leakage
- Impact on soil environment
- Debris and other waste concrete
- Reinstatement of land area used for onsite concrete preparation

Policy and Legal requirements, if any

Air Pollutant Emissions
Air pollutant emissions from non-road construction equipments, engines and vehicles are yet to be regulated and as of now there are no legal or statutory regulations.

Noise Emissions
Under Environment (Protection) Rules, 1986 (*Schedule VI, Part E*) the noise generation standards applicable for construction equipments, machinery and vehicles at the manufacturing stage are presented below:
Noise Limits for Automobiles (Free Field distance at 7.5 metre in dB (A) at the Manufacturing Stage)

Recommended Mitigation Measures

Noise Emission: Noise generation is expected form diesel engine driven mechanical mixers. The following measures shall be practised to the extent possible

- Orientation of mixer in such a way to reduce noise nuisance to nearest sensitive receptor.
- Locating Stockpiles to act as noise barrier
- Operating and maintaining the mixer in good condition to reduce noise generation
- Checking vibration induce noise and rectifying the same
- Operating the engine with factory recommended silencers

Air Emission: Air pollutant emitted from engine driven mechanical mixer is not a significant problem. However in an urban area, it is better to follow good O & M practices. Any dark, thick smoke emitted from engine which is persistent lasting more than 10 seconds in air shall be checked. Fugitive emissions from fuel tank shall be controlled by maintaining leak proof tank and cover.

Wash water discharge: Mechanical mixer will have to be washed with large amount of water after every production cycle is complete. Wash water will have cement and grit in large quantities and hence indiscriminate throwing of the same in nearby areas shall be prohibited. The wash water can be stored in a tank or a pit dug on ground. After about 30-90 minutes of setting, the clear water can be reused for cement preparation, washing, dust control sprinkling or even in curing newly cost concrete members. Throwing wash water on nearby land will form an impermeable layer due to cement content. Repeatedly throwing was water at one location may result in

formation of hard, crusty, cement concrete layer, the crusty hard layer shall be removed after the work is complete and disposed off along with other debris.

Location of stockpiles: Stockpiles shall be located without obstructing any public activity in the area. Slumping towards carriageway or drainage channels/nallahs shall be prevented or rectified. Location of stockpiles shall be near to concrete preparation site to prevent material spillage on the way. Other stockpile related problems such as wind-borne and water-borne erosion shall be prevented by following appropriate preventive measures. Cement bags storage and its handling shall not be result in dust generation.

Spillage of Concrete: Concrete shall be prepared close to work site where concrete is to be place to avoid spillage on the way. After the concrete work is completed, any spillage on the way shall be cleaned and cleared.

Oil, Fuel or Lubricant Spill/Leak: In a mechanical mixer, any spill or leak of oil, fuel or lubricant shall be avoided by following good O & M practices. Refuelling diesel engines, applying oil or lubricants to various mechanical parts of the mixer shall be carried out using appropriate tools and equipments. If unavoidable spreading a jute bag or other such cover on the ground below when refuelling or lubricating can prevent spillage onto ground.

Soil Environment: Soil environment especially the topsoi*l environment will be adversely impacted during onsite concrete preparation. The impact can be* significant if manual mixing of concrete or cement mortar is made on ground. Besides stockpile area, wash water disposal on ground, waste concrete or excess concrete/mortar disposal on ground, spillage of concrete, oil, fuel spill etc may also have adverse impacts on top soil environment. These impacts can be mitigated to some extent by following the measures recommended in this ESGP and proper reinstatement of the area after completing all concreting activities at the site.

Debris Disposal: Debris generated from stockpile area, waste/reject concrete/mortar, excess quantity of concrete/mortar, hard crusty soil surface formed due to manual mixing on ground etc. shall be disposed off as debris as per ESGP 8.

Reinstatement: The entire area used for concrete/mortar preparation shall be reinstated to pre- use or pre-construction status. All of the following areas shall be cleared:

- Stockpile area
- Concrete mixer area
- Manual mixing area
- Wash water disposal point, if any

In case of private land being used, a satisfaction certificate will be secured form the landowner upon handing back the land. This certificate as well as photographs of restored land shall be kept as a document of proof and shall be provided to Employer during any inspection.

References and Recommended further reading

Schedule VI, Part E, Environment (Protection) Rules, 1986

ESGP 22: GRIEVANCE MANAGEMENT

Brief Description of Activity

This code relates management of grievances due to any project activity, routine or emergency during the entire project period.

Environmental Health Safety & Social (EHS&S) Issues

EHS&S issues that are encountered by grievance management include:

- Public inconvenience and nuisance due to maintenance activities
- Public grievances due to damages to private property or CPRs
- Grievances due to labour camps and labour interaction with local community
- Grievances due to improper use of contractor's vehicles and construction machinery
- Excessive fugitive dust and noise emission
- Repeated grievances/ residual impacts after mitigation measures taken
- Contamination of local land resources, water bodies etc due to operation of project machinery

Policy and Legal requirements, if any

There is legal requirement for grievance management under the OPR contract. However, a World Bank funded project is required to maintain minimum standards of good practice in social, labour and environmental issues and achieving operational excellence. Grievance management not only helps in managing issues of potential risks to the project but also helps in maintaining a good relationship with the local community and thus helps in garnering over all support in favour of the project.
The following measures are recommended forest abolishing and managing a good grievance handling mechanism. The contractor shall undertake the following measures.

Grievance Redress Mechanism

The project proposes to establish a Grievance Redress Committee (GRC) to hear the complaints of project affected persons and resolve the same. The process will promote settlement of disputes and reduce litigation. GRC will be set up at the district level with District Collector as head. The following persons will be the members of GRC:

- District Collector or his designated representative of at least the rank of Assistant District Collector (preference would be given to women officers);
- The District Development Officer of the Department of Revenue;
- The Executive Engineer, PIU; and
- Representative from Social Sector/Local NGO (not involved with implementation) /Person conversant with similar issues and he/she should be widely respected and having problem solving skills (to be selected by DM / Collector).

GRC will be responsible for the following:

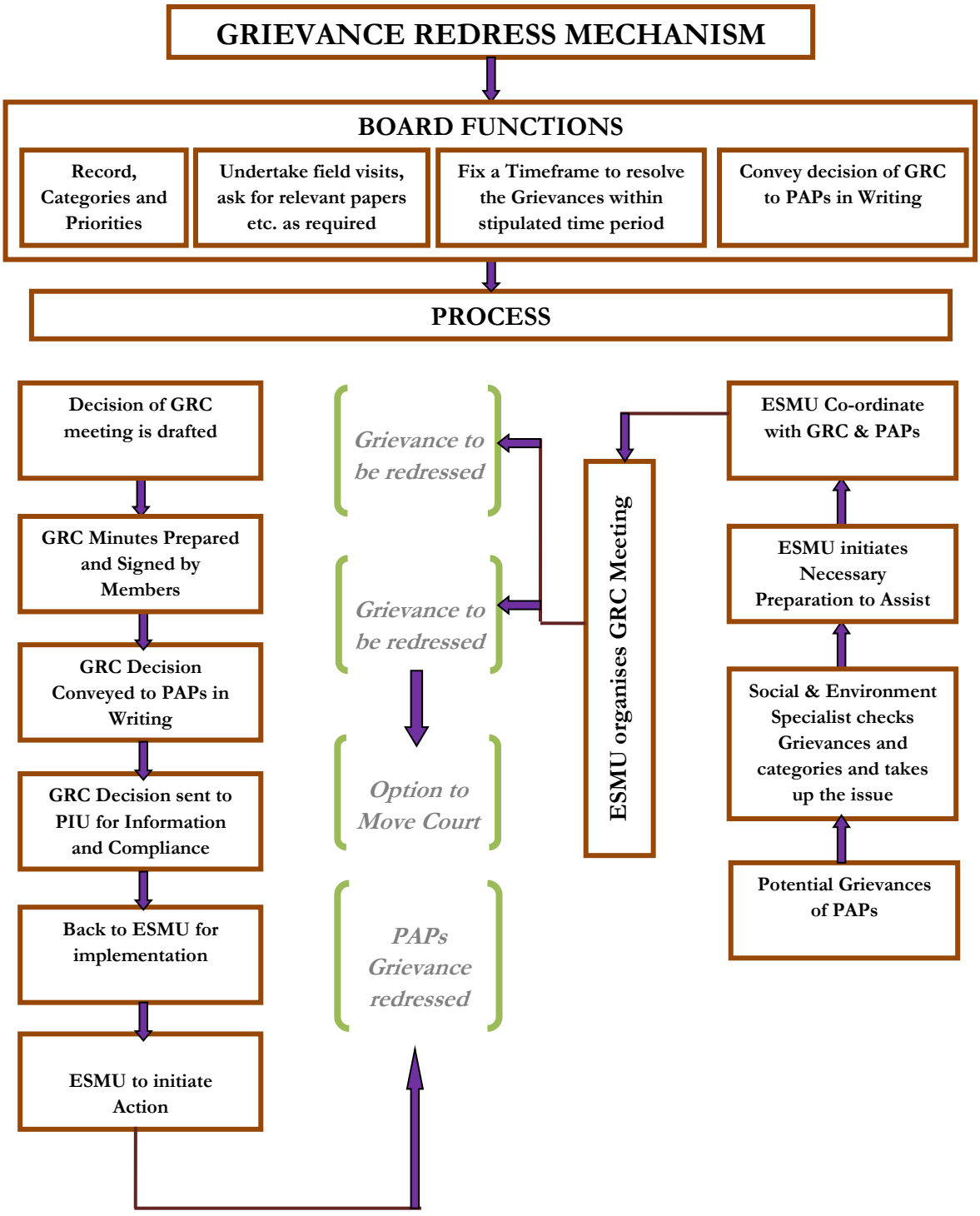
(i) Support PAPs in resolving issues related to Environment and R&R;
(ii) Record grievance and resolve them within stipulated time; and
(iii) Inform PIU about any serious cases. ESMU will provide all necessary help to PAPs in presenting his/her case before the GRC. The GRC will respond to the grievance within 15 days.

The GRC will normally meet once in a month but may meet more frequently, if the situation so demands. A time period of 45 days will be available for readressing the grievance of EPs. The decision of the GRC will not be binding to PAPs. The PAPs has the option of taking resource to the court of law, is he she so desires. Broad function of GRC as under:

- Record the grievances of PAPs, categorise and prioritize them and provide solution to their grievances related to environment loss and damage.
- The GRC may undertake site visit, ask for relevant information from project authority and other government and non government agencies, etc in order to resolve the grievances of PAPs.

- Fix a time frame within the stipulated time period of 45 days for resolving the grievances.
- Inform PAPs through ESMU about the status of their case and their decision to PAPs for compliance.

The GRC will be constituted within three months by an executive order from GoG from the date of mobilization of Contractor and RAP implementing NGO.



ESGP 23: E&S Regulatory Compliance

Brief Description & Scope

This code relates to systems and procedures that need to be adopted by OPR Contract or to ensure sustained policy and regulatory compliance through the OPR Contract tenure.

Environmental Health Safety &Social (EHS&S) Issues

The issues anticipated during OPR Contract tenure include the following:

- Regulatory compliance in a sustained manner through contract period.
- Negative media coverage upon OPR Contractor's regulatory non-complaint activities.
- Legal ramifications, risks and liabilities to OPR Contractor as well R&B Dept, as an employer.
- Non-governmental organisations, civil society movements and local community groups precipitate issues against OPR Contract or for non-compliance against any policy and regulations.
- People complaining to the World Bank and other State /Central Government Departments against OPR Contractor on regulatory issues.

Policy and Legal requirements, if any

The policy and legal framework applicable on the OPRC Project is highlighted below for reference and review. OPRC Contractor may do well under take a thorough review of regulations applicable on the project as part of the Environmental Management Framework processes recommended in the Contract.

Policy Framework Relevant to the Project

- National Environment Policy–2006 (Ref:http://moef.gov.in/mef/policy.htm)
- National Conservation Strategy and Policy Statement on Environment and Development, June1992
- Policy Statement for Abatement of Pollution,1992
- National Forest Policy,1988
- Wildlife Conservation Strategy 2002
- National Water Policy, 2002
- Gujarat State Water Policy
- R&R Policy for GSHP II

Regulatory Framework applicable on the Project: Environmental Regulations

- Environment (Protection) Act, 1986
- EIA Notification, 2006 and amendment thereof.
- Air (Prevention & Control of Pollution) Act, 1981
- Water (Prevention & Control of Pollution) Act,1974
- CPCB Notification for National Ambient Air Quality Standards, 18th November 2009
- Noise Pollution (Regulation and Control) Rules, 2000 and subsequent amendments
- The Plastics (Manufacture, Usage and Waste Management) Rules, 2009
- Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016
- The Batteries (Management and Handling)Rules,2001
- The Solid Waste Management Rules,2016
- Construction and Demolition Waste Management Rule, 2016
- The Manufacture, Storage and import of Hazardous Chemical Rules,1989 & amended 2000
- The Bio-Medical Waste Management Rules,2016
- Fly Ash Notification, January 2015
- Eco-sensitive zones specified in any of the Project or project related foot print are as
- Forest(Conservation)Act,1980anditsamendments;
- Forest(Conservation)Rules,2003anditsamendments;
- Forest (Conservation)Act,1980
- Wildlife(Protection)Act,1972;
- Wildlife(Protection)AmendmentAct,2002;
- TheAncientMonumentsandArchaeologicalSitesandRemainsAct,1958;
- TheMotorVehiclesAct,1988andCentralMotorVehicleRules,1989;

Other guidelines

- EIA Guidance Manual for Highways prepared by Administrative Staff College of India, February 2010
- IRC SP 93-2011: Guidelines on Requirement for EC for Road Projects
- IRC SP 108-2015: Guidelines on EMP
- IS Codes & CPCB Guidelines for monitoring & analysis of air, water, soil etc;
- The World Bank Operational Policies (http://go.worldbank.org/4D2JSWFIW0)

Health and Safety related regulations

- The Factories Act, 1948
- Explosives Act, 1884 and The Explosives Rules, 1983
- The Petroleum Act, 1934
- The Petroleum Rules, 2002
- The Gas Cylinder Rules, 2004.
- The Building and other Construction Workers (Regulation of Employment and Conditions of Service)Act,1996andCentralRules,1998

Social and labour regulations

- The Trade Unions Act,1926
- The Industrial Employment (Standing Orders) Act, 1946 and Rules, 1946
- The Industrial DisputesAct,1947
- The Payment of Wages Act,1936 and Rules,1937
- TheMinimumWagesAct,1948and(Central)Rules,1950
- The Minimum Wages (Gujarat) Rules 1961
- The Payment of Bonus Act, 1965 and Rules, 1975
- The Factories Act, 1948
- The Plantation Labour Act, 1951
- The MinesAct,1952
- The Motor Transport Workers Act,1961
- The Contract Labour (Regulation & Abolition) Act, 1970
- TheInter-StateMigrantWorkmen(RegulationofEmploymentandConditionsof
- Service)Act,1979
- The Interstate Migrant Workers (Gujarat) Rules 1981
- The Shops and Establishments Act
- The Building & Other Construction Workers (Regulation of Employment & Conditions of Service) Act, 1996
- The Gujarat (Amendment) Act, 2015)
- The Maternity Benefit Act, 1961 and amended 2016
- TheEqualRemunerationAct,1976
- The Bonded Labour System (Abolition) Act, 1976
- The Child Labour (Prohibition & Regulation) Act, 1986 & Gujarat Rules 1994
- The Contract Labour (Regulation & Abolition) Act, 1970 & The Contract Labour (P & R)(Gujarat) Rules 1972
- The Workmen's Compensation Act, 1923
- The Employees' State Insurance Act, 1948
- The Employees' Provident Fund & Miscellaneous Provisions Act, 1952
- The Payment of Gratuity Act, 1972
- The Employment of Manual Scavengers and Construction of Dry latrines Prohibition Act, 1993
- The Fatal Accidents Act, 1855
- The Weekly Holiday Act,1942
- The National and Festival Holidays Act
- The Personal Injuries (Emergency) Provisions Act, 1962
- The Personal Injuries (Compensation Insurance) Act, 1963
- The Labour Laws (Exemption from Furnishing Returns and Maintaining Register by Certain Establishments) Act, 1988
- The Public Liability Insurance Act, 1991

The Contractor shall be aware of the following clearances (list is not exhaustive and final) that are specific to the operation of the OPRC net work including any subsequent amendments:

- Forest Clearance for felling and branches trimming of trees from RoW of existing roads from the Forest and Environment Department, Government of Gujarat;
- Permission for withdrawal of ground water for construction from Central Ground Water Board, West Central Region (WCR), Ahmadabad;
- Permission for withdrawal of surface water from rivers and canals from Water Resource Department, Government of Gujarat;
- Permission for locating and operating borrow area pits from Local Administration/ Panchayats;
- Installation and operation of Hot Mix plants, Concrete batching plants and Crushers require Consent from Gujarat Pollution Control Board under Water and Air Acts;
- Authorization for Storage, handling, transport and disposal of hazardous materials from Gujarat Pollution Control Board under Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016;
- Consent for discharge of air/water pollutants from workers camp, DG set installations, equipment and storage yards from Gujarat Pollution Control Board under Air, Water Acts and HWM Rules;
- License for Quarries (in case of opening of new quarries) from Department of Mining, Govt of Gujarat;
- Permission for sand mining from river bed from Department of Mining, Govt of Gujarat;
- Authorization for disposal of bituminous wastes, if any from Gujarat Pollution Control Board under Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016;
- All Construction vehicles and off-road equipments are to be registered with Regional Transport Office as required under Central Motor Vehicles Act and possess appropriate PUC certificate;
- Traffic Police clearance to divert traffic or change traffic scheme within an urban area; and
- Licenses and certificates as per labour legislations.

List of International conventions and treaties to which India is a signatory given below to this code for reference and review.

- Ramsar Convention on Wetlands of International Importance - Provides the intergovernmental framework for international co-operation for the conservation and wise use of wetland habitat and species.
- Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris, 12 November 1972) - Protect cultural monuments and natural sites within their territory that are recognised to be of such outstanding universal value that safeguarding them concern humanity as a whole.
- Convention on International Trade in Endangered Species in Wild Fauna and Flora (Washington, 3 March 1973) - To ensure, through international co operation, that the international trade in specimens of species of wild fauna and flora does not threaten the conservation status of the species concerned.
- Bonn Convention on the Conservation of Migratory Species of Wild Animals (Bonn, 23 June 1979) - To conserve migratory species by Parties restricting harvests, conserving habitat and controlling other adverse factors. Sustainable utilisation is an implicit goal.
- The International Tropical Timber Agreement (Geneva, 18 November 1983) - To promote the management of tropical forests on a sustainable basis and to provide a framework for co-operation between production and consuming member states in the tropical timber industry.
- International Undertaking on Plant Genetic Resources (Rome, 23 November 1983) as supplemented - To ensure that plant genetic resources are preserved, particularly cultivated varieties of plants, plants or varieties which have been in cultivation in the past, primitive versions of cultivated plants, wild relatives of such plants and certain special genetic stocks and restrict destructive impact of development activities to conserve plant varieties which are threatened with extinction as a result of deforestation (especially in tropical areas) or changes in agricultural practices
- Vienna Convention for the Protection of the Ozone Layer (Vienna, 22 March 1988) and Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal, 16 September 1987) - To protect the ozone layer by taking precautionary measures to control equitably total global emissions of substances that deplete it, with the ultimate objective of their elimination on the basis of developments in scientific knowledge, taking into account technical and economic considerations and bearing in mind the developmental needs of developing countries.
- The Convention concerning Protection against Hazards of Poisoning Arising from Benzene (ILO Convention 136, Geneva, 23 June 1971) (hereafter, Benzene Convention, 1971); It contains 13

substantive articles providing, inter-alia, that whenever harmless or less harmful substitute products are available, ratifying States should use such substitutes instead of benzene.

- The International Convention on Civil Liability for Oil Pollution Damage, Brussels 1969 (CLC) - To portion the liability of oil pollution on the owner of oil tanker.
- The International Convention on the Establishment of an International Fund for Compensation of Oil Pollution Damage, Brussels 1971 (Fund Convention);

Provide for a compensation system in order to ensure full compensation to victims; and (b) to distribute the economic burden between shipping and cargo interests.
Source: http://envfor.nic.in/divisions/iass/eia/Annex3.htm

Recommended Practice /Measures

Policy and Regulatory Review: A scan be inferred from the above list of applicable policies, regulations and guidelines, it is clear that a host of regulations are to be complied in a sustained manner during the OPRC contract tenure.
Contractor as part of the EMF processes recommended in the contract shall undertake a review of Policy and Regulatory framework that would be applicable on the project. This review shall be repeated at least once every 6 monthly to re-assess and re-establish the applicable frame work to integrate and take on-board any changes in policy and legal environment in the future. In the interim between wore views, a regulatory register as mentioned below shall be maintained to keep track of applicable regulations.

Regulatory Register: Based on the regulatory review, formulating and maintaining a regulatory register applicable to project will prove useful to OPRC Contractor.

The regulatory register should shortlist policies, acts, rule and standards; those are applicable and relevant to the project activities. The register should enlist all required permit sand consents that are required by the Contractor to do project activities and through the contract period and the competent authority details who issue such permit and consents. The register should highlight the periodicity of individual permit sand consents and renewal of same.
The register can be made in a user friendly format with appropriate trigger points for timely renewal of permits and licenses.
The register shall be reviewed and updated at least once in a year either through in-house staff or using external resources. This will help in updating the register to prevailing policy and legal environment and integrate regulatory changes as applicable to the project.

Timely Renewal and Update of Regulatory Documents: As stated above, it is imperative on the part of OPRC Contract or to set in systems that will enable him to renew and or update licenses, consents and permits upon expiry of the current ones. OPRC Contract or will be held responsible for all regulatory compliance issues and his performance in this regard will be measured as part of the Environmental Performance Indicator.

Co-ordination with Regulatory Authorities: Contractor shall establish firm relationship and credible contact points at each of the regulatory authority to have a smooth functioning of the project. This co-ordination will help in getting timely updates of any upcoming regulations; clear and unambiguous clarifications on the law provisions; smooth applicatory process including prior knowledge of appropriate supporting document requirements etc. OPRC Contractor as part of his routine training and capacity building program of his field staff especially the management staff, can organise and conduct regulatory training sessions to understand the regulations; clearance procedures; penal procedures for contravening the law etc. The key contact personnel in each of the regulatory authorities can be sourced as training faculty in a periodic manner.

References and Recommended further reading:
Most of the regulations and policies are uploaded on the following web links which can be referred and reviewed:

- http://moef.nic.in/index.php; http://cgwb.gov.in/
- http://cpcb.nic.in/# ; http://www.moef.gov.in/mef/regional_offices.pdf

http://go.worldbank.org/4D2JSWFIW0