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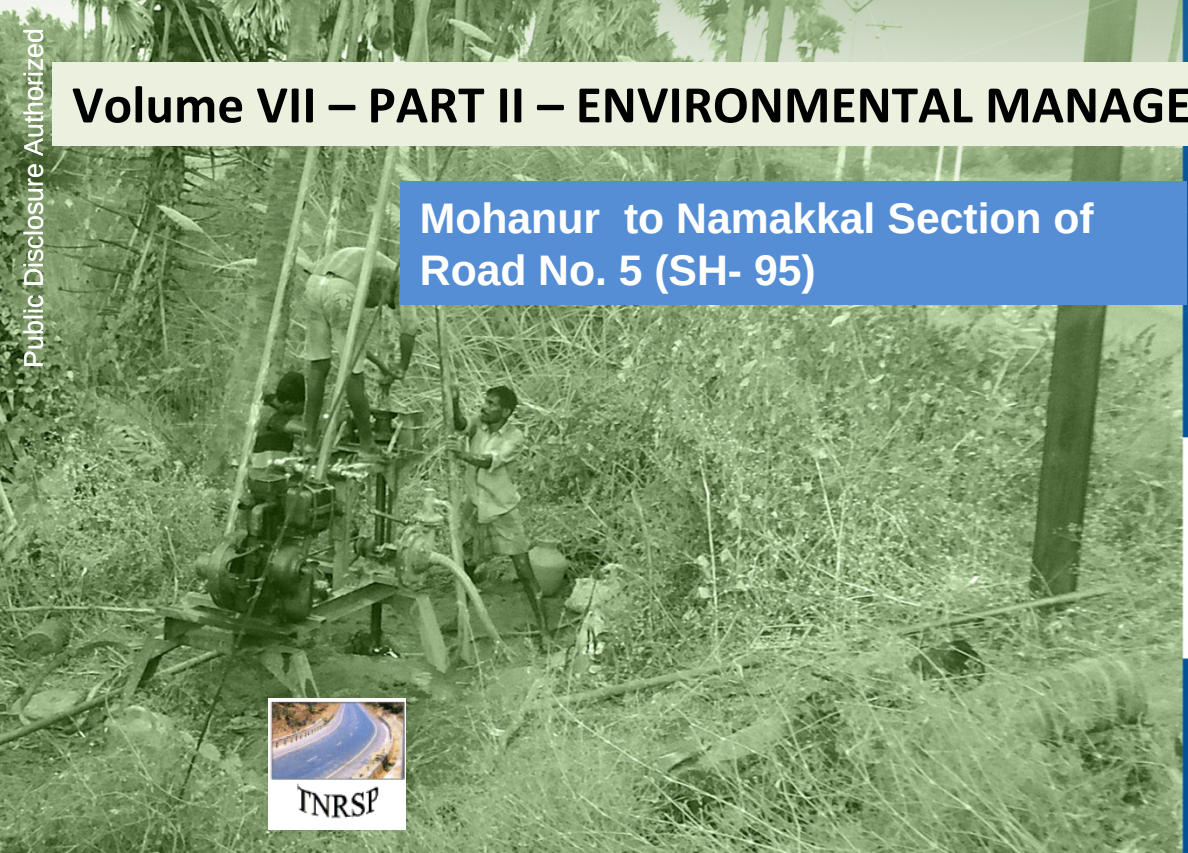
Project Preparation Consultancy Services for Preparing Detailed Project Report (DPR) for Various Road Improvement Works Under Tamil Nadu Road Sector Project II (TNRSP II) – Contract PPC 03

Volume VII – PART II – ENVIRONMENTAL MANAGEMENT PLAN

Mohanur to Namakkal Section of Road No. 5 (SH- 95)



CDM Smith India Private Limited

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CHAPTER 1. INTRODUCTION

Government of Tamil Nadu (GoTN), has proposed to improve the state highways and MDRs under Tamil Nadu Road Sector Project (TNRSP) in two stages. Under TNRSP Phase I, GoTN has improved the State Highways for a length of 1800 km under various improvement programs such as up-gradation, enhanced periodical maintenance, and performance based maintenance The GoTN has now taken up the up-gradation, maintenance and improvement of selected roads of State highways & MDRs for length of 1700 km under TNRSP Phase II program. Roads considered under TNRSP II are divided in to five Packages i.e., PPC01, PPC02, PPC03, PPC04 and PPC05.

CDM Smith India Private Limited has been entrusted by GoTN for the task of carrying out the Feasibility Studies and preparation of Detailed Project Report including Environmental and Social Impact Assessment for upgradation, maintenance and improvement of road network under package PPC03. Package PPC03 consists of 7 project corridors of total length 421.44km. Out of seven roads, Tiruchengode - Paramathy road section of Road No. 2 (SH86), Malliyakarai – Rasipuram – Tiruchengode road sections of Road No. 4 (SH79) and Mohanur to Namakkal road section of Road No. 5 (SH95) are considered as Phase I Roads under TNRSP II, which will be implemented in fast track mode. These roads will be improved from existing two lane to two lane with paved shoulder configuration with road furniture and other safety accessories.

This Environmental Management Plan (EMP) has been prepared for the Road No. 5 – Mohanur to Namakkal (SH 95) of length 13.3 km, considered in TNRSP-II of the 1700 km priority roads to define the Environmental Management requirements to ensure environmental safe guards during construction and operation phase.

The most important parts of this document are the Generic Environmental Management Action Plan (EMAP) and Corridor Specific Environmental Management Action Plan (EMAP). The Generic EMAP comprises activity wise impacts and generic mitigation measures identified for each environmental attribute like land, water, air, noise, biological environment, social environment and solid waste management. A robust Monitoring and Reporting (M&R) system is in-built into it for various phases of the project and activities. This is supported by annexure, which provides (i) detailed guidelines to enable the contractor to implement the EMAP in an appropriate manner, (ii) monitoring formats for the contractor to report to CSC (Construction Supervision Consultant) and (iii) checklists for the CSC to monitor the implementation of EMAP.

Preparation of Land Plan Schedule was completed and verification of land plan at site is under progress. Social Impact Assessment report will be prepared for proposed project, which details the no. of structures affected, land to be acquired and budget estimation for land acquisition. Subsequently, RAP will be prepared for compensation and rehabilitation, for direct (private properties) social impacts, while this EMP provides other social impact mitigation and enhancement for direct (public properties) and indirect impacts.

The Corridor Specific EMAP and its annexure provide Corridor specific and location specific impacts, mitigation measures and enhancement details.

1.1. ENVIRONMENTAL ASSESSMENT (EA) PROCESS

The project /corridor specific issues are addressed in the Environmental Impact Assessment reports and EMPs. The project road under consideration is abutting reserved forests at km

10+700 near Aniyapalayam village. This document addresses the corridor-specific Environmental Management Plan (EMP) for the 13.3 km of Mohanur to Namakkal section of Road No 5(SH95) included in the TNRSP-II improvement programme. Impact assessment at Namakkal town was not considered, since a ring road proposals are already in consideration for the built-up by GoTN under rural road development program through the financial assistance of NABARD.

The EIA and EMP reports identifies the environmental impacts in the earlier stages of project preparation to incorporate necessary mitigation measures required to minimise those impacts as well as to enhance the positive factors. All environmental management/ mitigation costs have been included in the Bill No.13 Titled 'Environmental Management Cost.

The project's Social Impact Assessments will be resulted in the preparation of a Resettlement Action Plan (RAP) for TNRSP-II roads to address the land acquisition procedures and all associated social aspects such as compensation, resettlement and relocation.

This document assists the Contractor and associated officials to mitigate or minimize the negative social and environmental impacts due to the construction and operation of the project and to enhance the positive impact of this project. The EMP has been prepared to meet the GOI requirements as specified by the Ministry of Environment and Forest (MoEF) and meeting the requirements of the World Bank. Its purpose is to present an evaluation of potential impacts due to the proposed upgrading and realignment of the existing State Highway from RUB near Mohanur to Namakkal (SH95).The document has presented the impacts, mitigation measures and appropriate costs for the proposed mitigation measures. The environmental and social impact mitigation and enhancement details of the proposed action within the SH95 corridor are presented and evaluated in detail in the remaining part of the document. Institutional strengthening for environmental management is also an essential part of this document for implementing contract provisions and other environmental mitigation and enhancement provisions.

1.2. OBJECTIVES OF ENVIRONMENTAL MANAGEMENT PLAN (EMP)

The objectives of the Environmental Management Plan (EMP) are to

- Define the Environmental management principles and guidelines for the pre-construction, construction and post construction phases of the road improvement.
- Describe the practical mitigation measures that should be implemented on road improvement works and ancillary sites (Quarry and borrow areas) to prevent or mitigate any negative environmental impacts and to enhance the positive issues.
- Establish the roles and responsibilities of all parties involved in the implementation of environmental controls;
- Establish monitoring and reporting system for facilitating aprropriate implementation of EMP.

1.3. ENVIRONMENTAL REGULATIONS APPLICABLE TO THE PROJECT

Summary of environmental clearances/ permits/ approvals required for the project is presented in **Table 1.1**. During the pre-construction stage, the responsibility of obtaining clearances from concerned authority lies with TNRSP. Those clearances which needs to be obtained during construction phase, but prior to work initiation lies with the contractor.

TABLE 1.1. LIST OF ENVIRONMENTAL REGULATIONS APPLICABLE TO THE PROJECT

Sl. No	Type of Clearance	Statutory Authority	Applicability	Project Stage	Responsibility
1.	Tree felling permission	District Collector & Forest Department	Felling of avenue trees	Pre construction	GoTN/ TNRSP
2.	Consent to Establish under the Air (Prevention & Control of Pollution) Act, 1981 and The Water (Prevention & Control of Pollution) Act, 1974.	Tamil Nadu Pollution Control Board	For establishing hot mix plants, crushers and batching mix plant	Construction (Prior to work initiation)	Concessionaire / Contractor
3.	Consent to Operate under the Air (Prevention & Control of Pollution) Act, 1981 and The Water (Prevention & Control of Pollution) Act, 1974.	Tamil Nadu Pollution Control Board	For operating hot mix plants, crushers and batching mix plant	Construction (Prior to work initiation)	Concessionaire / Contractor
4.	Permission to store Hazardous Materials under Hazardous Waste (Management and Handling) Act 1989	Tamil Nadu Pollution Control Board	Storage and Transportation of Hazardous Materials and disposal of hazardous waste	Construction (Prior to work initiation)	Concessionaire / Contractor
5.	Explosive license under The Explosives Act (& Rules), 1884 (revised in 1983)	Chief Controller of Explosives, petroleum & Explosive Safety Organisation	Storage of explosive materials and petroleum oils	Construction (Prior to work initiation)	Concessionaire / Contractor
6.	PUC for vehicles for construction under Central Motor and Vehicle Act 1988	Transport Department of Tamil Nadu	For all construction vehicles	Construction (Prior to work initiation)	Concessionaire / Contractor
7.	Quarry lease deeds and license under The Mines Act, 1958	Mines and Geology Department of Tamil Nadu	Quarrying and borrowing operations	Construction (Prior to work initiation)	Concessionaire / Contractor
8.	Environmental Clearance under EIA Notification, 2006 for new Quarry areas	SEIAA, Govt. of Tamil Nadu	Quarrying	Construction (Prior to work initiation)	Concessionaire / Contractor
9.	Consent for ground water extraction	Central Ground Water Authority	Ground water extraction	Construction (Prior to work initiation)	Concessionaire / Contractor

1.4. METHODOLOGY OF PREPARING EMP

Much of the environmental degradation that happens during the construction stage of a highway can be prevented or controlled, if there is an appropriate system in place. Hence, the EMAP table has been specifically designed to capture all the impacts that take place during the entire life cycle of a project from design to operation stage. Accordingly, a thorough activity analysis was carried out listing out all the project activities, based on which an impact identification matrix was prepared to understand the impacts upon various environmental parameters such as land, water, air, noise, flora and fauna. Also socio-economic impact upon people and solid waste generation was also considered as separate impacts.

Based on this exercise, a totally new Environmental Management Plan (EMP) has been prepared suggesting various mitigation measures to avoid or minimize the impacts of the project on the environment during the pre-construction, construction and operation phases. Two sets of guidelines were prepared and incorporated in the Generic EMAP table of EMP reports to enable the contractor to implement the project with least impact upon the environment– (i) Guidelines for entire project stretch including the project facilities like camps and sites and (ii) Guidelines exclusively for siting, management and restoration of project facilities like camps and sites. **Table 1.2** gives the list of these guidelines:

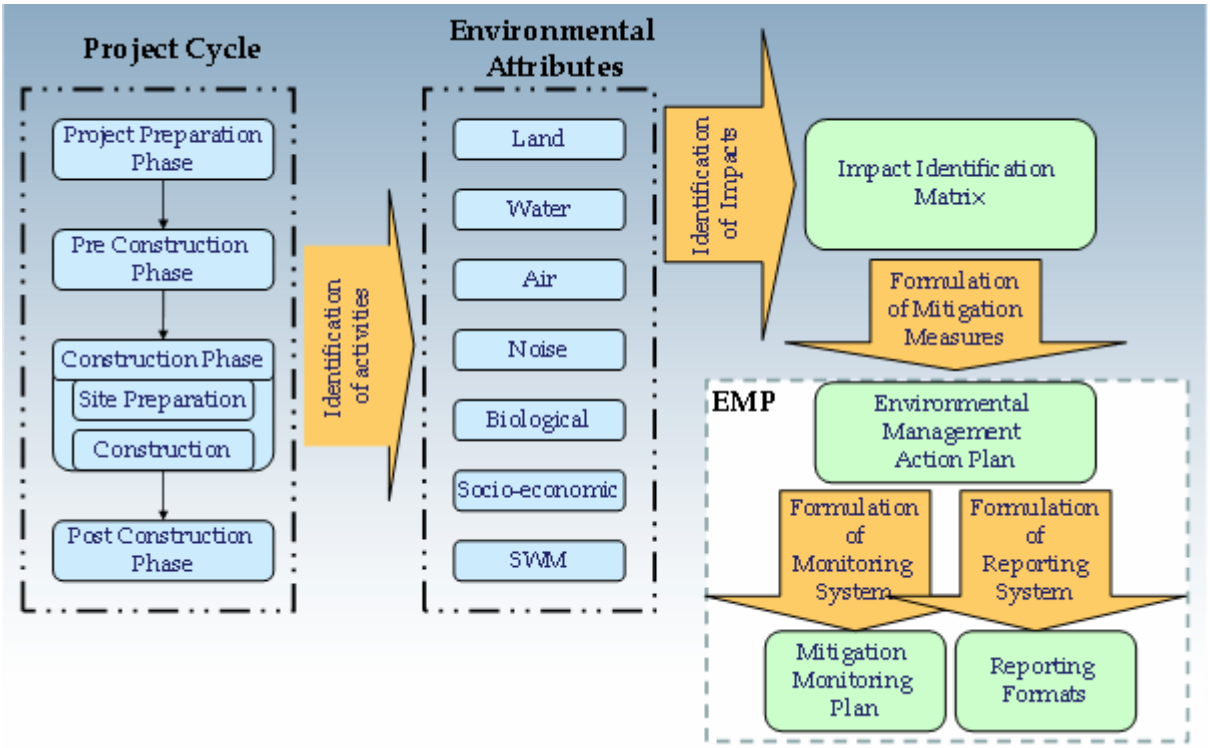
TABLE 1.2. GUIDELINES IN GENERIC EMAP

Sl. No.	Title
A	**Guidelines for entire project stretch**
1.	Guidelines for preparing comprehensive waste management plan
2.	Guidelines for top soil conservation and reuse
3.	Guidelines for Provision of Noise Barriers
4.	Guidelines to Ensure Worker's Safety during Construction
5.	Guidelines for Preparation of Traffic Management Plan
6.	Guidelines for Storage, Handling, Use and Emergency Response for Hazardous Substances
7.	Environmental monitoring plan
B	**Guidelines for project facilities**
1.	Guidelines for siting, management and redevelopment of construction camps
2.	Guidelines for siting, management and redevelopment of labour camps
3.	Guidelines for siting, management and redevelopment of quarrying and stone crushing operations
4.	Guidelines for siting, management and redevelopment of borrow areas
5.	Guidelines for siting and management of debris disposal site

The guidelines for project facilities have been structured with following objectives:

(i) It facilitates the selection of a site with least environmental impact,
(ii) It looks into the satisfaction of the land owner in case of leased out / rental out lands,
(iii) It guides the contractor with step by step measures in setting up of an efficient and environment friendly camp / site,
(iv) It ensure smooth, safe and efficient functioning of these camps and sites
(v) It guides the contractor in preparing a camp / site management and restoration plan to be submitted to CSC (prior to setting up of the camp/site)
(vi) It facilitates restoration of the site at the closure stage in a very environment friendly manner.

EMP assigns the responsibilities for various actions identified to limit the adverse impacts of the project. An environmental monitoring plan and an institutional framework have been proposed as part of the EMP for proper implementation and monitoring of mitigation measures. The cost for implementing the proposed environmental mitigation measures and carrying out the environmental monitoring has been worked out and is presented as part of the EMP for necessary budgetary allocations as part of the project cost. In order to implement various environmental requirements during pre construction, construction and operational phases, all mitigation and enhancement measures have been clearly built in to the Environmental Management Plan. All necessary mitigation and enhancement costs have been part of the BOQ.



CHAPTER 2. PROJECT DESCRIPTION

2.1. REGIONAL SETTING OF THE PROJECT ROAD

The State of Tamil Nadu is located in the South-East of the Union of India. Presently there are 32 districts and 226 taluks in the State. The population density of the State is very high, 555 per sq.km. The State is bounded by Andhra Pradesh and Karnataka States in the North and the Bay of Bengal in the East; Kerala State in the east and Indian Ocean towards south. The project road is located in the Namakkal district. Study area map of the Road no. 5 – from Mohanur to Namakkal (SH95) is presented as **Figure 2.1**

2.2. PROJECT CORRIDOR

The proposed project corridor is SH 95, which starts at Mohanur town at RUB of Velur-Mohanur Road (MDR 547) (km 15+650) and ends at Laddiwadi before proposed Namakkal outer ring road junction (km 13+300). Total length of the project corridor is 13.350km. The project corridor runs from south to north from 11.0652 N latitude and 78.1364 E longitude to 11.1706 N latitude and 78.1666 E longitude. Average RoW of the existing road varies in road sections, from km 0+600 to 2+000 average width of the road is 8-16 m and between km 2+000 to km 13+200, RoW varies between avg. 18-30 m. At built-up locations RoW varies from 8m to 10m. Two minor realignments are proposed in Road No. 5 to overcome the geometric deficiency and to attain the desired design speed. An Outer Ring Road (ORR) for Namakkal town will be developed under rural road development scheme as a separate project funded by NABARD. Hence, no bypass study was conducted for Namakkal Town and no development will be considered for existing stretch in this town area.

As per Terms of Reference, the Road No. 4 of SH79 starts at Mohanur and ends at Rasipuram. Section II of Corridor 5 (from km 23+010 after proposed ORR for Namakkal town to km 52+400 near proposed Rasipuram bypass junction) has not been considered in fast track mode, since existing alignment is very narrow (RoW ranges between 8 and 16m) with continuous built-up and requires bypass for a length of 8km from Senthamangalam village to Pattathayambuttai village. Hence, Section II of Corridor 5 will be taken up in Phase II roads under TNRSP II.

The project envisages the improvements of this corridor from existing two lane with earthen shoulder to two lane with paved shoulder configuration based on the lane requirements, type of land use and terrain and availability of land & maximum utilization of existing pavement. Based on the traffic assessment report and available RoW, TNRSP has formulated typical cross sections in line with the provisions of manual and terms of reference (ToR). The proposed improvement includes the widening of the project roads as per the traffic warrants, strengthening / reconstruction of the existing pavement for the entire length, provision of footpath cum drain at builtup locations, improvement / redesign of sharp curves, widening / reconstruction of existing culverts and provision of additional culverts depending on the drainage condition, junction improvements, provision for pedestrian crossing facilities, provision of traffic signs and road furniture, provision of bus shelters, and shifting of utilities. The location map of the project road is given in **Figure 2.2** below.

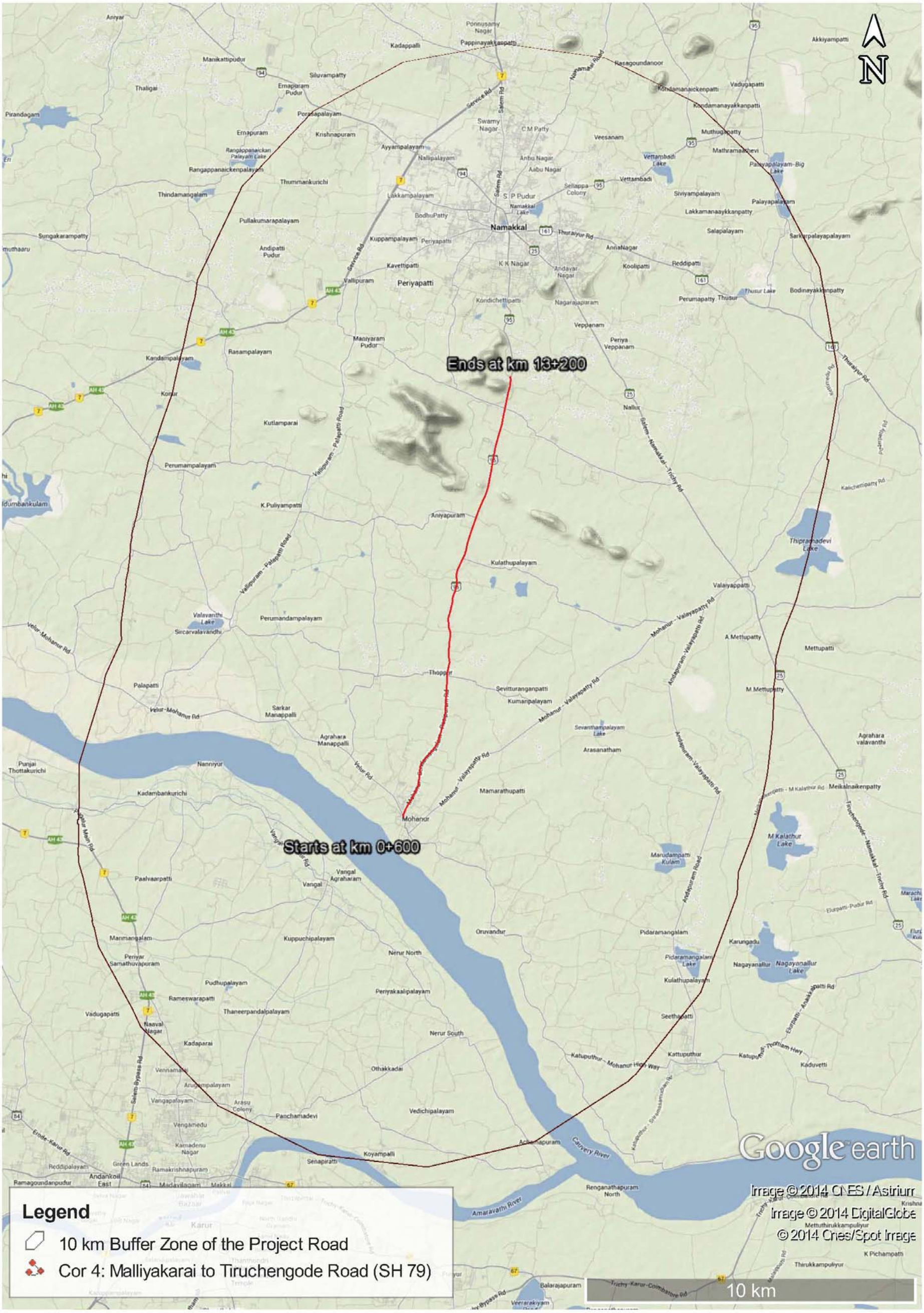


FIGURE 2.1. STUDY AREA MAP OF ROAD NO. 5 – MOHANUR – NAMAKKAL ROAD (SH 95)

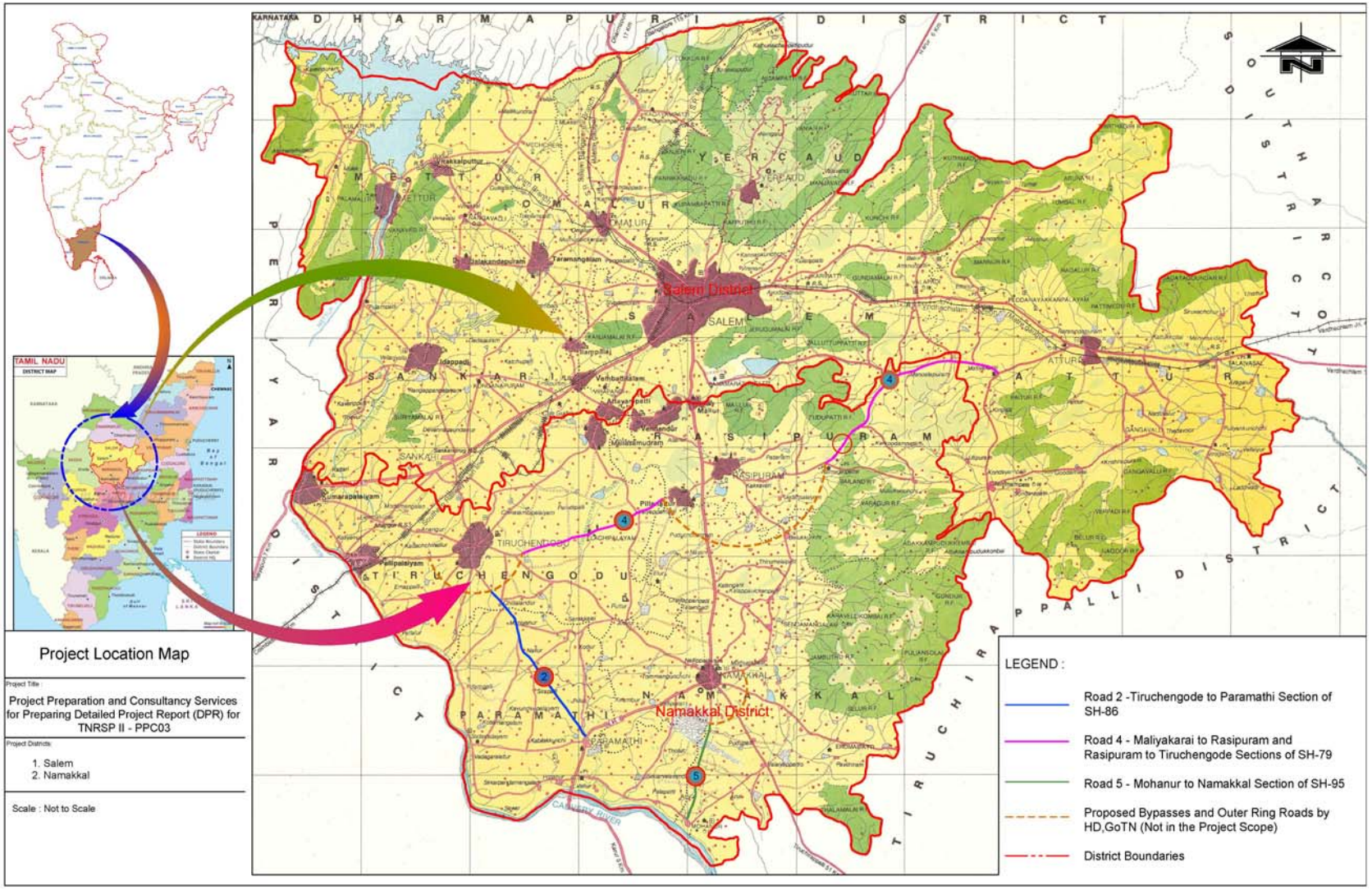


FIGURE 2.2. LOCATION MAP OF ROAD NO. 5 – MOHANUR – NAMAKKAL ROAD (SH 95)

2.3. PROPOSED PROJECT IMPROVEMENTS

Study mandates the improvement of the project road to two lane with paved shoulder standards with other improvements to make the road a standard facility. Improvement proposals formulated are based on the IRC guidelines and site specific requirements. The proposed improvements are aimed at easing traffic congestion, reducing the road accidents by improving physical characteristics of the road, which includes geometry, pavement strength, drainage, and enhancing the aesthetics. General philosophy followed in formulating the improvement proposals are:

- Limit the improvements within the land identified for the project.
- Introduce transition to all the curves along the alignment
- Utilize the available Right of Way to the maximum extent possible so as to avoid additional land acquisitions
- Improve and introduce the project facilities
- Improvement of road safety features

Accordingly, the following optimum level of improvements is proposed:

- Widening of the project road as the traffic warrants;
- Strengthening/reconstruction of the existing pavement for the entire length;
- Provision of footpath cum built-up drain at urban locations;
- Provision of open lined drain at village areas;
- Improving / redesigning sharp curves;
- Widening/ reconstruction of existing culverts and provision of additional culverts depending on the cross drainage requirements;
- Bridge and cross drainage rehabilitation, widening and reconstruction.
- Junction improvements;
- Provision for pedestrian crossing facilities;
- Street lights will be provided at urban and village areas;
- Provision of traffic signs and road furniture;
- Provision of bus shelters

2.4. ENVIRONMENTAL ENHANCEMENT MEASURES ADOPTED IN THE PROJECT

General environmental enhancement measures proposed for the project are construction of sound insulating stone wall to abate sound at silent zone, providing hand pump facility, reconstruction of affected open well, planting trees on the inner side of the sound insulating wall as noise barrier at sensitive locations, planting trees on both sides of the road at places where land available, landscaping of junctions and cultural property locations, plantation of trees at government premises, turfing of embankments, etc., Apart from this, public utilities such as construction of bus shelters at bus bys locations, improvement of ponds and lakes will be undertaken along the project corridor. Table 2.1 provides the specifications and schedules for site specific environmental enhancement and mitigation measures.

The environmental impact mitigation measures and enhancement measures proposed are covered under road specific EMAP and the typical design drawings are provided as **Annexure 3.59**. The landscaping, tree planting, etc. are provided as an environmental enhancement measure as shown in **Annexure 3.56** and **3.59**.

Landscaping, tree plantation and provision of benches and white wash for compound wall are proposed at cultural property locations from the point enhancement of aesthetic condition of the region. To increase the green cover as well as to achieve compensatory tree plantation in the project region, tree plantation will be done in the government institutions present along the project corridor. Apart from this, construction of green barriers at sensitive receptor locations, avenue plantation and general environmental enhancement measures are also incorporated in the project proposal. The envisaged improvements are of three types as provided in **Annexure 3.56** *Landscaping, Tree planting and Environmental Enhancement Plan.*

TABLE 2.1. SPECIFICATIONS AND SCHEDULES FOR SITE SPECIFIC ENVIRONMENTAL ENHANCEMENT AND MITIGATION MEASURES

Sl. No.	Details of Enhancement Measures	Location (Chainage)		Side (LHS/ RHS)	Length (m)	Width (m)	Height (m)	Materials to used (Specification)	Typical Drawing (refer Drawing No)	Additional details about site specific enhance measure
		Km.	Km							
Cultural Property Enhancement Measures										
1	Temple	2+900	2+920	LHS	20	20		Tree Sapling, Manure & Concrete bench	Dwg. No. Vol.12/Part IV/TNRSP II/CP/01	Tree plantation and sitting benches will be provided
2	Temple	6+900	6+922	RHS	22	30		Tree Sapling, Manure,Concrete benches and concrete bricks, cement and foundation stones for compound wall	Dwg. No. Vol.12/Part IV/TNRSP II/CP/02	Tree plantation, sitting benches and compound wall with white wash wiil be provided.
3	Temple	12+700	12+850	LHS	150	75		Tree sapling & Manure	Dwg. No. Vol.12/Part IV/TNRSP II/CP/03	Tree plantation in front of the temple
4	Temple	10+800	10+858	RHS	58	150		Tree Sapling, Manure & Concrete bench	Dwg. No. Vol.12/Part IV/TNRSP II/CP/04	Tree plantation, sitting benches and land scaping wiil be provided
Government Property Enhancement Measures										
1	School	1+600	1+720	RHS	120	130		Concrete bricks, cement and foundation stones for Noise barrier. Tree Sapling & manure.Access road to school is part of engineering work	Dwg. No. Vol.12/Part IV/TNRSP II/GP/01	Tree plantation along the compound wall as noise barrier and provision of access to road wiil be given
2	Primary School	5+200	5+212	LHS	12	254		Concrete bricks, cement and foundation stones for Noise barrier. Tree Sapling & manure.Access road to school is part of engineering work	Dwg. No. Vol.12/Part IV/TNRSP II/GP/02	Tree plantation along the compound wall as noise barrier and provision of access to road wiil be given

Sl. No.	Details of Enhancement Measures	Location (Chainage)		Side (LHS/ RHS)	Length (m)	Width (m)	Height (m)	Materials to used (Specification)	Typical Drawing (refer Drawing No)	Additional details about site specific enhance measure
		Km.	Km							
3	Govt.HSS	9+900	10+050	RHS	150	75		Concrete bricks, cement and foundation stones for Noise barrier. Tree Sapling & manure.Access road to school is part of engineering work	Dwg. No. Vol.12/Part IV/TNRSP II/GP/04	Tree plantation along the compound wall as noise barrier and provision of access to road will be given
4	Telephone Exchange	13+300	13+330	LHS	30	40		Tree sapling & Manure	Dwg. No. Vol.12/Part IV/TNRSP II/GP/03	Tree plantation along the compound wall.
Provision for Soak Pits at Hand Pump & Syntax Water tanks										
1	Water tank	1+050		RHS	2	2	2	Cement, PVC pipes and pebble & Gravel	Dwg. No. Vol.12/Part IV/TNRSP II/COR2/GENERAL/ 19	Water collecting duct to Soak pit will be provided
2	Hand Pump	4+020		RHS	2	2	1.5	Cement, PVC pipes and pebble & Gravel	Dwg. No. Vol.12/Part IV/TNRSP II/COR2/GENERAL/ 19	Water collecting duct to Soak pit will be provided
3	Hand Pump	8+100		RHS	2	2	1.5	Cement, PVC pipes and pebble & Gravel	Dwg. No. Vol.12/Part IV/TNRSP II/COR2/GENERAL/ 19	Water collecting duct to Soak pit will be provided
4	Water tank	11+570		RHS	2	2	2	Cement, PVC pipes and pebble & Gravel	Dwg. No. Vol.12/Part IV/TNRSP II/COR2/GENERAL/ 19	Water collecting duct to Soak pit will be provided

CHAPTER 3. ENVIRONMENTAL MANAGEMENT ACTION PLAN

Environmental mitigation measures have been incorporated within the design process, including the avoidance of potential impacts through changes in the alignment and other means. Appropriate measures have also been identified for action in the construction and operation phases. Environmental Management Action Plan (EMAP) presented as **Table 3.1** to **Table 3.4** tabulates the environmental mitigation and enhancement measures identified for all phases of the project i.e., the design, pre-construction, construction and operation, which have, or will be taken by the responsible agency, and, where appropriate, the contractual clause or drawing no. referring to the measure.

The **Table 3.1** and **Table 3.2** called 'Generic EMAP' lists those measures, which are common to all roads under PPC03 of TNRSP, while **Table 3.3** and **Table 3.4** called 'Corridor Specific EMAP' lists those measures which are specific to this Corridor.

The EMAP is also classified based on responsibility of implementation of mitigation measures such as EMAP for PIU, CSC and others i,e., **Table 3.1** and **Table 3.3** and EMAP for Contractor i,e., **Table 3.2** and **Table 3.4**. EMAP for PIU, CSC and others includes stake holders comprises of planning department, local police & fire station, state motor vehicle department and other organisations which are directly or indirectly associated with the project. EMAP for contractor will be monitored by CSC/PIU.

Penalty Clause for Nonconformity to EMP

The Contractor shall implement all mitigation measures for which responsibility is assigned to him as stipulated in the EMP Report as well as grievances raised by the public during the implementation of the project. The Contractor shall undertake regular reporting to CSC, comprising submission of reports as well as management and redevelopment plans to CSC. Any lapse in implementing the same will attract the penalty clause as detailed in table given below.

Contract Clause	Description
Sub-Clause 10.3.4: Protection of the Environment	1. All lapse in obtaining clearances / permissions under statutory regulations and violations of any regulations with regard to 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 CSC, or with the TNRSP and communicated to the contractor, which is not properly addressed within the time period intimated by the CSC / PIU shall be treated as a major lapse. 3. Non-conformity to any of the mitigation measures stipulated in the EMP Report (other than stated above) shall be considered as a minor lapse. 4. On observing any lapses, CSC shall issue a notice to the Contractor, to rectify the same. 5. Any minor lapse for which notice was issued and not rectified, first and second reminders shall be given after one month from the original notice date and first reminder date respectively. Any minor lapse, which is not rectified shall be treated as a major lapse from the date of issuing the second reminder. 6. If a major lapse is not rectified upon receiving the notice, CSC shall invoke the penalty clause, in the subsequent interim payment certificate. 7. Penalty for major lapses shall be with-holding of 10% of the interim payment certificate, subject to a maximum limit of Rs. 30 lakhs.

	8. If the lapse is not rectified within three months after withholding the payment, the amount withheld shall be forfeited.

CSC should ensure the proper implementation of the EMP by regular site inspection and monitoring of the project facilities. CSC should maintain all the reports for various project facilities in different construction phases. A register has to be maintained by CSC on ingress and egress of the documents, report and correspondence made by contractor on implantation of EMP as well as on penalty.

Based on evaluating the criteria mentioned in above table, CSC can impose the penalty clause on contractor. This has to be communicated to the contractor through TNRSP. Team leader/ environmental officer of the contractor should be liable to acknowledge the penalty imposed on him, which should be properly documented by CSC.

TABLE 3.1. GENERIC ENVIRONMENTAL MANAGEMENT ACTION PLAN FOR PIU AND CSC

Sl. No.	Activity	Management Measures	Implementing organisation	Monitoring organisation	References
A. Project Preparation Phase					
A.1.	Designing of Project Road	**Mitigation Measures for Impacts on Land and Water**			
		Proposed alignment is designed minimizing land requirement, RoW is kept to a minimum, avoiding religious buildings and other environmentally sensitive areas.	Design Consultant & Contractor	PIU	EMAP
		Guidelines for sitting, management and redevelopment of project related facilities by the contractor are presented in **Annexure 3.1** to **Annexure 3.5.**	Design Consultant & Contractor	PIU	EMAP
		Erosion control measures like compaction of earth, pitching, turfing and landscaping with adequate drainage are included in engineering design**.**	Design Consultant & Contractor	PIU	EMAP
		Slope stabilization and erosion control measures like compaction of earth, pitching, turfing, construction of retaining wall and landscaping with adequate drainage system such as slope drains and storm water drains are included in the engineering design.	Design Consultant & Contractor	PIU	EMAP
		Concrete flooring, catch drain and oil interceptors are proposed for hot mix plant area, work shop, vehicle washing area and fuel handling area in construction camps as presented in **Annexure 3.44.**	Design Consultant & Contractor	PIU	EMAP
		Sufficient number of drainage structures like culverts, storm water drains etc. are included in the engineering design to prevent flooding and water logging. Bridges have been designed for the 50-year flood frequency. All culverts have been designed for 25 years flood frequency. The fill height has been designed for 50-year flood.	Design Consultant & Contractor	PIU	EMAP
		Mitigation Measures for Impacts on Water			
		Sedimentation trenches and storm water drain are proposed for surface runoff from construction camps as per the design presented in **Annexure 3.45.**	Design Consultant & Contractor	PIU	EMAP

Sl. No.	Activity	Management Measures	Implementing organisation	Monitoring organisation	References
		Toilets, sewage collection system and soak pits are proposed in construction camps, labour camps.	Design Consultant & Contractor	PIU	EMAP
		Mitigation Measures for Impact on Air and Noise			
		Tree plantation along road is included in the design.	Design Consultant & Contractor	PIU	
		Mitigation Measures for Impacts on Noise			
		Sensitive noise receptors along the project stretch are identified and noise barriers are proposed at these locations as per design given in **Annexure 3.50.**	Design Consultant & Contractor	PIU	EMAP
		Mitigation Measures for Impacts on Flora and Fauna			
		Plantation of ten trees for every tree to be cut has been proposed as per the guidelines of MoEF.	Design Consultant & Contractor	PIU	EMAP
		Mitigation Measures for Socio-economic impacts			
		Proposed alignment is selected minimizing socio-economic impact. Information dissemination and community consultation has been undertaken. It is proposed to pay compensation to PAPs based on the RAP that includes the Entitlement Policy.	PIU recommended in RAP	PIU Environment Officer (EO) & R&R officer	EMAP
		Proposed alignment has been adjusted to minimize impact on religious and cultural properties.	Design Consultant & Contractor	NA	EMAP
		Cultural properties along the alignment have been identified and proposed to relocate prior consultation and approval of the local community. List of affected cultural properties along the project road is presented in Section 6.7 of RAP Report. Section 10.1.1 of RAP Report mentions role of supporting implantation agency in carrying out RAP & TDP for the project.	Design Consultant & Contractor	PIU	EMAP

Sl. No.	Activity	Management Measures	Implementing organisation	Monitoring organisation	References
		All community utilities such as stand posts, bore wells, wells, ponds, water supply lines, toilets, sewerage lines, drainage systems, optical fiber cables, electric power supply lines, transformers, irrigation pump houses, telephone and television cables have been identified for relocation. Cost of shifting the utilities are included in the project cost.	Design Consultant & Contractor	PIU and TNRSP	EMAP
		It has been proposed to replace private dinking water source according to RAP and public water sources according to EMAP. It has also been proposed to make temporary arrangements if the existing water supply is disrupted.	Design Consultant & Contractor	PIU and TNRSP	EMAP
		Road stretches which are accident prone and have adverse factors are identified and necessary design measures like improvement of horizontal and vertical road geometry, improvement of junctions, etc. are adopted for road safety. Refer **Annexure 3.35**. Sign boards, street lights and pedestrian facilities are proposed for the entire stretch.	Design Consultant & Contractor	PIU and TNRSP	EMAP
		Existing bus stops have been suitably relocated or integrated to the design and bus lay bys, bus waiting shed.	Design Consultant & Contractor	PIU and TNRSP	EMAP
		Improved road surface with improved road geometry, pedestrian facilities bus bays and road furniture have been planned. Signages have been given a high priority for all road junctions. Safety audits have been undertaken and corrective measures undertaken.	Design Consultant & Contractor	PIU and TNRSP	EMAP
		Mitigation Measures for Impacts due to Solid Waste Generation			
		Demolition of sound highway structures has been avoided as far as possible by reinforcing them instead of replacing with new structures. Recycling / reuse of debris in highway construction has been considered wherever possible.	Design Consultant & Contractor	PIU and TNRSP	EMAP
A.2.	Obtaining Tree Cutting Permission from concerned District Collector	Application for issuance of tree cutting permission has to be submitted to concerned District Collector.	PIU	TNRSP	Tamil Nadu Forest Act 1882 and Tamil Nadu

Sl. No.	Activity	Management Measures	Implementing organisation	Monitoring organisation	References
					Timber Transit Rules, 1968
B Pre-construction Phase					
B.1.	Environmental Monitoring Facility and Equipment (Meters, Vehicles and Buildings)	This will include institutional requirements, training, environmental management and monitoring. Provision for purchasing required equipment.	EO of PIU, CSC	EO of PIU	As a Project specific action this will have to be incorporated.
B.2.	Identification of sites for project facilities like construction camp, labour camp, quarry, crusher unit, borrow areas, debris and excess soil disposal	**Mitigation Monitoring during Siting of Project Facilities**			
		The suitability of identified site should be verified based on the reports submitted by the contractor from time to time by the CSC through site visit and verification of records. This shall be a one time activity for each newly identified site, based on which the approval for the site shall be issued by CSC to contractor.	CSC	PIU	
B.3.	Setting up of all project facilities like construction camp, labour camp, quarry, borrow area and debris disposal site	**Mitigation Monitoring during Setting up of Project Facilities**			
		CSC to monitor using checklists provided in **Annexures 3.20 to 3.24**, and through site inspection and records verification, whether the camps are being set up in line with the camp / site management plan submitted by the contractor.	CSC	PIU	EMAP
B.4.	Clearing, grubbing and stripping, cutting of earth, filling, stripping, demolition	**Mitigation Monitoring During Site Preparation**			
		CSC to monitor through site visits, whether the mitigation measures outlined in EMAP are adhered to.	CSC	PIU	EMAP
C. Construction Activities					
C.1.	Operation of construction camp, quarry, stone crusher units, borrowing of earth and functioning	**Mitigation Monitoring During Construction Stage**			
		CSC shall continue to monitor all the project facilities once in a quarter using checklists in **Annexures 3.20 to 3.24**. CSC shall continue to monitor all the construction activities using checklists given in **Annexures 3.31 to 3.40**.	CSC	PIU	EMAP

Sl. No.	Activity	Management Measures	Implementing organisation	Monitoring organisation	References
	of labour camps	Reporting format for monthly report which has to be submitted to PIU by CSC is given in **Annexure 3.42**.			
		Noise level monitoring should be conducted as per Environmental Monitoring Plan.	CSC	PIU	EMAP
D. Post construction / Operational Phase					
D.1.	Redevelopment of construction and labour camp sites, quarry and crusher sites, borrow areas.	CSC to monitor using checklists provided in **Annexures 3.25** to **3.29**, and through site inspection and records verification, whether the camps / sites are redeveloped in line with the camp / site redevelopment plans submitted by the contractor.	CSC	PIU	EMAP
		Proper implementation of traffic rules. Pollution Under Control (PUC) certificates should be undertaken.	PIU	TNRSP	EMAP
		Proper maintenance of traffic signs and implementation of accident care facilities along the road should be undertaken.	PIU	TNRSP	EMAP
		The cross drainage system and the flood water drains should be periodically cleared to avoid occurrence of floodings. Drainage systems should be maintained well to accommodate proper storm water flow.	PIU	TNRSP	EMAP
		Contingency plans should be in place for clean up of spills of oil, fuel and toxic chemicals.	PIU	TNRSP	EMAP
		Public should be informed about the regulations on air pollution of vehicles.	PIU	TNRSP	EMAP
		Noise monitoring to be undertaken along the project stretch at pre-identified locations as specified in Environmental Monitoring Plan.	PIU	PIU	EMAP
		New buildings are prohibited within 50 mts of the carriageway.	PIU	TNRSP	EMAP
		Where ever required appropriate noise barrier should be constructed.	PIU	TNRSP	EMAP
		COMPLIANCE with "Rules" as defined in Environmental (Protection) Act, 1986, including: For delivery of hazardous substances, three	PIU	TNRSP	EMAP

Sl. No.	Activity	Management Measures	Implementing organisation	Monitoring organisation	References
		certificates issued by transportation department are required - permit license, driving license, and guarding license. Vehicles delivering hazardous substances should be printed with standard signs. Public security, transportation and fire fighting departments should designate a special route for these vehicles. These vehicles should be parked only at designated parking lots. In case of spill of hazardous materials, relevant departments should be informed at once and deal with it in accordance with the spill contingency plan.			
		Safety Audits should be conducted.	PIU	TNRSP	NA

TABLE 3.2. GENERIC ENVIRONMENTAL MANAGEMENT ACTION PLAN FOR CONTRACTOR

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
A. Pre-construction phase					
A.1.	Identification of sites for project facilities like construction camp, labour camp, quarry, crusher unit, borrow areas, debris and excess soil disposal	**Mitigation Measures to be adopted at Siting Stage to Minimise all types of Impacts**			
		Locate the camp as per detailed site selection criteria given in **Annexure 3.1** to **Annexure 3.5.** The details of identified sites should be reported to the Construction Supervision Consultant (CSC) for approval in the format given in **Annexure 3.12** to **Annexure 3.19.**	Contractor	CSC	MoRTH Specification 111.1
		An agreement has to be signed with the land owner, if the land is taken on lease / rent. The agreement should specify the preferences of land owner about land re-development while handing over the site back to him.	Contractor	CSC	MoRTH Specification 111.1
		Camp / site[1] Management and Redevelopment Plan should be prepared as per guidelines given in **Annexure 3.1** to **Annexure 3.5** and submitted to CSC for approval. Activities in the site should be initiated only after getting written approval from CSC.	Contractor	CSC	MoRTH Specification 111.1
		Comprehensive Waste Management Plan, Occupational Health and Safety Management Plan and Hazardous Substances Management Plan should be prepared as per guidelines given in **Annexure 3.6, Annexure 3.9** and **Annexure 3.11.**	Contractor	CSC	MoRTH Specification 111.1
		Obtain required permissions before setting up the camp as per the details given in **Annexure 3.43**.	Contractor	CSC	MoRTH Specification 111.1
		Site for overburden disposal should be planned within the quarry site or any other appropriate site. Quarry Management and Redevelopment Plan should address the disposal of overburden.	Contractor	CSC	MoRTH Specification 111.1

[1] Includes construction camp, labour camp, quarry and crusher unit, borrow area and debris disposal site.

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
		Borrow Area Management and Redevelopment Plan should address the water logging issue.	Contractor	CSC	MoRTH Specification 111.1
		Record the number of trees to be cut in each site and make provision in the Management and Redevelopment Plans to plant ten times the number of trees to be cut.	Contractor	CSC	MoRTH Specification 111.1
		Reporting format for monthly report which has to be submitted to CSC by contractor is given in **Annexure 3.41**. Reporting format for work force management which has to be submitted to CSC by contractor is given in **Annexure 3.30**.	Contractor	CSC	EMAP
A.2.	Identification of water sources	**Mitigation Measures for Impacts on Ground Water**			
		Only surface water should be used for construction and dust suppression. Possibility of using treated industrial water for dust suppression should be explored. Details of identified water sources should be submitted to CSC for approval in the format given in **Annexure 3.19.**	Contractor	CSC	MoRTH Specification 111.1
		Water for domestic use should be sourced from municipal water supply / approved water suppliers/ open well/ bore well. Clearance should be obtained from State Ground Water Board for construction of wells. Permission from relevant state authority (PWD / Irrigation dept.) should be obtained for surface water utilization.	Contractor	CSC	MoRTH Specification 111.1
		Mitigation Measures for Socio-Economic Impacts			
		Extraction of water from public water supply schemes, community spring water sources, community hand pumps, and community wells should be avoided. Local community should be consulted (with respect to the quantity of water, time and duration of withdrawal) before finalizing the surface water sources.	Contractor	CSC	MoRTH Specification 111.1

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
B.	**Construction Phase**				
B.1. Site Preparation Activities					
B.1.1.	Setting up of all project facilities like construction camp, labour camp, quarry, borrow area and debris disposal site	**Mitigation Measures for Impacts on Land and Water**			
		Topsoil conservation to be carried out as per guidelines given in **Annexure 3.7** before setting up the project facilities.	Contractor	CSC	MoRTH Specification 111.4
		Once the project facility is setup, it should be entered in the register of sites given in **Annexure 3.19** in a chronological order.	Contractor	CSC	MoRTH Specification 111.1
		Concrete flooring with catch drain and oil interceptors should be constructed for hot mix plant area and work shop, vehicle washing and fuel handling area in construction camps and should be part of construction camp management plan as per the design presented in **Annexure 3.38**.	Contractor	CSC	BOQ No. 11
		Sedimentation trenches should be constructed along the storm water drain in the construction camp as presented in **Annexure 3.45** to control soil erosion due to surface run off.	Contractor	CSC	MoRTH Specification 111.4
		Proper maintenance of vehicles and machineries should be carried out to minimize the spillage of oil. Provision should be made for storage of used oil. Authorization should be obtained from the SPCB under Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008 for collection, storage and disposal of hazardous wastes.	Contractor	CSC	Hazardous Wastes (Management and Handling) Rules, 2008 / PART II: MoRTH Specification 111.4
		Adequate no. of toilets with sewage collection system and septic tanks and soak pits should be provided separately for males and females in construction camps and labour camps.	Contractor	CSC	MoRTH Specification 111.1

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
	Setting up of all project facilities like construction camp, labour camp, quarry, borrow area and debris disposal site (Contd. from above)	Management Plans approved by the CSC should be strictly adhered to while setting up the sites and camps.	Contractor	CSC	MoRTH Specification 111.1
		Permissions Obtain required permissions before starting the operation of the camp as per the details given in **Annexure 3.43**.	Contractor	CSC	MoRTH Specification 111.1
		Contour trenches should be made around the quarry and crusher as presented in **Annexure 3.46** to catch the sediments in surface run off and prevent surface water pollution.	Contractor	CSC	MoRTH Specification 111.3
		Minimum distance of any sewage or toilet facility from water sources should be 60 metres.	Contractor	CSC	MoRTH Specification 111.1
		Mitigation Measures for Impacts on Air and Noise			
		Arrangements should be made for regular sprinkling of water for dust suppression in construction camp, quarry areas, stone crushing units, access roads and borrow areas to control the air pollution due to dust.	Contractor	CSC	MoRTH Specification 111.1
		All dust producing units should be housed in a building with suitable wall, roofing and flooring. Dust extraction units with a collection system should be provided in the crusher unit and all transfer points.	Contractor	CSC	MoRTH Specification 111.8
		Roads inside the construction camp and stone crusher premises should be paved.	Contractor	CSC	MoRTH Specification 111.1
		All the vehicles should have Pollution Under Control certificate	Contractor	CSC	MoRTH Specification 111.1
		Stack height and emission level of diesel generator in construction camp and crusher should meet the TNPCB guidelines to reduce air pollution.	Contractor	CSC	MoRTH Specification 111.1
	Setting up of all project facilities like construction camp,	Hot mix plants should have the latest, advanced pollution control measures available in the country.	Contractor	CSC	MoRTH Specification 111.5 and

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
	labour camp, quarry, borrow area and debris disposal site (Contd. from above)				Section IX Particular Conditions (PC) Part B – Special Provisions, Sub clause 21.0
		Stack height and emission level of hot mix plants should meet the TNPCB guidelines. Diesel generator should have noise control measures to meet the noise standards set by Central Pollution Control Board (75 dB(A) at 1 m from the enclosure surface for generators with integral acoustic enclosure. Acoustic enclosure for generators without integral acoustic enclosure shall be designed for minimum 25 dB(A) insertion loss or for meeting the ambient noise standards, whichever is on the higher side at 0.5 m from the enclosure).	Contractor	CSC	MoRTH Specification 111.5 and System & procedures for compliance with noise limits for DG Sets upto 1000 KVA, CPCB, 2008.
		Noise level of vehicles used for construction activities should meet the noise standards set by Central Pollution Control Board (maximum 80 dB(A)).	Contractor	CSC	Environment Protection (Amendment) Rules, 2005
		Mitigation Measures for Impacts on Biological Environment			
		Green belt development along the camp boundary should be undertaken. No. of trees planted should not be less than ten times the number of trees cut.	Contractor	CSC	MoRTH Specification 111.1
		LPG should be provided for cooking to avoid firewood collection from forest or nearby areas.	Contractor	CSC	MoRTH Specification 111.1
		Mitigation Measures for Socio - Economic Impacts			

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
		Safe drinking water and sanitation facilities comprising toilets, sewage collection system and septic tanks should be made available to the construction workers in all the camps and sites.	Contractor	CSC	MoRTH Specification 111.1
	Setting up of all project facilities like construction camp, labour camp, quarry, borrow area and debris disposal site (Contd. from above)	Personal protective equipments such as ear plugs, helmets, goggles, gloves etc. should be made available to the workers in construction camp, quarry areas, stone crusher unit and borrow areas.	Contractor	CSC	MoRTH Specification 111.1
		Labour camps should not be constructed with inflammable materials. Fire safety standards should be followed in both construction camp and labour camp construction.	Contractor	CSC	MoRTH Specification 111.6
		Fire fighting equipments like fire extinguishers shall be provided in the camp as per fire safety standards.	Contractor	CSC	MoRTH Specification 111.1
		Fencing should be provided for all the camps and sites to prevent trespassing of humans and animals into the camp.	Contractor	CSC	MoRTH Specification 111.1
		Operation manuals and training should be provided to machine operators. Warning signs should be placed at accident prone areas.	Contractor	CSC	MoRTH Specification 111.1
		Other provisions to ensure worker's safety shall be followed as per guidelines given in **Annexure 3.9**.	Contractor	CSC	MoRTH Specification 111.6
		Mitigation Measure for Impacts due to Solid Waste Generation			
		There should be provision of adequate space in all the camps and sites for segregated waste collection and waste handling.	Contractor	CSC	MoRTH Specification 111.1
		There should be provision of separate waste bins for bio-degradable, non-degradable and domestic hazardous waste in the camps / sites.	Contractor	CSC	MoRTH Specification 111.1
		Comprehensive waste management plan to be prepared based on the guidelines given in **Annexure 3.6**. Debris / solid waste should be disposed in debris disposal site	Contractor	CSC	MoRTH Specification 111.10

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
		approved by CSC and based on the comprehensive waste management plan.			
B.1.2.	Clearing, grubbing and stripping, cutting of earth, filling, demolition	**Mitigation Measures for Impacts on Land and Water**			
		Topsoil conservation should be undertaken as per guidelines given in **Annexure 3.7** to prevent its loss.	Contractor	CSC	MoRTH Specification 111.4
		Ten times the no. of trees cut should be planted, wherever space is available along the road and in identified government premises.	Contractor	CSC	BOQ No. 11
		The plants should be provided with adequate protection from animals and proper monitoring shall be carried out to ensure their survival and growth. Landscaping should be done with a lag of 3 to 4 months from the start of the work on any section. The section shall be deemed to be completed when the landscaping is over.	Contractor	CSC	MoRTH Specification 111.1
		Avoid dumping of earth into canals, drainage channels and water bodies. Earth, stone or any other construction material shall be properly disposed off safely so that the flow of water in cross drainage channels is not blocked.	Contractor	CSC	MoRTH Specification 111.1
		As far as possible avoid earthworks construction activity during monsoon.	Contractor	CSC	MoRTH Specification 111.4
		If any existing irrigation and drainage system ponds are damaged, they shall be suitably repaired.	Contractor	CSC	MoRTH Specification 111.4
		Mitigation Measures for Impacts on Air and Noise			
		Water should be sprinkled to suppress dust during any dust generating activity.	Contractor	CSC	BOQ No 11
		For cutting of rocks, instead of mechanical blasting, rock cutting process should be carried out to reduce the noise pollution.	Contractor	CSC	MoRTH Specification 111.1
		Machinery and vehicles should be well-maintained to keep their	Contractor	CSC	MoRTH

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
		noise to a minimum.			Specification 111.1
		Mitigation Measures for Socio-Economic Impact			
		Provide adequate signages and cordon off the activity area so as to ensure the safety of the pedestrians and passers by. Temporary access should be maintained throughout the course of the work unless the contractors make agreements with any affected frontages or legitimate road user.	Contractor	CSC	MoRTH Specification 111.1
		Mitigation Measures for Impacts due to Solid Waste Generation			
		Tree wastes should not be burned at site. They should be disposed off at debris disposal site or sold off as firewood. Over burden to be disposed off in the sites identified for the same as per the Comprehensive Waste Management Plan prepared based on guidelines given in **Annexure 3.6**.	Contractor	CSC	MoRTH Specification 111.1
B.1.3.	Demolition	Sprinkling of water should be carried out on site to suppress fugitive dust emissions.	Contractor	CSC	BOQ No. 11
		Debris to be disposed off in the sites identified for the same as per guidelines given in **Annexure 3.5.**	Contractor	CSC	MoRTH Specification 111.10
B.2. Construction Activities					
B.2.1	Operation of construction camp, quarry, stone crusher units, borrowing of earth and functioning of labour camps	**Mitigation Measures for Impact on Land and Water**			
		Proper maintenance of vehicles and machineries should be carried out to minimize the spillage of oil. Maintenance should be carried out on impervious platforms with spill collection provisions. Oil and grease waste generated from garages in construction camps should be drained out through catch drains and oil interceptors. Vehicle maintenance and refueling should be confined to areas in construction camps designed to contain spilled lubricants and fuels.	Contractor	CSC	MoRTH Specification 111.4
		Sanitation facilities, storm water drainage, catch drains and oil interceptors should be maintained properly.	Contractor	CSC	MoRTH Specification

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
					111.1
		Management plans prepared for all project facilities and approved by the CSC should be strictly adhered to.	Contractor	CSC	MoRTH Specification 111.1
		Adequate care should be taken so that natural drainage patterns are not altered or blocked, while quarrying, borrowing, disposing off the over burden or any debris.	Contractor	CSC	MoRTH Specification 111.1
		Mitigation Measures for Impacts on Air			
		Emission levels of all vehicles, plants and machineries should be well within the prescribed limits. PUC certificates of all vehicles and machineries should be renewed at required intervals. Mixing equipment should be well sealed, and be equipped with a dust-removal device. Filtering mechanisms like air filter and water filter should be operational.	Contractor	CSC	MoRTH Specification 111.8
		Roads inside the construction camp and crusher premises should be tarred or concreted.	Contractor	CSC	MoRTH Specification 111.1
		Water sprinkling should be undertaken for dust suppression. Provide sufficient water storage facility for 2 days use.	Contractor	CSC	BOQ No.11
		LPG should be provided for cooking and use of fire wood for cooking or any other purpose should be strictly banned.	Contractor	CSC	MoRTH Specification 111.1
		Air quality monitoring should be conducted at hot mix plant, quarry site and crusher location as per Environmental Monitoring Plan so that appropriate measures are taken up towards abatement of pollution. Monitoring results should be compared with NAAQS given in **Annexure 3.62**.	Contractor	CSC	PART II: MoRTH Specification 111.1

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
		Mitigation Measures for Impacts on Noise			
		In construction camp: Vehicles used for construction activities should be maintained well, so as to ensure that the noise levels continues to be within the noise standards set by Central Pollution Control Board (maximum 80 dB(A)).	Contractor	CSC	Environment Protection (Amendment) Rues, 2005.
	Operation of construction camp, quarry, stone crusher units, borrowing of earth and functioning of labour camps (Contd. from above)	At construction camps within 150 m of human settlements, noisy construction should be stopped between 10:00 pm and 6:00 am.	Contractor	CSC	MoRTH Specification 111.1
		In quarry and crusher units: Controlled blasting techniques should be adopted in quarries. Conduct quarrying in a skillful, scientific and systematic manner. Follow a routine and preventive maintenance procedure for the DG set in consultation with the DG set manufacturer. The stack height of the DG set has to be adequate as per the guidelines of TNRSP.	Contractor	CSC	MoRTH Specification 111.3
		Workers shall not be exposed to sound of more than 85 – 90 DB for more than eight hours a day and shall be provided with ear plugs. Noise level monitoring should be conducted at sensitive receptor locations as well as hot mix plant, quarry site and crusher location as per Environmental Monitoring Plan so that appropriate measures are taken up towards abatement of pollution. Monitoring results should be compared with NAAQS for Noise given in **Annexure 3.62**.	Contractor	CSC	MoRTH Specification 111.1
		Mitigation Measures for Impacts on Biological Environment			
		Saplings planted for green belt development should be properly taken care of and protected to ensure their survival and growth.	Contractor	CSC	MoRTH Specification 111.1
		If the camp is located near the forest or private plantations, orient the labourers to refrain from any activities involving poaching, NTFP collection or spread of forest fire.	Contractor	CSC	MoRTH Specification 111.1
		Mitigation Measures for Socio-Economic Impacts			

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
		Provision of safe drinking water and access to sanitation services should be continued at satisfactory service levels.	Contractor	CSC	MoRTH Specification 111.1
		Construction workers should use the personal protective equipments provided to them and it shall be replaced if necessary. Fire fighting equipments like fire extinguishers provided in the camp should be maintained well.	Contractor	CSC	MoRTH Specification 111.1
		Fencing of the camp to prevent trespassing of humans and animals into the camp should be maintained properly.	Contractor	CSC	MoRTH Specification 111.1
		To the extent possible local people should be included in the labour force so that there are less incidence of crime. Information dissemination should be undertaken to generate awareness among migrant labourers about the sensitivities of the local region with respect to rules, laws, local customs and beliefs.	Contractor	CSC	MoRTH Specification 111.1
	Operation of construction camp, quarry, stone crusher units, borrowing of earth and functioning of labour camps (Contd. from above)	Other provisions to ensure worker's safety shall be followed as per guidelines given in **Annexure 3.9**. Follow guidelines in **Annexure 3.11** to ensure safety in storage and handling of hazardous substances.	Contractor	CSC	MoRTH Specification 111.6 and Section VII General Conditions of Contract - Sub Clause 4.8 and 6.7
		On occurrence of any accident or injury, the safety officer should submit an accident report to the CSC in the format given in **Annexure 3.36.**	Contractor	CSC	MoRTH Specification 111.1
		Mitigation Measures for Impacts due to Solid Waste Generation			
		Waste petroleum and lubricants should be collected and sold out to approved oil recycling agencies. Other solid wastes should be collected and taken to approved	Contractor	CSC	MoRTH Specification 111.1

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
		disposal sites, according to GOI laws.			
		Periodical maintenance of waste handling space should be undertaken in construction camp and labour camp. All types of solid waste should be collected and disposed of frequently as per Comprehensive Waste Management Plan. Debris / solid waste should be disposed in debris disposal site approved by CSC. Guidelines for management of debris disposal given in **Annexure 3.6** should be followed.	Contractor	CSC	MoRTH Specification 111.10
B.2.2.	Extraction of Surface water	Water should be drawn from only those sources that have got prior approval of CSC. Over extraction of surface water should be avoided.	Contractor	CSC	MoRTH Specification 111.1
B.2.3.	a) Transportation of materials b) Scarifying of existing bituminous layer	**Mitigation Measures for Impacts on Land and Water**			
		Vehicles and machinery should be maintained and refilled in such a fashion that fuel spillage does not contaminate the soil and their emission levels are as per norms of state PCB. Fuel storage and refilling sites should be kept away from cross drainage structures and important water bodies.	Contractor	CSC	MoRTH Specification 111.1
		Existing project road and haul roads maintenance should be undertaken regularly to reduce the damage due to over use and for easy plying of construction vehicles as well as regular local commuters.	Contractor	CSC	MoRTH Specification - 111.11
		Washing of vehicles, construction equipments and machineries near/inside the water bodies should be avoided to prevent water contamination.	Contractor	CSC	MoRTH Specification 111.4
		Mitigation Measures for Impacts on Air and Noise			
		All vehicles should have PUC certificates. Dust covers/ tarpaulins should be provided to cover construction	Contractor	CSC	MoRTH Specification -

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
		material loaded on trucks.			111.8
		Idling of delivery trucks or other equipment shall not be permitted during periods of unloading or when they are not active.	Contractor	CSC	MoRTH Specification 111.1
		Sprinkling of water should be carried out along the haul road at least twice a day on a regular basis during the entire construction period especially in the winter and summer seasons.	Contractor	CSC	BOQ No. 11
		Wherever the haul road is passing within 150 mts of human settlements, the transportation of material shall be stopped during night time (between 10:00 pm and 6:00 am.). At construction sites within 150 m of human settlements, noisy construction should be stopped between 10:00 pm and 6:00 am. Near sensitive receptors use temporary noise barriers and avoid work at night.	Contractor	CSC	MoRTH Specification 111.1
		Mitigation Measures for Socio-Economic Impacts			
		Workers should be provided with personal protective equipments such as ear plugs, helmets, goggles, gloves etc.	Contractor	CSC	MoRTH Specification 111.1
		Other provisions to ensure worker's safety should be followed as per guidelines given in **Annexure 3.9.**	Contractor	CSC	MoRTH Specification - 111.6
		Traffic Management Plan shall be prepared based on guidelines presented in **Annexure 3.10** to reduce the disruption of traffic.	Contractor	CSC	MoRTH Specification 111.1
		Diversion roads should be paved, adequate traffic safety measures should be adopted**.**	Contractor	CSC	MoRTH Specification 111.1

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
		Mitigation Measures for Impacts due to Solid Waste Generation			
		Scarified material shall not be disposed off anywhere in an unscientific and unsafe manner. Scarified material should be reused for construction of internal roads within camps and sites.	Contractor	CSC	MoRTH Specification 111.1
B.2.4.	Compacting earth and laying of sub-base course, base course, construction of bridges, culverts, other structures etc.	**Mitigation Measures for Impacts on Land and Water**			
		Vehicles, machinery and equipments used in construction should be maintained and refilled in such a fashion that fuel spillage does not contaminate the soil or water. Construction vehicles should operate within the Corridor of Impact avoiding damage to soil and vegetation.	Contractor	CSC	MoRTH Specification 111.4
		Fuel storage and refilling sites should be kept away from cross drainage structures and important water bodies.	Contractor	CSC	MoRTH Specification 111.1
		All construction operators, drivers and workshop personal should be trained well so that they can take immediate measures for the spill of contaminate. All spills and construction debris should be disposed off in the sites identified for the same as per guidelines and the site should be fully cleaned before handing over.	Contractor	CSC	MoRTH Specification 111.1
		Construction of foundation of bridges/ culverts during monsoon season should be avoided.	Contractor	CSC	MoRTH Specification 111.1
		Adopt necessary measures to prevent the wastewater produced during construction from entering directly into water bodies.	Contractor	CSC	MoRTH Specification 111.1
	Compacting earth and laying of sub-base course, base course, construction of bridges, culverts,	**Mitigation Measures for Impacts on Air**			
		Road surface should be cleaned with air compressor and vacuum cleaners prior to the construction works. Manual labour using brooms and blowing of air should be avoided.	Contractor	CSC	MoRTH Specification 111.1

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
	other structures etc. (Contd.)	Sprinkling of water on site to aid compaction of the material and for dust suppression.	Contractor	CSC	BOQ No. 11
		The construction operations during nights, especially in the winter season shall be carried out under restricted conditions.	Contractor	CSC	MoRTH Specification 111.1
		Mitigation Measures for Impacts on noise			
		Construction contract shall clearly specify the use of equipment emitting noise of not greater than 90 dB (A) for the eight hour operation shift.	Contractor	CSC	MoRTH Specification 111.1
		For protection of construction workers, earplugs shall be provided to those working very close to the noise generating machinery.	Contractor	CSC	MoRTH Specification 111.1
		At construction sites within 150 m of human settlements, noisy construction shall be stopped between 10:00 pm and 6:00 am	Contractor	CSC	MoRTH Specification 111.1
		Near sensitive receptors use temporary noise barriers and avoid work at night. Public will be informed about the regulations on noise of vehicles. Proper signboards should be erected near sensitive receptors.	Contractor	CSC & PIU	MoRTH Specification 111.1
	Compacting earth and laying of sub-base course, base course, construction of bridges, culverts, ROB, other	**Mitigation Measures for Impacts on flora and fauna**			
		Construction activity in and near water bodies should be restricted during breeding period of aquatic life.	Contractor	CSC & PIU	MoRTH Specification 111.1
		Mitigation Measures for Socio-Economic Impact			
		Traffic Management Plan should be prepared based on guidelines presented in **Annexure 3.10**.	Contractor	CSC & PIU	BOQ No. 11
		Diversion roads to be paved, adequate traffic safety measures to be adopted.	Contractor	CSC & PIU	MoRTH Specification 111.1

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
	structures etc. (Contd.)	All contractors' staff should wear high visibility purpose made overalls or trousers/a waist coat at all times All operators working with any materials above head height (even in trenches) should wear hard hats all at times on the worksite.	Contractor	CSC & PIU	MoRTH Specification 111.1
		Other provisions to ensure worker's safety should be followed as per guidelines given in **Annexure 3.9**. On occurrence of any accident or injury, the safety officer should submit an accident report to the CSC in the format given in **Annexure 3.36**.	Contractor	CSC & PIU	MoRTH Specification 111.6
		Mitigation Measures for Impacts due to Solid Waste Generation			
		If the site is within 100 Km from thermal power plant permission under Fly Ash Notification, 2007, to be obtained from regional office of MoEF for using fly ash in the construction process.	Contractor	CSC & PIU	MoRTH Specification 111.1
		Debris shall be collected in a scientific manner and to be disposed off in the sites identified for the same as per guidelines given in **Annexure 3.5**.	Contractor	CSC & PIU	MoRTH Specification 111.10
B.2.5	Debris disposal	As far as possible, use the debris to interior unpaved road or the approach roads / haul roads to strengthen it. It can also be used for filling of low lying play grounds etc.	Contractor	CSC & PIU	MoRTH Specification 111.10
		Provide proper drainage facility so that the sites do not contaminate any water sources, rivers etc.	Contractor	CSC & PIU	MoRTH Specification 111.1
B.2.6	Roadside plantation and landscaping	The compensatory avenue plantation shall be taken up at the onset of monsoon season as per IRC: SP 21-2009 "Guidelines on Landscaping and Tree Plantation" and in consultation with the State Forest Department. Compensatory tree plantation at a rate of ten per each tree removed.	Contractor	CSC & PIU	MoRTH Specification 111.1
		Debris to be disposed off in the sites identified for the same as per guidelines in **Annexure 3.5.**	Contractor	CSC & PIU	MoRTH Specification 111.10
C. Post construction / Operational Phase					

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
C.1.	Redevelopment of construction and labour camp sites, quarry and crusher sites, borrow areas.	**Mitigation Measures for Impacts on Land and Water**			
		Should be undertaken depending on the type of redevelopment envisaged in the redevelopment plan.	Contractor	CSC / PIU	MoRTH Specification 111.2 and 111.3
		All the temporary structures should be cleared as per redevelopment plan. All building debris, garbage, night soils and POL waste should be disposed off safely and the site should be fully cleaned before handing over. All disposal pits or trenches should be filled, disinfected and effectively sealed off.	Contractor	CSC / PIU	MoRTH Specification 111.1, 111.2 and 111.3
		Plantation along the boundary, erosion control measures, leveling or slope stabilization measures should be undertaken based on the activities envisaged in redevelopment plans approved by the CSC.	Contractor	CSC / PIU	MoRTH Specification 111.3 and 111.2
		All measures envisaged in redevelopment plans approved by the CSC shall be undertaken.	Contractor	CSC / PIU	MoRTH Specification 111.1
		Mitigation Measures for Impacts on water			
		Based on the quarry redevelopment plan approved by the CSC necessary development activity like water recharging or developing it into a fishing pond shall be undertaken.	Contractor	CSC / PIU	MoRTH Specification 111.3
		Depending upon the type and form of rehabilitation to be adopted slope stabilization measures and small bund creations may be undertaken in borrow areas.	Contractor	CSC / PIU	MoRTH Specification 111.2
		Mitigation Measures for Impacts on Biological Environment			
		Plantations along the boundary shall be undertaken. Surplus trees after avenue plantation will be utilized for green belt development of exhausted borrow areas.	Contractor	CSC / PIU	MoRTH Specification 111.1

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
		Mitigation Measures for Socio-economic Impacts			
		Involve local community in the implementation of redevelopment plan of quarry sites and borrow areas.	Contractor	CSC / PIU	MoRTH Specification 111.3
C.2.	Operationalisation of the project stretch	Regular maintenance of plantations especially during summer season until defect liability period gets over.	Contractor	PIU	MoRTH Specification 111.1
		Necessary signboards should be put up to inform the public about the restrictions on horn at sensitive locations like schools and hospitals along the road.	Contractor	PIU	MoRTH Specification 111.1

TABLE 3.3. CORRIDOR SPECIFIC ENVIRONMENTAL MANAGEMENT ACTION PLAN FOR PIU AND CSC

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
A. Design / Project Preparation Phase					
A.1.	Designing of Project Road	Cultural properties along the alignment were identified. Religious structures were avoided by adjustment of alignment. (Refer **Annexure 3.61**).	Design Consultant and Contractor	PIU	EMAP
		Issues raised in public consultations were examined and suitably incorporated based on merit. These include bus shelter areas, parking areas and other road safety measures.	Design Consultant and Contractor	PIU	EMAP
		Road safety issues due to acute curves have been addressed by road realignment as given in **Table 4.0** in **Annexure 3.56** and according to **Annexure 3.47.**	Design Consultant and Contractor	PIU	EMAP
		Loss of existing bus stops and waiting shed facilities were addressed by suitably relocating or integrating them to the design (Refer **Annexure 3.49**). Bus lay bys and bus waiting shed designs are provided in **Annexure 3.59.**	Design Consultant and Contractor	PIU	EMAP
		Accident black spots were addressed by improving the road surface, road geometry, pedestrian facilities and bus bays. (Refer **Annexure - 3.49**). Signages were given a high priority for all road junctions.	Design Consultant and Contractor	PIU	EMAP
B. Pre-Construction Phase					
B.1	Clearing the site	All the cultural properties and common property resources being impacted due to the project should be relocated with prior approval of the concerned community / departments/ agencies before starting the construction. (Refer **Annexure 3.61**). List of affected cultural properties along the project road is presented in Section 6.7 of RAP Report. Section 10.1.1 of RAP Report mentions role of supporting implantation agency in carrying out RAP & TDP for the project.	Contractor	CSC	NA
B.2.	Clearing of Avenue Trees	Chainage wise number of trees to be felled for the corridor is shown in **Annexure 3.55.** Small trees girth size <30cm shall be suitably transplanted to nearby puramboke land or within the available RoW wherever possible.	Contractor	CSC	BOQ No. 1

TABLE 3.4. CORRIDOR SPECIFIC ENVIRONMENTAL MANAGEMENT ACTION PLAN FOR CONTRACTOR

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
A. Construction Phase					
A.1. Site Preparation Activities					
A.1.1.	Material sources	**Mitigation Measures for Impact on Land and Water**			
		Sourcing of materials from approved sources as per **Annexure 3.53 and 3.54.** Soak pits at hand pumps/ wells are provided in along the project corridor. (refer **Annexure 3.59**). Rain water harvesting pits are proposed at rural areas for every 500m interval for each kilometer to enhance the ground water table in the project region (refer **Annexure 3.59**).	Contractor	CSC	BOQ 13. 1.3 Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GENERAL/09 & Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GENERAL/10
A.2. Construction Activities					
A.2.1.	All types of construction activities including compacting earth, laying of sub-base course, base course, construction of bridges, culverts, other structures etc.	**Mitigation Measures for Impacts on Land and Water**			
		Retaining walls with cross drainage structures to be constructed at locations given in **Annexure 3.47**, where there are filling of low lying areas and construction of embankments.	Contractor	CSC	EMAP
		The foundation area should be separated from other areas with an impervious barrier. This barrier will act as a settling tank for the solids and will prevent substantial increase in the turbidity of surrounding water. The sludge should be removed periodically and disposed off in the selected construction debris disposal sites. This has to be taken care of at locations given in **Annexure 3.52**, where there are water bodies and at locations given in **Annexure 3.48,** where there are filling of low lying areas and construction of embankments.	Contractor	CSC	EMAP

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
		At locations where the proposed road crosses water body enhancement measures should be undertaken. (refer **Annexure 3.52**).	Contractor	CSC	BOQ No. 13.1
		To reduce flooding and water logging, the cross drainage structures should be provided at locations given in **Annexure 3.47** and **Annexure 3.51**.	Contractor	CSC	BOQ No. 5
		Water quality monitoring shall be conducted along project stretch as per Environmental Monitoring Plan so that appropriate measures are taken up towards abatement of pollution. Monitoring results should be compared with surface & ground water standards given in **Annexure 3.62**.	Contractor	CSC	BOQ No. 13.4.3 & 13.6.3
		Mitigation Measures for Impacts on Air			
	All types of construction activities including compacting earth, laying of sub-base course, base course, construction of bridges, culverts, other structures etc.	Air quality monitoring shall be conducted along project stretch as per Environmental Monitoring Plan so that appropriate measures are taken up towards abatement of pollution. Monitoring results should be compared with NAAQS given in **Annexure 3.62**.	Contractor	CSC	BOQ No. 13.4.1 & 13.6.1
		Mitigation Measures for Impacts on Noise			
		Near sensitive receptors as listed in **Annexure 3.50** use temporary noise barriers and avoid work at night.	Contractor	CSC	EMAP
		Construction of noise barriers (stone walls and planting) for silence zones including schools and hospital. [Refer **Appendix 3.50**]. Design for noise barrier provided in **Appendix 3.59**.	Contractor	CSC	BOQ No. 13.5.2
		Noise quality monitoring shall be conducted at the site of project facilities as per Environmental Monitoring Plan so that appropriate measures are taken up towards abatement of pollution. Monitoring results should be compared with NAAQS for Noise given in **Annexure 3.62**.	Contractor	CSC	EMAP
		Mitigation Measures for Impacts on Biological Environment			
		Compensatory tree planting at the rate of ten per each tree removed. (refer .**Annexure 3.55** for details of tree removal). List of indigenous tree is shown in **Table 3.0** in **Annexure 3.56**. The project tree planting strategy is provided in **Annexure 3.56.**	Contractor	PIU	BOQ No. 13.2

Sl. No.	Activity	Management and mitigation measures	Implementing organisation	Monitoring organisation	Reference
		Tree planting in cultural Property locations and govt. premises given in **Table 3.0 and 4.0** in **Annexure 3.56** (also refer **Annexure 3.59) .**	Contractor	PIU	BOQ No. 13 Dwg. No. Vol.12/Part IV/TNRSP II/COR5/CP/ 01 – 04 & Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GP /05 -08
		Mitigation Measures for Socio-Economic Impact			
		Bus shelters and bus laybyes should be constructed at locations identified in **Annexure 3.49** and **Annexure 3.59**.	Contractor	PIU	BOQ No. 13 Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GE NERAL/11-12
		Information boards showing name of rivers, pilgrim sites, tourist locations as per the environmental enhancements (Refer **Annexure 3.52** and **Annexure 3.58**).	Contractor	PIU	BOQ No. 9

CHAPTER 4. ARRANGEMENTS FOR THE IMPLEMENTATION OF EMAP

The Environmental Management Action Plan (EMAP) (Provided as Table 1), which is an integral part of the Environmental Management Plan, identify the detailed impacts, propose the mitigation actions, mention the implementing organization and monitoring organization. The responsibility for the implementation of EMP involves a number of parties, each with specific responsibilities. They are listed as follows:

- Project Implementation Unit (PIU), that represents TNRSP and is directly responsible for implementing the project
- Construction Supervising Consultant (CSC), who will be in charge of supervising the Contractor
- Construction Contractor, who is in charge of undertaking road construction work.

This chapter looks into the organisation and staffing of each of these stakeholders along with their responsibilities.

4.1. ORGANISATION, STAFFING AND RESPONSIBILITIES OF PIU

Project Implementation Unit (PIU) for the project under scrutiny of TNRSP, in general, as the project proponents, are responsible for the implementation of all road improvement works and environmental management activities. The TNRSP is executing the project work under the guidance of Project Director (PD) as its head. The Project Director is assisted on all technical issues by one Chief Engineer (Projects), one Superintendent Engineer, one Executive Engineer (Environment) and sociologist and Assistant Executive Engineer and Assistant Engineers.

Each project activities in the site will be distributed among groups to ensure the implementation of project work in the scheduled date. Superintending Engineer (operation) is in charge for review the implementation of EMP with the assistance of one Environmental Specialist (ES), and 2 Assistant Environmental Scientist followed by environmental supporting team. The team will oversee the project related management activities of the project including the overall control of construction activities and implementation of contracts.

The implementation of mitigating measures requires supervision from adequately trained staff within the TNRSP. The institutional organisation for EMP implementation is shown in **Figure 4.1, Figure 4.2** and **Figure 4.3** shows a very flexible and practical Environmental Management Unit (EMU). The detailed structure of TNRSP is separately captured in **Figure 4.3**.

Responsibilities of Project Director: A Project Director (PD) will have overall responsibility for the successful planning, execution, monitoring, control and closure of a project. S/he is responsible for acquisition of all necessary right-of-way (ROW) land and buildings, review and approval of detailed road designs, responsible for ensuring in obtaining all necessary clearances for construction and related activities, review and approval of the road realignments and road works (including retaining walls and excavation sites) and liasoning with supervision consultants. The statutory consents and other approvals required prior to the construction like tree cutting permission will also be obtained by the Project Director (PD). The Project Director is also responsible for managing the work of consultants, allocating and utilising resources in an efficient manner and maintaining a co-operative, motivated and successful team. Chief Engineer

and Environmental Specialist will assist Project director to reporting various stakeholders (World Bank, Regulatory body etc.). The Project Director must ensure that appropriate time, quality and cost monitoring and reporting systems are in place and that they receive the report on a regular basis.

Responsibilities of Chief Engineer: The Superintending Engineer and Environmental Specialist (ES) of Project Implementation Unit (PIU) assists the Chief Engineer in the overseeing of environmental aspects of the construction contracts, including the enforcement of all monitoring provisions, and advice on the locations of construction and labour camps, etc. Ensuring compliance with legislative requirements, standards and statutory connected to environmental quality, health and safety, security, privacy and dignity is also the responsibility of the CE. Further, providing technical advice relating to environmental issues, enforcing and monitoring compliance the requirements of the EMP on site, assessing the Contractor's environmental performance in consultation with the Environmental specialist are also the responsibility of the CE.

Responsibilities of Superintending Engineer: The Environmental Specialist (ES) of Project Implementation Unit (PIU) assists the Superintending Engineer in the overseeing of environmental aspects of the construction contracts, including the enforcement of all monitoring provisions, and advice on the locations of construction and labour camps, etc. He will Review of periodic reports on EMP implementation and advising Project Director in taking corrective measure and conduct periodic field inspection of EMP implementation.

Responsibility of Environmental Specialist: He is familiar with the Indian environmental legislation, environmental monitoring, EMP implementation aspects etc. The Environmental specialist shall oversee day to day implementation of the environmental management plans pertaining to the construction contract for various road Corridors and is also responsible for monitoring reports to World Bank. Additional recruitment if needed will be undertaken as necessary on contract basis. He will be responsible for obtaining regulatory clearances. He will coordinate with CSC to conduct necessary training program for the workers, engineers and office staffs. Briefing the Contractor about the requirements of the Environmental Specification and/ or EMP, as applicable, advising the Engineer about the interpretation, implementation and enforcement of the Environmental Specification and other related environmental matters, monitoring and reporting on the performance of the contractor/project in terms of environmental compliance with the EMP to the Superintending Engineer and Chief Engineer; and providing technical advice relating to environmental issues are also the responsibility of the Environmental Specialist.

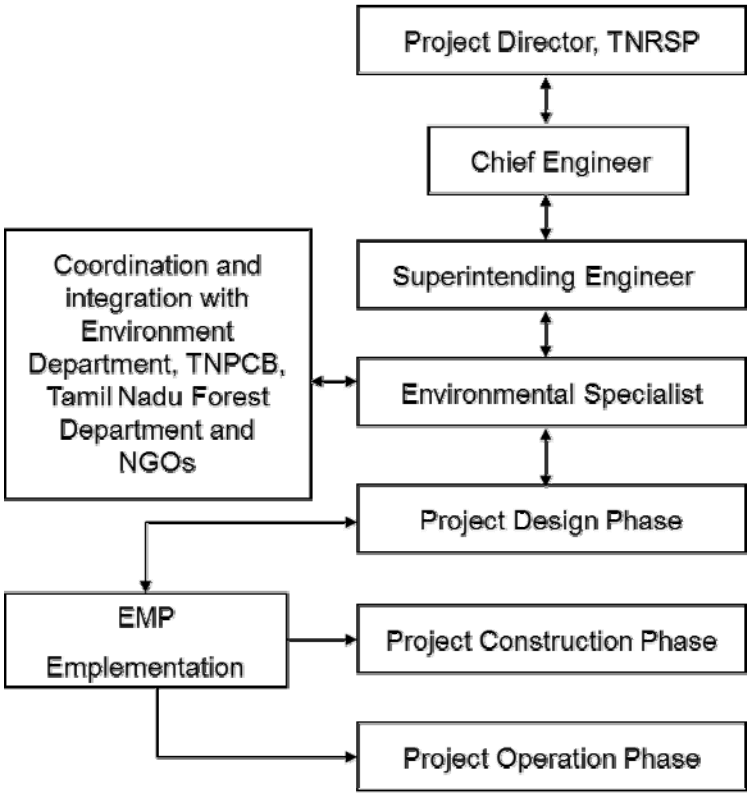


FIGURE 4.1. INSTITUTIONAL ORGANISATION FOR TNRSP EMP IMPLEMENTATION

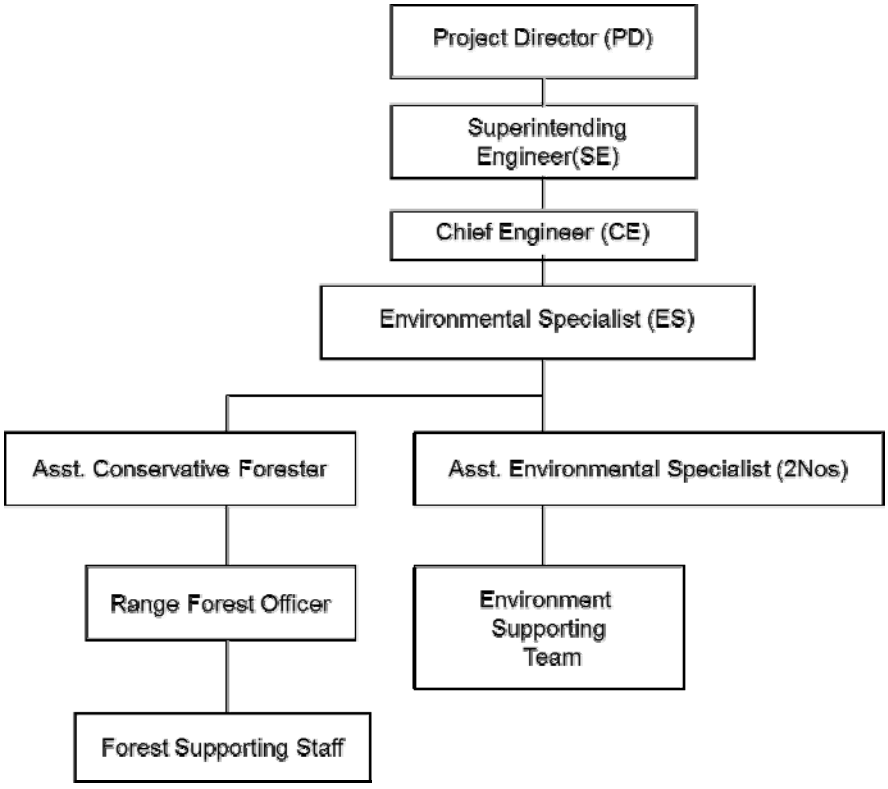


FIGURE 4.2. ENVIRONMENTAL MANAGEMENT UNIT (EMU)

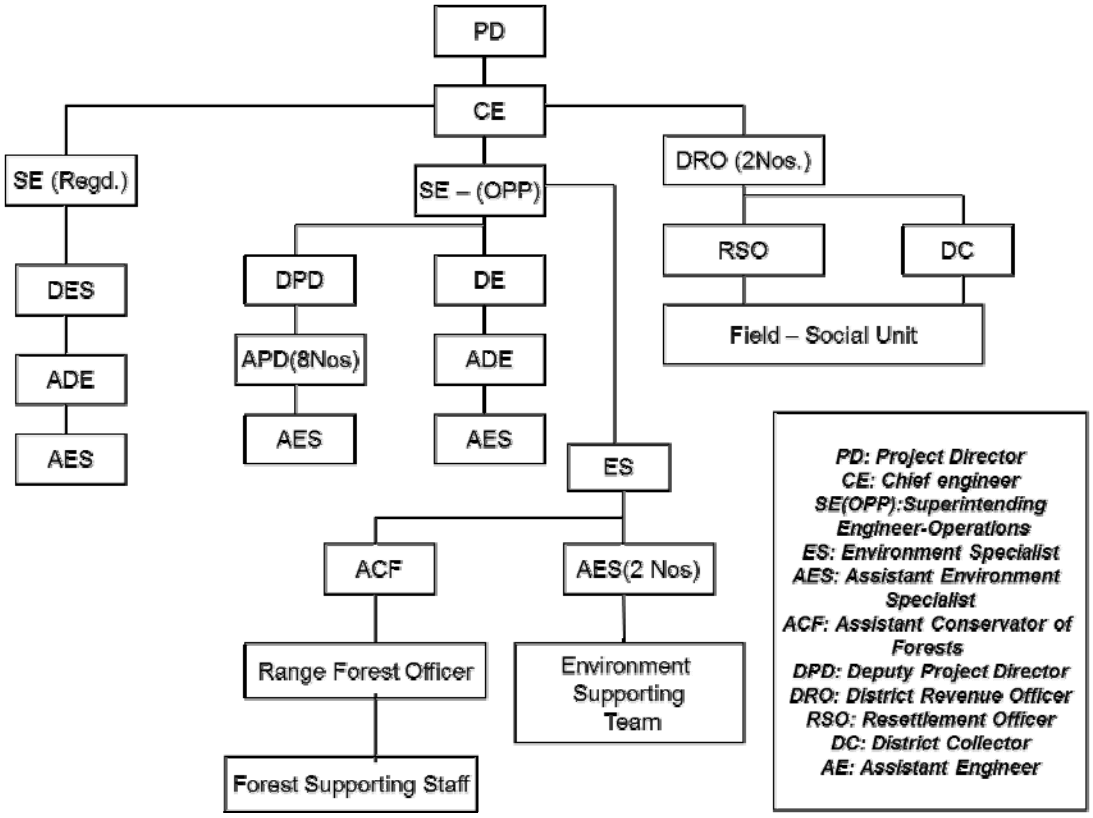


FIGURE 4.3. ORGANISATION STRUCTURE, TNRSP

Responsibility of Assistant Environmental Specialist

The main duties of the Assistant Environmental Specialist will include:

- Collection and dissemination of relevant environmental documents including amendments to environmental protection acts issued by the Government and various agencies such as the World Bank, Asian Development Bank (ADB) and other organisations.
- Co-ordination with non-government organisations (NGOs), community groups, government departments, etc. on environmental issues and obtaining the necessary clearances from the regulatory authorities.
- Monitoring the environmental aspects of the project during construction to ensure that the environmental requirements of the contract and the mitigation measures proposed in the EMP are implemented.
- Advising the Engineer and preparing the environmental input for the monthly progress report.
- Development of guidelines or a code of good practice on low-cost environmental measures that can be implemented in the road construction and maintenance programs for the Public Works Department.
- Development of environmental training activities for contractors and supervisory consultants staff.

- Assistance to local governments in the restoration of the environmentally degraded portions of any existing Right-of-Way, which may revert to their control due to the construction of realignments.
- Promotion of the policies adopted for the development of roadside amenities
- Assistance with the road safety components and issues related to the effects of roadside environment on road safety and non-motorised traffic.
- Laison with the EO of CSC and report to Superintending Engineer on all matters related to implementation of the Environmental Management Plan.
- Issuing completion certificate for constructed road works for payment.

4.2. ORGANISATION, STAFFING AND RESPONSIBILITIES OF CONSTRUCTION SUPERVISING CONSULTANT (CSC)

The Supervising Consultant will supervise the activities of the construction Contractor on behalf of Tamil Nadu State Sector Project and will be reporting directly to the Superintending Engineer. The Supervising Consultant will be responsible for the technical supervision of road layout, overseeing contract implementation and certifying works for payment.

The roles of Construction Supervision Consultant are described below:

- Supervision of the Contractor to ensure that work is undertaken according to the construction contract.
- Inspection and reporting of Contractor activities to ensure effective implementation of the EMP.
- Auditing of Contractor works and activities against the conditions put forward in the EMP.
- Issuing corrective action, requests and conduct follow up inspections and evaluation.
- Reporting any exceptions to the Project Director.
- Certifying completed constructed road works for payment.

The Construction Supervision consultants will have all the required specialists including an Environmental officer (EO) and a Senior Construction Safety Specialist. The brief description of qualifications, duties and responsibilities of the Team Leader, Senior Construction Safety Specialist and Environmental Officer of the Construction Supervision Consultants (CSC) are as follows:

Qualifications, roles and responsibilities of Team Leader: S/He shall be at least a graduate in Civil Engineering, with at least at least 20 years of professional experience out of which he should have worked as Team Leader/Project Manager or equivalent for minimum 4 years on supervision/construction of highway projects, preferably involving flexible pavements. Post Graduate qualification in civil engineering is desirable. His roles and responsibilities shall be as follows:

- S/He will be overall in-charge of the project supervision team.
- S/He shall be responsible for the overall implementation activities.

- S/He shall be assisted by key Professionals and other support Staff.
- S/He shall coordinate with the subordinate team to ensure that the construction process is well controlled as per established Procedures.
- S/He will interact with the client.

Qualifications, roles and responsibilities of Senior Construction Safety Specialist (SCSS): The candidate shall be at least a Graduate in civil engineering and preferably with post graduate qualification in Industrial and Construction safety. S/he needs a minimum of 10 years of relevant professional experience, out of which, s/he should have worked for at least 5 years at a road / bridge construction site in the capacity of a safety engineer. Experience in working on height / deep foundations and live traffic situation and imparting safety training to construction managers and workers will be highly desirable.

- The SCSS will report to the Team leader of the Construction Supervision Team.
- S/he will be responsible for reviewing and approving the construction zone safety plans and traffic management including all temporary works/staging along with the structural or bridge engineer to confirm the safety point of view.
- The Safety Specialist will be responsible to guide the field supervision team and contractors site officers and should confirm whether safety measurements implemented in the field are complying with safety standards.
- The safety specialist must report any job accident or safety violation to the concerned officials through team leader. When an employee is injured on the job, the construction safety officer will investigate the accident and handle any workers' compensation claims.
- The safety specialist shall teach proper safety and health procedures to the entire construction workers. Also, he should take initiatives to conduct training programmes and monk safety drills which will help to update safety procedures as well as the importance of reporting a safety concern or injury.

Qualifications, roles and responsibilities of Environment Officer (EO) of CSC: The candidate shall be M. Sc. Environmental Science or graduate in Civil / Environmental Engineering. The candidate shall have professional experience of at least 5 years relevant to environmental management in infrastructure projects. Experience in implementation of EMP in externally aided/FIDIC based major highway projects is preferable. He should have adequate experience in implementing EMPs and organizing training to Contractor's and Employer's staff. He should be familiar with requisite procedures involved in obtaining and implementing environmental clearance requirements for project roads.

- The Environmental Officer (EO) will report to the Team leader of the Construction Supervision Team. The EO shall not instruct or direct the Contractor or Contractor's men but can discuss various issues and environmental mitigation measures with all concerned directly or indirectly.
- All matters related to environmental and social activities within the ROW such as latest EIA, SEA, RAP and other related documents should be available to the EO immediately after mobilisation. The tree cutting permission and related conditions

and other approval status should be specified. A status report prepared by EMU of PIU would be required for the EO to start the work.

- The Environmental Officer (EO) should be mobilised during the early stages of construction. This is to help the Contractor in identifying environmentally sound locations for Construction camps, hot mix plant, WMM plant and all other issues according to the Environmental Management Action Plan (EMAP).
- The important role of EO during construction is to ensure the smooth implementation of EMAP and to address direct and indirect social issues arising out of implementation of the RAP.
- The EO should visit incomplete construction work sites where there are no contractor's current activities, active construction work sites and completed areas of the work sites and conduct regular meetings with the contractor in identifying gaps pertaining to both environment and construction safety. The EO will also visit the hot mix plant; quarries and crushers, borrow areas and others as per the necessity. EO has to ensure appropriate corrective and preventive action to the identified gaps in construction site in environmental aspects. Conduct regular meeting on environmental aspects with Environmental and Social Management Unit in TNRSP.
- The EO will assist the Engineer to ensure environmentally sound engineering practices. In addition, other specialists of the engineers team may also act and report on road safety related issues.
- The EO will carry out consultation with the Contractor, contractors men, local Project Affected People (PAPs) and interest groups. The EO will also consult with NGOs to consider any problems (e.g. access problem to school, buildings, houses and business establishments) arising from construction activities.
- The EO will assist in the compliance with various labour laws including the payment of minimum wages to the individual contract labourer's especially 'unskilled illiterate migrant labourers'. This has a direct bearing on the health and safety of the workers.
- The EO will assist the Contractor, and the Public Works Department in all matters related to public contacts including consultation, training and public relations.
- The EO will prepare standard formats (if available they may be obtained from other projects that are being implemented or are completed recently) for the compliance of the environmental and social requirements.
- The EO will ensure the procurement of materials that are included in the Bill of Quantities relating to environmental and social mitigation costs.
- The EO will assist the TNRSP and the Contractor in all training activities during construction supervision period.
- The EO will prepare and submit a regular report to the team leader of CSC.
- The EO will assist the various Environmental monitoring activities of the Contractor / TNRSP.
- The EO will be responsible to confirm whether the contractor has received all certifications in different sectors from the concerned authority to proceed the work.

- The EO in cooperation with the EO of PIU and Superintending Engineer will make sure that compensatory tree plantation shall be carried out through contractor. He should aware of the tree plantation procedure given in Annexure 3.56 'Landscaping, Tree Plantation and Environmental Enhancement Plan.

4.3. ORGANISATION, STAFFING AND RESPONSIBILITIES OF CONSTRUCTION CONTRACTOR

The construction Contractor shall be responsible for undertaking all duties and works assigned in the road construction contract as well as during operation & maintenance stage, including all specified conditions in the EMAP. The construction Contractor should prepare an implementation plan of mitigating actions specified in the EMP Activity Table. The Contractor will work closely with the Supervising Consultant to ensure that works are constructed to standard. Throughout this EMP, the construction Contractor is referred to as the 'Contractor' and the supervising Consultant is referred to as the 'Construction Supervising Consultant' (CSC). Detailed staffing pattern in the contractor's office is given below in **Table 4.1.**

TABLE 4.1. STAFFING PATTERN IN CONTRACTOR'S OFFICE

Sl. No.	Designation	Nos.
1	Contract Manager	1
2	Construction Planning Engineer	1
3	Site Engineer	4
4	Quality Control/Material Engineer	1
5	Bridge Engineer	1
6	Earth Works Supervisor	6
7	Pavement Supervisor	2
8	Environmental and Safety Engineer	1

Roles and Responsibilities of Team Leader of Contractor: The Team Leader of the Contractor shall be responsible for the timely implementation of EMP, as per the conditions stipulated in the Environmental Management Action Plan. S/he shall prepare an implementation plan of mitigating actions specified in the EMP Activity Table. H/she shall guide / supervise the ESE in ensuring that all construction work is undertaken in line with the requirements of EMP. The team leader shall ensure that the reporting procedures mentioned in EMAP and is adhered to and required reports and management plans are submitted to CSC on time. The corrective actions, as suggested by CSC shall also be implemented and reported. S/he shall have good understanding of the contractual clauses, especially the penalty clause given in sub-clause 10.3.4 as well as EMAP of this report. He also has to ensure that the responsibilities stipulated in EMAP for Defect Liability period are carried out2.

Qualifications, Roles and Responsibilities of Environment and Safety Engineer (ESE) of Contractor: The candidate shall be M. Sc. Environmental Science or B.Tech. in Civil / Environmental Engineering with two years field experience in environmental management of transportation projects.

The duties and responsibilities of the Environment and Safety Engineer in the contractor's team3 are as follows:

1. To ensure that all the contractor activities are done in line with the EMP requirements.

[2] No full time engineer is required for this, any one in the Contractor's team shall be given this responsibility.

[3] The Contractor will need a dedicated civil engineer to address EMF and safety-related issues for each contract package. This engineer will be given appropriate logistical support to carry out the various activities

2. To have good understanding of the contractual clauses, especially the penalty clause given in sub-clause 10.3.4 as well as EMAP of this report.

3. To verify the appropriateness of all the EMP items.

4. To prepare a management and redevelopment plan for all the sites of identified project related ancillary facilities like (i) Construction camp, (ii) labour camp, (iii) quarry and stone crusher unit, (iv) borrow area and (v) debris disposal site in line with detailed guidelines given in EMP.

5. To ensure that all the five sites and camps mentioned activity is operated, managed and closed in line with management and redevelopment plan.

6. To ensure that the top soil preservation is done wherever required as per the guidelines.

7. To ensure the adoption of proper waste management practices in the plant sites, labour camps, construction camps and along the road (also pertains to the proper disposal of bituminous / concrete waste generated during construction).

8. To ensure that the Contractor does not violate any social norms such as employment of child labour, children at work sites, providing creches, unhygienic working conditions and minimum wage considerations as per prevailing laws

9. To ensure that all the MORTH specifications are available and followed in all the contractor activities.

10. To carryout compensatory tree plantation and maintenance of the same for five years, as per the budgetary allocation made in BOQ.

11. To liaison with the Supervision Consultant and the PIU / TNRSP on matters pertaining to the EMP.

12. To liaison with Government Agencies such as the Pollution Control Boards and other departments in order to obtain the required clearances, and to ensure that the Contractor activities are carried out in line with any conditions placed.

13. To ensure adoption of good construction-related safety practices and appropriate traffic management practices to ensure road safety during the construction phase.

14. To prepare and implement a plan for road safety, accidents and traffic management.

15. To demark the start & end chainage of the project as the construction zone, and provide sign boards as per accepted standards.

16. To inform and train all the contractor personnel on the IRC requirements on construction safety and on road safety.

17. To ensure the availability of first aid facilities.

Reporting requirements of Contractor: The Contractor shall undertake regular reporting to CSC, comprising submission of reports as well as management and redevelopment plans to CSC.

4.4. PUBLIC PARTICIPATION

Public participation in various stages of the project will play vital role in decision making in hurdle free project implementation. During design phase, project consultants had conducted

public consultation along the project corridor. This is intended to collect valuable inputs, suggestions and grievances while designing the alignment for project corridors. Summary of issues discussed during the organised public consultations are as follows,

TABLE 4.2. MINUTES OF PUBLIC CONSULTATION MEETINGS

Location: Mohanur	
Date & Time : 01.05.2014, 11 am	Subjects and issued discussed
Venue: Navaldiyan Thiruma Mandapam	• Requested bypass for Mohanur town • Improvement should be done using the existing available highway land and minimum acquisition • Demanded to remove the all encroachments on the highway land and thus minimize the acquisition. • No. of trees to be felled for the project should be minimum and the same species has to be planted as compensatory plantation • Cauvery water supply pipelines should be protected from proposed improvement • Water bodies along the project road are to be protected from proposed improvement. • Requested bus bays for all bus stops • All the public utilities should be saved from proposed improvement
Type of Participants: Officials fro Highway Department and TNRS Local representatives, Businessme peasants, land cum building owne etc.	
Total no. of participants: 51	

While analyzing the opinion sheets collected from public consultation, it became quite clear that the people who are staying and doing the business at Mohanur town are strongly demanding for bypass. The PAFs demanded market value for their losing assets and also asked to explore more options to minimize the negative impact. The consultant has considered all the issue/ suggestions raised by public during designing of the project alignment contemplating with technical, social, environmental and economic feasibility.

Consultative process shall be continued through implementation and post implementation periods to avoid very adverse social and environmental impacts and to reduce the magnitude of the impacts of the project by suggesting suitable measures. This will enable speedy implementation of the project in cooperation with project stakeholders.

4.5. INFORMATION DISSEMINATION

Information dissemination shall be undertaken by PIU at a macro level and by the Contractor in the project site at micro level. The wider dissemination of information to public shall be undertaken by PIU through the disclosure of EIA / EMP reports in the website of PIU. At the project site, i.e. the direct impact zone, information boards shall be displayed at critical and pre-identified locations to disseminate the project details. Such information boards shall display project name, contractor's name, concerned official's name in Contractor's office with his designation and contact no., name and contact details of an authorised official in local TNRSP divisional office. These information boards shall be approximately of size 5' x 5' and shall be designed and put up in such a way that public can easily read it from a distance. Such boards

shall be setup, not only along active project stretches, but also at the sites of construction camps and labour camps and other project facilities like borrow area, quarry and stone crusher site and debris disposal site. These information boards shall also mention the availability of a complaint register with ESE of the Contractor. Under the RTI Act, 2005, Contractor is also duty bound to share any information demanded by the public, pertaining to any aspect of the project, as and when it is demanded.

4.6. GRIEVANCE REDRESSAL MECHANISM

Complaints register with TNRSP: Public can directly send their grievances to the address of TNRSP head office, Chennai or to the e-mail ID or by telephone no. given in the website. Not less the DE level officer should be appointed as Public Information Officer. Such complaints will be directly sent to SE, TNRSP, who act as Grievance Redressal Officer for TNRSP II. The complaints will be further forwarded to the Environmental Specialist in-charge for the project for necessary actions. The environmental specialist will be assisted by group of environmental engineers for each package, who are responsible to ensure the proper implementation of the EMPs. Based on the seriousness of the complaint, the concerned officer will immediately contact the complainant and discuss about the issue and take follow up actions. If necessary, environmental specialist will consult other senior technical team members associated with project to resolve the issues in a reasonable manner. It is the responsibility of the environmental specialist to suitably address the issue within 15 days after complaint received from the complainant. A letter on action taken on issue shall be sent to the complainant within 15 days of the receipt of complaint. A weekly report is also sent from all concerned officers with details of the complaints received and action taken to the PI cell. Once in three month, a meeting will be conducted in presence of CE, TNRSP, CSC and Contractor to review the effectiveness of the GRM and further to improve the transparency and speedy response to the grievances received from public.

Complaints register with Contractor: The contractor shall keep and maintain a complaint register report at his site office along the project road as well as project facilities like construction camp, labour camp etc., for public to register their complaints. The format for same is given in **Annexure 13** in the EMAP table. The Contractor, after taking necessary action based on the complaint, shall also incorporate the same in the complaint register. This report shall also be part of the monthly report, for CSC to monitor and take necessary action, if needed. It has to be noted that, inaction upon the complaint of the public shall be considered as a major lapse from the side of the Contractor, leading to invoking of penalty clause which is given in Chapter 3 of this report.

4.7. TRAINING PROGRAMME ON ENVIRONMENTAL ASPECTS

Training is an investment made on the human resource of the organization to provide and tone the competencies, required to do an existing job well and also to perform for future needs. Targeted and monitored training can set up an environment of good morale and productivity and contributes in creating a powerhouse of competencies for the organisation. The general awareness on environment and safety should be imparted to the Educational Institutes that are present in the project corridor by the contractor. This section deals with the training to be imparted to the Contrator's staff by the EO and SCSS of CSC for ensuring effective implementation of EMP. The training requirement could be broadly identified as given in **Table 4.3** below.

TABLE 4.3. TRAINING PROGRAMME TO THE CONTRACTOR'S STAFF

Programme	Particulars	Duration	Participants
Orientation Programme	Contactor's Responsibility as per bid document Reporting System in EMAP	One day each	Engineers including ESE
Awareness programme	General Awareness on Environment General Awareness on Safety aspects	One day each	Skilled and unskilled labourers
			Engineers, supervisors and office staff
			Educational Institutes in the project line

The need for additional and specialised training shall be examined and appropriate training will be undertaken as required.

CHAPTER 5. ENIVRONMENTAL MONITOING & REPORTING REQUIREMENTS

5.1. MONITORING AND REPORTING OF ENVIRONMENTAL MANAGEMENT MEASURES

A robust monitoring and reporting system is mandatory to ensure compliance to EMAP by the contractor. The monitoring and reporting system evolved for TNRSP -II is shown in **Table 5.1** and is integrated into EMAP table and its annexures. It comprises following three parts:

(A) Monitoring and reporting of environmental management measures for project related facilities like construction camp, labour camp, quarry area, borrow area and debris disposal site,

(B) Monitoring and reporting of environmental management measures for overall project, and

(C) Monitoring and reporting of quality of environmental parameters like air, water and noise.

This monitoring and reporting system attempts to pre-empt much of the environmental issues created during construction and post construction stages and provides the necessary feedback for CSC / PIU to make sure that EMAP is implemented in full spirit. Instead of a linear reporting system, this system works on a two way basis – initial reporting by contractor followed by monitoring by CSC based on contractor's reports. Responsibilities for monitoring will rest with the Environmental Officer of the Supervising Consultant reporting to the PIU and EMU at TNRSP.

The detailed procedure of reporting and monitoring system is as follows:

(A) Monitoring and Reporting of Environmental Management Measures for Project Related Facilities

Stage I – Site Identification: While initiating the project, the Contractor needs to identify suitable sites for project related ancillary facilities like construction camp, labour camp, quarry and stone crusher units, borrow area, debris disposal sites and sources of water for construction. The same shall be undertaken adhering to the criteria given in the respective guidelines for each of these sites given in **Annexures 3.1** to **3.5**. . As it is recommended by the design consultants to establish one construction camp and one labour camp for the proposed project corridor, contractor shall identify such camp locations in the project vicinity in line with guidelines given in **Annexure 3.1** & **3.2**. Once the site is identified by the Contractor, s/he shall prepare a site identification report furnishing all the details pertaining to the identified site using the reporting format given in **Annexures 3.12 to 3.17** and submit it to the CSC. Subsequently, the EO of CSC has to visit each site and approve / reject the site with reasons. The EO of CSC has to give a copy of this format to the contractor after his approval / rejection with remarks. This reporting procedure needs to be undertaken for each and every parcel of land identified for any of the project related ancillary facility.

Stage II – Setting up of Sites: On approval of a site, the Contractor has to prepare the Management and Redevelopment Plan for this site as per the relevant Guidelines given in **Annexures 3.1** to **3.5** of EMP and submit to CSC for approval. In addition to the Management and Redevelopment Plans for sites, the Contractor has to prepare Comprehensive Waste Management Plan, Occupational Health and Safety Management Plan, Traffic Management Plan and Hazardous Substances Management Plan for all sites together, as per the Guidelines given in EMP **Annexure 3.6**, **3.9**, **3.10** and **3.11** respectively. Subsequently, the EO of CSC needs to visit

each site and approve the Management Plan. The EO of CSC has to give a copy of this management plan to the contractor after his approval with remarks / suggestions for additional mitigation measures. Any kind of activity could be initiated in a site only after getting approval from CSC for the Management and Redevelopment Plan for that site. These plans need to be prepared for each and every parcel of land identified as described above.

Stage III –Operation of Sites: Once the Contractor receives approval for the Management and Redevelopment Plan, s/he can initiate activities on the site. All the activities shall be undertaken strictly in line with the said plan. CSC shall monitor the implementation of management plan monthly once, through site visits and the Checklists for Monitoring the Environmental Management of Sites / Camps given in **Annexures 3.20 to 3.24.** Corrective actions with specific timeframe should be proposed for each environmental management measure, which is not implemented satisfactorily. A copy of the filled up checklist should be given to the ESE of the Contractor. CSC has to attach this format to the monthly Report to be submitted to PIU, with details of corrective action taken by the Contractor.

A Register of Sites Opened and Closed in the format given in **Annexure 3.19** should be maintained by the contractor (preferably in A3 size paper) for each road. Details of each site opened should be entered in this register in chronological order. Whenever a site is closed, it should be recorded in this register with status of redevelopment. Clearances applicable for each site and the status of clearances should also be entered in this register. This same format shall be used to report the details of sites opened and closed to the CSC along with the Monthly Report of the Contractor. EO of CSC has to visit the sites, verify the details and approve the report with instruction to the contractor if any clearance is pending for any site or redevelopment is not done satisfactorily for any closed site. .A copy of the approved report with CSC's remarks should be given to the ESE of the Contractor. The EO of CSC has to attach this format to the monthly Report to be submitted to PIU, with details of corrective action taken by the Contractor.

Stage IV – Closure of Sites: Upon completion of the operation in any particular project ancillary facility site, the Contractor shall undertake redevelopment of the same, in line with the redevelopment plan which was already approved by CSC and intimate to CSC through the format for Register of Sites Opened and Closed. The Environmental Officer of the CSC shall monitor the same through site visit and the Checklists for Monitoring the Redevelopment of Sites / Camps provided in **Annexures 3.25 to 3.29** as and when a site is closed and reported by the Contractor. Corrective actions with specific timeframe should be proposed for each environmental management measure, which is not implemented satisfactorily. A copy of the filled up checklist should be given to the ESE of the Contractor. CSC has to attach this format to the Monthly Report to be submitted to PIU, with details of corrective action taken by the Contractor.

As described above, the reporting tasks for project facilities have been split and shared among contractor and CSC and its summary is given below:

- One time reporting by contractor to CSC at the stage of identification of sites and camps
- One time reporting by contractor to CSC through management and redevelopment plans before setting up of sites and camps.
- Monthly reporting of sites opened and closed by contractor to CSC
- Monthly monitoring by CSC during the operation stage of sites and camps
- One time monitoring by CSC after the closure of each site and camp

(B) Monitoring and Reporting of Environmental Management Measures for Overall Project

The Contractor shall undertake regular monthly reporting to CSC using the format given in **Annexure 3.41,** and all other reporting formats shall be attached to this monthly report as annexures. The Monthly Report captures the physical progress of the work, main issues / concerns, corrective actions taken, no. of workers in the reporting month etc. Further, CSC shall report monthly to PIU, summarising the issues / concerns and actions taken. This report has to be prepared in the format given in **Annexure 3.42** and all other reports are to be attached to it as annexures. All the reporting formats given in **Annexures 3.30** to **3.40** shall be used by the Contractor to report environmental management measures related to various aspects of the overall project. These reports are to be submitted monthly by the Contractor to the CSC. The EO of CSC shall visit the sites and verify the implementation of management measures and approve the reports. EO of CSC should give a copy of the approved reports to the ESE of the Contractor with his remarks.

(C) Monitoring and Reporting of Environmental Quality

Environmental quality monitoring shall be undertaken by the Contractor through an NABL approved Laboratory, based on the Environmental Quality Monitoring Plan presented in **Table 5.2**. Environmental monitoring should be conducted during construction and operation phase. Suppose if the construction duration is extended, the contractor should be liable for carrying out the environmental monitoring for the extended construction period too. Monitoring results should be compared with environmental standards as given in **Annexure 3.62.** The monitoring results shall be reported by the Contractor to the CSC in the Reporting Format for Environmental Quality Monitoring given in **Annexure 3.36** along with the Monthly Report, if monitoring was due in that month. A copy of the monitoring report given by the Laboratory has to be attached to this format. The CSC has to visit the sites and verify the details. Additional mitigation measures, if required, can be suggested by the CSC. The EO of CSC has to give back a copy of this format to the contractor after his approval with remarks.

TABLE 5.1. MONITORING AND REPORTING PLAN FOR ENTIRE PROJECT

REPORTING / MONITORING FORMAT	APPLICABLE PROJECT SITE	FREQUENCY OF REPORTING BY CONTRACTOR	FREQUENCY OF REPORTING / ACTION TO BE TAKEN BY CSC	APPLICABLE ANNEXURE NO.
A. FOR PROJECT RELATED FACILITIES AND SITES				
STAGE-I. SITE IDENTIFICATION				
Reporting Formats for Identification of Sites	Construction camp	One time reporting to CSC for each site, as and when it is identified.	Visit each site and approve the site as and when it is reported	Annexure No. 3.12
	Labour camp			Annexure No. 3.13
	Quarry and stone crusher unit			Annexure No. 3.14
	Borrow area			Annexure No. 3.15
	Debris disposal site			Annexure No. 3.16
	Water Sources			Annexure No. 3.17
STAGE-II. SETTING UP OF SITES				
Management and Re-development Plans for Sites / Camps	Construction camp	One time reporting to CSC for each site, and when it is required.	Visit each site and approve the management plans as and when it is submitted	Annexure No.3.1
	Labour camp			Annexure No.3.2
	Quarry and stone crusher unit			Annexure No.3.3
	Borrow area			Annexure No.3.4
	Debris disposal site			Annexure No.3.5
Comprehensive Waste Management Plan	All Sites	One time reporting to CSC for all sites together	Visit each site and approve the management plan as and when it is submitted	Annexure No.3.6
Occupational Health and Safety Management Plan	All Sites	One time reporting to CSC for all sites together	Visit each site and approve the management plan as and when it is submitted	Annexure No.3.9
Traffic Management Plan	All Sites	One time reporting to CSC for all sites together	Visit each site and approve the management plan as and when it is submitted	Annexure No.3.10
Hazardous Substances Management Plan	All Sites	One time reporting to CSC for all sites together	Visit each site and approve the management plan as and when it is submitted	Annexure No.3.11

REPORTING / MONITORING FORMAT	APPLICABLE PROJECT SITE	FREQUENCY OF REPORTING BY CONTRACTOR	FREQUENCY OF REPORTING / ACTION TO BE TAKEN BY CSC	APPLICABLE ANNEXURE NO.
STAGE-III. OPERATION OF SITES				
Format for Register of sites opened and closed and its reporting	All sites / camps	Details to be recorded in chronological order as and when a site is opened / closed. To be submitted to CSC monthly.	Check the status of clearances and redevelopment status of each site and approve the report monthly.	Annexure No. 3.19
Checklists for Monitoring Environmental Management of Sites / Camps	Construction camp	Nil	Monitor the implementation of management plan monthly once, through site visits and checklists.	Annexure No. 3.20
	Labour camp			Annexure No. 3.21
	Quarry and stone crusher unit			Annexure No. 3.22
	Borrow area			Annexure No. 3.23
	Debris disposal site			Annexure No. 3.24
STAGE-IV. CLOSURE OF SITES				
Checklists for Monitoring Redevelopment of Sites / Camps	Construction camp	Nil	Monitor the implementation of redevelopment plan through site visits and checklists as and when a site is closed and reported through the register of sites.	Annexure No. 3.25
	Labour camp			Annexure No. 3.26
	Quarry and stone crusher unit			Annexure No. 3.27
	Borrow area			Annexure No. 3.28
	Debris disposal site			Annexure No. 3.29
B. FOR OVERALL PROJECT				
Format for Register of complaints and its reporting	All project sites	Monthly	Monitor the implementation of management measures through site visits and approve the reports monthly.	Annexure No. 3.18
Reporting Format for Work Force Management	All project sites	Monthly		Annexure No. 3.30
Reporting Format for Occupational Health and Safety Measures	All project sites	Monthly		Annexure No. 3.31
Reporting Format for Top Soil Conservation	All project sites	Monthly		Annexure No. 3.32
Reporting Format for Water Sprinkling for Dust Suppression	All project sites	Monthly		Annexure No. 3.33
Reporting Format for Road Safety	All project sites	Monthly		Annexure No. 3.34

REPORTING / MONITORING FORMAT	APPLICABLE PROJECT SITE	FREQUENCY OF REPORTING BY CONTRACTOR	FREQUENCY OF REPORTING / ACTION TO BE TAKEN BY CSC	APPLICABLE ANNEXURE NO.
Measures During Construction				
Reporting Format for Register of Accidents and it's Reporting	All project sites	Monthly		Annexure No. 3.35
Reporting Format for Enhancement and Mitigation of Cultural Properties	All project sites	Monthly		Annexure No. 3.37
Reporting Format for Noise Barrier Construction	All project sites	Monthly		Annexure No. 3.38
Reporting Format for Enhancement Measures Other than Cultural Properties	All project sites	Monthly		Annexure No. 3.39
Reporting Format for Tree Plantation	All project sites	Monthly		Annexure No. 3.40
Reporting Format for Monthly Report from Contractor to CSC	All project sites	Monthly		Annexure No. 3.41
Reporting Format for monthly Report from CSC to PIU	All project sites	Nil	Monthly	Annexure No. 3.42
C. FOR ENVIRONMENTAL QUALITY MONITORING				
Reporting Format for Environmental Quality Monitoring	All project sites	Monitoring is to be conducted as per Environmental Quality Monitoring plan in Table 5.2. To be submitted to CSC along with the Monthly report.	Verify the details through site visits and approve the reports monthly	Annexure No. 3.36

5.2. ENVIRONMENTAL MONITORING PLAN FOR THE PROJECT

The environmental monitoring plan for the project is presented in **Table 5.2.** For each of the environmental components, the monitoring plan specifies the technical aspects of monitoring like locations of monitoring; frequency of monitoring and duration, sampling method, parameters to be monitored and standards to be compared. Monitoring results obtained for various environmental components should be compared with environmental standards as given in **Annexure 3.62.** The monitoring plan also specifies the applicable standards, and implementation and supervising responsibilities.

TABLE 5.2. ENVIRONMENTAL MONITORING PLAN

Technical aspect of monitoring	Details of Each Technical Aspect
Air Quality Monitoring	
Project stage	Construction and operation stages
Parameter	PM_{10}, PM $_{2.5}$, SO_2, NOx, CO and Pb
Sampling Method	High volume air sampler to be located 50 m from the source of pollution in the downwind direction. Method specified by CPCB for analysis shall be followed.
Standards	Revised National Ambient Air Quality (NAAQ) Standards set by CPCB
Frequency	Once in every season for three seasons (except monsoon) per year for Construction phase #- Two years.
Duration	Continuous 24 hours / or for 1 full working day
Locations along the Project Road *	Total three locations ie., Mohanur, Aniyapuram and Near Veterinary University
Other Locations **	One monitoring station near each construction related facility namely, hot mix plant, stone crusher and quarry area along the project road during construction stage. Monitoring shall be done at each additional hot mix plant, if present.
Measures	Wherever air pollution parameters increase above specified standards, additional measures as decided by the engineer shall be adopted.
Implementation	Contractor through NABL approved monitoring agencies
Supervision	CSC appointed by TNRSP
Water quality Monitoring	
Project stage	Construction stage
Parameter	pH, BOD, COD, TDS, Pb, Oil & Grease, Detergents and Faecal Coliforms for Surface water. pH, TDS, Total hardness, Sulphate, Chloride, Fe, and Pb for groundwater.
Sampling Method	Grab sample collected from source and analysis as per Standard Methods for Examination of water and Waste water
Standards	Indian standards for Inland Surface Water (IS; 2296, 1982) and for Drinking water (IS; 10500,1991)
Frequency	Four season in a year for seven years (Construction phase - Two years and Defect liability period – five years).
Duration	One-time grab sampling
Locations along the Project Road *	Total two locations ie., Mohanur and Aniyapuram
Measures	At locations of increased water pollution towards down stream, all inflow channels shall be checked for pollution loads and channel delivering higher pollution loads shall be terminated from disposal into the water source.
Implementation	Contractor through NABL approved monitoring agencies
Supervision	CSC appointed by TNRSP

Technical aspect of monitoring	Details of Each Technical Aspect
Noise Level Monitoring	
Project stage	Construction and operation stages
Parameter	Noise level on dB (A) scale
Sampling Method	Measure equivalent noise levels using an integrated noise level meter kept at a distance of 15m from edge of the pavement
Standards	Noise Pollution (Regulation and Control) Rules, 2000
Frequency	Once in every season for three seasons (except monsoon) per year for seven years (Construction phase - Two years and Defect liability period – five years).
Duration	Reading to be taken at 15 seconds interval for 15 minutes every hour for 24 hours and then average will be taken.
Locations along the Project road.*	Total five locations ie., Mohanur at km 0+600, Mohanur at km 1+600, Seemapalayam, Aniyapuram and Near Veterinary University
Other Locations **	Hot mix plant, stone crusher and quarry area. Monitoring shall be done at each additional hot mix plant, if present.
Measures	In case of noise levels causing disturbance to the sensitive receptors, management measures as suggested in the EMP shall be carried out.
Implementation	In location 1 by Environmental Engineer of CSC using the instruments provided by TNRSP and in locations 2 by the contractor
Supervision	CSC appointed by TNRSP

*Locations along the project stretch (locations identified during baseline study) and cost is part of BOQ for Contractor.

** Locations mentioned here includes quarry, stone crusher site and construction camp. This activity is part of contractor's responsibility and related cost. Hence it is not covered under BOQ.

Contractor should carry out the monitoring for the construction phase and operation phase. Suppose, in case of extension of construction period, he should be liable to carryout the environmental monitoring for the extended period too.

CHAPTER 6. ENVIRONMENTAL BUDGET

6.1. ENVIRONMENTAL MANAGEMENT COST TO BE BORNE BY TNRSP

Environmental budget as detailed in **Table 6.1** includes the cost of training to be imparted to staff of TNRSP and vehicle purchase cost. An amount of **Rs. 2,788,000** has been considered for the corridor as environmental management cost to be borne by TNRSP, which include

A. Environmental Training Cost. This includes environmental training for PIU staff and project level environmental training at an expense of Rs. 6,00,000.

B. Vehicle, travel and administrative costs. This includes cost of vehicle to be purchased and other travel and administrative costs. It is budgeted as Rs. 21,88,000.

TABLE 6.1. ENVIRONMENTAL MANAGEMENT COST TO BE BORNE BY TNRSP

ITEMS	UNIT	QUANTITY	UNIT RATE (RS)	AMOUNT (RS)
A. ENVIRONMENTAL TRAINING				
Environmental training for TNRSP/PIU Staff and Modules preparation	Number	5	100000	500,000
Project level Environmental Training for TNRSP II Officials	Number	2	50000	100,000
SUBTOTAL				**600,000**
B. TRAVEL AND ADMINISTRATIVE COSTS FOR EMU				
Travel and Administrative Costs	Month	36	18000	648,000
Vehicle	Number	1	1,000,000	1,000,000
Maintenance of vehicle	Month	36	15,000	540,000
SUBTOTAL				**2,188,000**
GRAND TOTAL				**27,88,000**

6.2. ENVIRONMENTAL MANAGEMENT COST INCLUDED IN CONTRACT COST

The **Table 6.2** provides details of environmental mitigation and enhancement measures to be implemented for the project like rain water harvesting, tree transplantation and tree planting, providing noise barriers, conducting environmental monitoring etc. These items will be included in the Contract BOQ and the Contractor has to quote his cost for these items.

TABLE 6.2. CONTRACT ITEMS INCLUDED IN THE CONTRACT COST FOR ENVIRONMENTAL MANAGEMENT (CONTRACT BOQ BILL NO 13)

ITEM NO.	ITEM	UNIT	QUANTITY	REMARKS
A	**CONSTRUCTION PHASE**			
13.1	**Mitigation Measures other than Good Engineering practices**			
13.1.1	Oil Interceptors	Number	2	Refer Annexure 3.44
13.1.2	Rain Water Harvesting Pits	Number	16	Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GENERAL/10
13.1.3	Soakpits for Hand Pump/Wells	Number	8	Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GENERAL/09
13.1.4	Desilting/Deepening of Ponds	Number	1	Refer Annexure 3.48
13.2	**Avenue Plantation including Compensatory Plantation**			
13.2.1	Plantation & maintenance of Saplings for 5 years	Number	8,150	
13.2.2	Tar Drum Fence	Number	8,150	
13.2.3	Tree Cutting Cost	Covered under Site Clearing cost (Engineering cost)		
13.3	**Tree Transplantation Cost**			
13.3.1	Tree Transplantation (GBH <30cm-10cm)	Nos.	175	
13.4	**Landscaping**			
13.4.1	At 2 Major Junctions	Sq.m	300	Area = 1.5m X 100m X 2
13.4.2	At 46 Minor Junctions	Sq.m	2700	Area = 1.5m X 60m X 30
13.4.3	Realignment Locations	Sq.m	1275	Area = 1.5m X 300m
13.5	**Monitoring of Environmental Attributes during Construction Phase**			
13.5.1	Air Quality			
13.5.1.1	Monitoring of Air Quality near Hot mix plants	Per Samples	6	Three season in a year for 2 years
13.5.1.2	Monitoring of Air Quality at Critical Locations	Per Samples	30	Three season in a year for 2 years
13.5.2	Noise Levels			
13.5.2.1	Monitoring of Noise Level at Equipment Yards	Per Samples	6	Three season in a year for 2 years
13.5.2.2	Monitoring of Noise Levels at Critical Locations	Per Samples	66	Three season in a year for 2 years
13.5.3	Water Quality			
13.5.3.1	Monitoring of Water Quality	Per Samples	36	Three season in a year for 2 years
13.5.4	Soil Quality			
13.5.4.1	Monitoring of Soil Quality	Per Samples	18	Three season in a year for 2 years
13.5.4.2	Additional Soil Monitoring during Spills	Per Samples	12	Three season in a year for 2 years

ITEM NO.	ITEM	UNIT	QUANTITY	REMARKS
13.6	**Mitigation/Enhancement Measures**			
13.6.1	**Cultural Properties (Specific Enhancement as per Annexure 3.56 & 3.61)**			
13.6.1.1	Temple, Km 2+900, LHS	LS as per dwg.		Refer Dwg. No. Vol.12/Part IV/TNRSP II/COR5/CP/01 & Table no. 3 of Annexure 3.56
13.6.1.2	Temple, Km 6+900, RHS	LS as per dwg.		Refer Dwg. No. Vol.12/Part IV/TNRSP II/COR5/CP/02 & Table no. 3 of Annexure 3.56
13.6.1.3	Temple, Km 12+700, LHS	LS as per dwg.		Refer Dwg. No. Vol.12/Part IV/TNRSP II/COR5/CP/03 & Table no. 3 of Annexure 3.56
13.6.1.4	Temple, Km 10+800, RHS	LS as per dwg.		Refer Dwg. No. Vol.12/Part IV/TNRSP II/COR5/CP/04 & Table no. 3 of Annexure 3.56
13.6.2	**Government Premises (Specific Enhancement as per Annexure 3.56)**			
13.6.2.1	School, Km 1+600, RHS	LS as per dwg.		Refer Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GP/05 & Table no. 2 of Annexure 3.56
13.6.2.2	Primary School, Km 5+200, LHS	LS as per dwg.		Refer Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GP/06 & Table no. 2 of Annexure 3.56
13.6.2.3	Telephone Exchange, Km 13+300, LHS	LS as per dwg.		Refer Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GP/07 & Table no. 2 of Annexure 3.56
13.6.2.4	Govt. Higher Secondary School, Km 9+900 RHS	LS as per dwg.		Refer Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GP/08 & Table no. 2 of Annexure 3.56
13.6.3	**Cultural Properties (Generic Enhancement)**			
13.6.3.1	New CW for Govt. Schools at km 2+800 on RHS	Cu. m	19	Construction of compound wall for 35m length X 0.23m width X 2.375m height
13.6.3.2	New CW for Govt. Schools at km 5+200 on LHS	Cu. m	31	Construction of compound wall for 56m length X 0.23m width X 2.375m height
13.6.3.3	New CW for Govt. Schools at km 10+020 on RHS	Cu.m	82	Construction of compound wall for 150m length X 0.23m width X 2.375m height
B	**OPERATION PHASE**			
13.7	**Monitoring of Environmental Attributes during Operation Phase**			
13.7.1	Monitoring of Air Quality at Critical Locations	Nos.	30	5 locations for 3 season in a year for 2 years
13.7.2	Monitoring of Noise Levels at Critical Locations	Nos.	66	11 locations for 3 year for 2 years
13.7.3	Monitoring of Water Quality	Nos.	36	6 locations for 3 season in a year for 2 years
13.7.4	Monitoring of Soil Quality	Nos.	18	3 locations for 3 season in a year for 2 years
13.7.5	Additional Soil Monitoring during Spills	Nos.	12	2 locations for 3 season in a year for 2 years

6.3. ENVIRONMENTAL MANAGEMENT COST TO BE BORNE BY THE CONTRACTOR AS PART OF GOOD ENGINEERING PRACTICES

Costs of certain environmental management and enhancement measures specified in the EMAP have already been included in the Contract Cost and these items have been listed in Table 6.2 above. There are many other environmental mitigation measures to be implemented by the Contractor at work sites, construction camps, quarries, borrow areas etc. These measures include barricading, dust suppression, providing health and safety measures including personal protective equipment to works, providing drinking water and sanitation facilities at labour camps etc. Costs for these measures will not be calculated separately as these are the measures to be implemented by the Contractor as part of good engineering practices and project management. Contractor is bound to implement most of the health and safety measures and other facilities at labour camps as per the prevailing labour laws of India. There are general clauses in the Contract which makes it mandatory for the Contractor to implement certain good engineering practices such as providing barricades and sign boards at work sites and dust suppression at work sites for the health and safety of the general public as well as workers. Contractor has to keep in mind these requirements while bidding for the project. The Contractor has to note that a penalty clause has been included in the Contract as mentioned in sub-clause 10.3.4 of this EMP to ensure the implementation of environmental management measures for which responsibility has been assigned to the Contractor in the Environmental Management Action Plan (EMAP).

Annexures

ANNEXURE 3.1. GUIDELINES FOR SITING, MANAGEMENT AND REDEVELOPMENT OF CONSTRUCTION CAMPS

A. OVERVIEW

Construction camp accommodates a mix of activities, which are highly polluting in nature causing considerable environmental impact and its proper siting, management and redevelopment is crucial to avoid, minimize and mitigate those impacts. The EMAP clearly distinguishes between various impacts that may occur at various stages of the camp like (i) siting, (ii) setting up, (iii) operation and (iv) closure / redevelopment and provide respective mitigation measures to some extent. In addition to that, this guideline has been prepared to provide the Contractor with comprehensive and systematic information on various steps to be undertaken during these four stages, so that s/he can execute his/her role in an environmentally sound manner. Various mitigation measures have been synthesized into this guideline so that it serves as a single and stand alone document for the Contractor.

B. CRITERIA FOR SITING THE CAMP

To the extent, possible barren land or wastelands shall be preferred during site selection and fertile land and agricultural land shall be avoided. All such sites must be above the HFL with adequate drainage facility. In areas prone to floods, cyclones, cloudbursts or heavy rainfall, selection of the site should be made keeping in mind the safety of the camp and the workers. In addition, the Contractor should take care of the following criteria for locating the site:

- A minimum of 250 m away from any major settlement or village in downwind direction.
- A minimum of 200 m of any major surface water course or body[1]
- Not within 500 m from ecologically sensitive areas like wild life sanctuary, mangroves etc.
- Sufficiently wide access roads (at least 5.5 m Wide) for heavy vehicle movements

After identification of the site the Contractor should fill up the prescribed reporting format and submit the same for approval to the CSC without which any activity shouldn't be started on the site

C. FINALIZATION OF SELECTED SITE/S

After identification of the site, the Contractor should fill up the prescribed reporting format provided in EMAP and submit the same for approval to the CSC. Environmental Officer of CSC shall approve the

[1] In the absence of site meeting the stipulated criteria, an alternate site can be selected specifying the reasons. In such a case, the construction camp management plan should incorporate additional measures specific to the site as suggested by the CSC.

selected site/s, after considering the compliance with the EMP clauses. No agreements or payments shall be made to the land owner/s prior to receipt of a written approval from the CSC. Any consequence of rejection prior to the approval shall be the responsibility of the Contractor and shall be made good at his own cost. After obtaining a written approval from the CSC for the selected site, the Contractor has to enter into an agreement with the landowner to obtain his/her consent before commencing any operation / activities in the land. The agreement should also mention its type, duration, amount and mode of payment as well as the preferences of the owner regarding site maintenance and redevelopment.

D. DESIGNING OF CAMP / PREPARATION OF LAYOUT PLAN

The Contractor should design a layout plan of the camp with adequate space for (i) site office along with store room, rest area and sanitary facilities, (ii) plants, machineries, (iii) workshops, (iv) vehicle washing area, (v) fuel handling area, (vi) room for raw material unloading and stocking, (vii) space for storage and handling of solid wastes (viii) security cabin etc. The laying out of these should be undertaken in such a manner that it facilitates smooth functioning of both man and machine. Fuel pumps, storage facility for inflammable and hazardous chemicals/ materials shall be provided inside the camp, but at a safe distance from office. Electric safety practices shall be integrated/ incorporated during the lay-out plan preparation.

Prevailing wind direction shall be kept in mind while planning out the lay-out of internal facilities. Cutting of trees should be minimum and the existing ones need to be integrated into the lay-out plan with proper planning. The roads within the camp should be well planned with adequate space for movement of vehicles and their parking.

E. SETTING UP OF CONSTRUCTION CAMP

(i) Site preparation: The stripping, stacking and preservation of top soil will be mandatory in case of farm lands and fertile areas and absolutely no material stacking or equipment installment or vehicle parking or any other activity should be allowed prior to the satisfactory completion of this activity as per guidelines in EMP. Thereafter, the site should be graded and rendered free from depressions such that the water does not get stagnant anywhere. A compound wall of 2.4 m height should be constructed all around the camp to prevent the trespassing of humans and animals. Green belt should be provided along the boundary and as detailed in the EMP, it should be integrated with storm water drain and sedimentation trenches as given in annexure in EMAP. No. of trees planted should not be less than three times the number of trees cut. The approved layout plan should be strictly adhered to while setting up the camp.

(ii) Setting up of plants and machineries: Adequate arrangements should be made for avoiding fugitive emissions from plants and camp premises. This will include (i) control of air pollution through provision of in-built dust extraction systems like bag filter, damper and cyclone filter for bitumen hot mix plant, (ii) a chimney of appropriate height (as per SPCB guideline) from ground level attached with dust extraction system and scrubber for the hot mix plant, (iii) a chimney of appropriate height for the DG set (iv) water sprinkling facilities for the concrete batching plant, wet mix macadam plant as well as in the camp premises and (v) garden net to prevent fugitive emissions from storage place of cement and aggregates.. It has to be also ensured that effluent from the sludge tank of the scrubber is recycled and reused and the sludge is used for land filling with top soil spread on it.

To ensure that noise levels are within the limit, all plants and machineries should have their own silencers or any other noise control devices. All pollution control devices should be provided with back up power. Following conditions should be complied regarding the sound level conditions:

- The sound level (Leq) measured at a distance of 1 m from the boundary of the site shall not exceed 55dB (A) during day time (6am - 6pm) and 45 dB(A) during night time (6 pm - 6am).
- The total sound power level of the DG set shall be less than 96+10 log 10(KVA) dB(A) where KVA is the nominal power rating of DG set.
- The DG set shall be provided with acoustic enclosure/acoustic treatment with an insertion loss of minimum 25 dB(A).
- The DG set shall be provided with proper exhaust muffler with insertion loss of minimum 25 dB(A).
- A proper, routine and preventive maintenance procedure for the DG set shall be set and followed in consultation with the DG set manufacturer.
- Concrete flooring with slope drains and oil interceptors should be proposed for hot mix plant area and workshop, vehicle washing and fuel handling area as per EMP, so that oil and lubricants that may spill on the floor does not contaminate any soil or water body. In case of any oil spills, it should be cleaned properly. There shall also be provisions for storage of used oil until it is disposed as per comprehensive waste management plan prepared by Contractor and approved by CSC.

(iii) Sanitation Facilities: Adequate no. of toilets shall be provided separately for males and females (depending on their strength), screened from those of men and provided with markings in vernacular language. All such facilities must have adequate water supply with proper drainage and effluent treatment system like septic tank with soak pit. Soak pit should have a sealed bottom, honey comb wall and 75 cm. thick, 2 mm sand envelope around that. The sewage system for the camp must be properly sited, designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place.

Portable toilets may be brought to use and the night soil from such units has to be disposed through designated septic tanks so as to prevent pollution of the surrounding areas. In the construction camp, no night soil or sewerage shall be disposed of at any place other than the septic tanks constructed at the site.

(iv) Waste Disposal: While preparing the layout plan, the Contractor should allocate adequate space for storage and handling of various wastes generated until they are disposed off in pre-identified disposal sites. The Contractor should provide separate garbage bins for biodegradable, non-biodegradable and domestic hazardous wastes in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner. No incineration or burning of wastes shall be carried out by the Contractor. The disposal of any biodegradable matter shall be carried out in pits covered with a layer of earth within the camp site. Discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, hessian, metal containers, strips and scraps of metal, PVC pipe scrubber and poly urethane foam, auto mobile spares, tubes, tires, belts, filters, waste oil, drums and other such materials shall be either reused or sold /given out for recycling. POL (petroleum, oil and lubricants) waste shall be disposed off by

transfer only to recycler/ re-refiners possessing valid authorization from the State Pollution Control Board and valid registration from the Central Pollution Control Board. Used lead batteries, if any, should be disposed as per the Batteries (Management and Handling) Rules 2001.

(v) First aid / safety facilities: At every camp site, a readily available first-aid unit including an adequate supply of sterilized dressing materials and appliances should be provided. Workplaces which are remote and far away from regular hospitals should have indoor health units with one bed for every 250 workers. Details of nearest clinics as well as major hospitals like their location, distance from camp, phone nos. facilities offered by the hospital should be displayed in the camp office at clearly visible location in a legible manner. Suitable transport should be provided to facilitate taking injured and ill persons to the nearest hospital. Adequate personal protective equipments and fire fighting equipments as detailed out in EMP should be made available in the camp and provided to the staff / workers. Operation manuals and training should be provided to machine operators. Warning signs should be placed at accident prone areas as well as at the entrance of the site.

(vi) Training to workers: Workers shall be trained in smooth operation of plants and machines, their regular maintenance and various safety measures to be followed as well as about the need for adherence to these measures.

(vii) Information dissemination: There should be a sign board of size 6' x 4' mentioning the project details and Contractor's details to disseminate the information to the public. There should be a second sign board displaying the latest air and noise monitoring data against the standards specified.

Warning signboards should be set up at the entrance gate for the public as well as at other required places for the workers to alert them about the nature of operation being undertaken at those respective places.

Once the construction camp is set up, the date of commissioning of the camp should be intimated to the Head Office and concerned District Office of the SPCB.

F. OPERATION OF CONSTRUCTION CAMP

During the operation phase of the camp it is important to ensure that all vehicles and machineries are maintained regularly and their PUC certificates are renewed at regular intervals. All pollution control devices should be monitored and maintained properly at regular intervals. In case of process disturbance/ failure of pollution control equipments, the respective units should be shut down and should not be restarted until the control measures are rectified to achieve the desired efficiency. All units should operate only between 6 am and 10 pm. or as specified by SPCB in the consent letter.

Oil and grease waste generated from garages in construction camps should be drained out through oil interceptors and they should be maintained properly. Necessary arrangements should be made for regular sprinkling of water for dust suppression. Raw materials and products should be transported with proper cover to prevent spreading of dust.

Hygienic environment must be ensured by (i) provision of safe drinking water, (ii) proper maintenance of toilets including daily cleaning and disinfection using proper disinfectants, (iii) regular cleaning of drains by removing the silt and solid waste, (if any) and iv) appropriate waste management practices. While it is of utmost importance to ensure that fire fighting equipments like fire extinguishers are in working condition, it should also be monitored that construction workers use the personal protective

equipments provided to them and they are replaced when necessary. All these facilities should be inspected on a weekly basis to achieve the desired levels of safety and hygiene standards.

Environmental monitoring should be undertaken by the Contractor as stipulated in the EMP. If any standard is set by SPCB for hot mix plant emissions, the Contractor should collect samples of emission from all the chimneys and analyse for the parameters at least once in a month. The CTE certificate from SPCB should be renewed at regular intervals and the same should be intimated to CSC.

A register should be maintained at the site office which provides (i) a one page format for each migrant labourer which will give their personal profile (including name, age, sex, educational qualification, address, blood group and any major illness), along with a copy of any ID proof and an original photograph, (ii) a copy of the ID card of local labourers. A copy of the details of the migrant labourers should be submitted to the local police station.

G. PREPARATION OF CONSTRUCTION CAMP MANAGEMENT AND REDEVELOPMENT PLAN

After the site for the construction camp has been finalized and approved by CSC, the Contractor should prepare a construction camp management plan to be submitted to CSC for approval prior to setting up of the camp and it should comprise the following details:

- **Section–1: Details of site:** Copy of approved site identification report along with location plan on a village map or an FMB, showing the site, its survey no., access road, project stretch, distance form the project stretch, surrounding features and land use like residences, agricultural land, water bodies etc., photograph of the site showing the topography and other existing features.
- **Section-2: Site preparation:** Activities that will be undertaken for preparing the site based on EMP and this guideline.
- **Section-3: Arrangements/ facilities within the camp:** List of plants / machineries to be set up within the camp like hot mix plant, batching plant, DG set etc., and other facilities to be provided like site office, store room, rest room, toilet room, material stocking yard etc, layout plan showing all these details along with vehicular movement path, green belt etc. Species wise no. of trees to be cut shall be provided.
- **Section-4: Mitigation measures** that will be undertaken as per the EMP and this guideline while setting up of the camp and operation of the camp should be separately listed out here.
- **Sectoin-5: Other details:** Any other relevant detail like list of trainings to be provided to workers, details of information dissemination, date of CTE certificate from SPCB, its validity, additional conditions laid down in it etc. should be included.
- **Section 6: Re-development plan**, which should indicate the following points: (i) List of structures to be demolished and list of the clean up activities that needs to be undertaken, (ii) Proposed use of the land after de-mobilising and (iii) Presence of facilities that could be put in use by the land owner if it is a leased out private land or community in case of a public property.

Section-7: Annexure-(a) Working drawings: Electrical plan showing the electrical network planned for the site, location of plants, generators, master switch boards etc. and plumbing drawing showing the network of water supply lines, sewerage line and drainage line, **(b) Copy of certificates** / permissions

obtained from regulatory authorities / local governing body / community etc. as applicable, **(c) Copy of agreement entered with the owner** of the site if it is a leased out land.

All the drawings should have north direction marked in it along with prevailing wind direction. Necessary dimensions and specifications should be provided where ever necessary. The construction camp management plan should be submitted to the CSC for a written approval before any physical work (includes storage of materials, equipment etc.) is undertaken on a particular site. The CSC shall carefully examine the proposals considering the specific conditions of each site as well as various EMP and regulatory provisions and provide suggestions, as necessary to the Contractor who shall incorporate it in the management plan.

Contractor needs to prepare this document for each different site identified and CSC shall undertake a thorough analysis of the said management and redevelopment plan through a site investigation and suggest additional mitigation measures depending on the site and as demanded by the features of the specific site.

H. DEMOBILIZATION AND REDEVELOPMENT OF THE SITE

The Contractor should clear all temporary structures; dispose all building debris, garbage, night soils and POL waste as per the approved debris management plan. All disposal pits or trenches should be filled in, disinfected and effectively sealed off. All the areas within the camp site should be leveled and spread over with stored top soil. Residual topsoil, if any will be distributed or spread evenly in plantation sites, on adjoining/near-by barren land or affected agricultural land adjacent to the RoW that has been impacted on account of any accidental spillage. Entire camp area should be left clean and tidy, in a manner keeping the adjacent lands neat and clear, at the Contractor's expense, to the entire satisfaction of landowner and CSC.

These activities should be completed by the Contractor prior to demobilization. Once the Contractor finishes his job, he needs to obtain a certificate from the owner, stating that the site has been re-developed to his/her satisfaction and in tune with the agreement. Then following documents needs to be submitted to the CSC by the Contractor:

Copy of approved site identification report

Photographs of the concerned site 'before' and 'after' setting up the camp.

Certificate from the owner stating his/her satisfaction about status of re-development of the site.

CSC shall ensure, through site verification that all clean-up and restoration operations are completed satisfactorily and a written approval should be given to the Contractor mentioning the same before the 'works completion' certificate is issued/recommended. The PIU shall ensure through site inspection that the Contractor and CSC have complied with all these provisions. The site can then be handed over to the concerned owner or local bodies or for local communities as the case may be.

Certification/documentation pertaining to approval for clean-up and restoration operations and thereafter handing-over to the owner shall be properly maintained by the Contractor, Supervision Consultant and PIU.

ANNEXURE 3. 2. GUIDELINES FOR SITING, MANAGEMENT AND REDEVELOPMENT OF LABOUR CAMPS

A. OVERVIEW

Staff-quarters include accommodation for Engineers / Supervisors and labour camp include accommodation for workers / labourers along with other basic amenities such as kitchen, potable water supply, sanitation (toilets, bathrooms, washing areas and water supply for such needs), first aid room as well as garbage collection and disposal facility. Staff quarters shall be provided with additional facilities of drawing room. The guidelines outlined here aims to facilitate the Contractor in implementing the measures in the EMP there by reducing the impact on the environment.

B. CRITERIA FOR LOCATING THE SITE/S

Following criteria should be followed in the siting of labour camps:

To the extent possible, agricultural lands and fertile lands shall be avoided[2].

500m away from the existing settelments

Not to be located in CRZ area.

Not within 500m of ecologically sensitive areas like wild life, sanctuary, mangroves, forest etc.

C. FINALIZATION OF SELECTED SITE/S

After identification of the site, the Contractor should fill up the prescribed reporting format provided in EMAP and submit the same for approval to the CSC. The selected site/s shall be approved by Environmental Officer of CSC, after considering the compliance with the EMP clauses. No agreements or payments shall be made to the land owner/s prior to receipt of a written approval from the CSC. Any consequence of rejection prior to the approval shall be the responsibility of the Contractor and shall be made good at his own cost. After obtaining a written approval from the CSC for the selected site, the Contractor has to enter into an agreement with the landowner to obtain his/her consent before commencing any operation / activities in the land. The agreement should also mention its type, duration, amount and mode of payment as well as the preferences of the owner regarding site maintenance and redevelopment.

D. DESIGNING AND SETTING UP OF LABOUR CAMP

[2] In the absence of site meeting the stipulated criteria, an alternate site can be selected specifying the reasons. In such a case, the construction camp management plan should incorporate additional measures specific to the site as suggested by the CSC.

Following facilities should be provided in a labour camp to ensure safe, clean and hygienic accommodation for the workers.

(i) Site preparation: The site should be graded and rendered free from depressions such that the water does not get stagnant anywhere. Fencing should be constructed all around the camp to prevent the trespassing of humans and animals. Green belt should be provided along the boundary and as detailed in the EMP, it should be integrated with storm water drain and sedimentation trenches as given in annexure in EMAP. No. of trees planted should not be less than three times the number of trees cut. The approved layout plan should be strictly adhered to while setting up the camp.

(ii) Accommodation: Contractor will follow all relevant provisions of the Factories Act, 1948 and the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labour camp. The height of the worker's and labour accommodation shall not be less than 3mt. from floor level to the lowest part of the roof. The camps shall be floored with concrete, shall be kept clean, with proper cross ventilation, and the space provided shall be on the basis of one sq.mt per head or as per the relevant regulation, which ever is higher. Fire and electrical safety pre-cautions shall be adhered to. Cooking, sanitation and washing areas shall be provided separately. The Contractor will maintain necessary living accommodation and ancillary facilities (including provision of clean fuel to prevent damage to forests and to prevent fuel wood cutting and burning by labour) in functional and hygienic manner.

The site must be graded and rendered free from depressions such that water does not get stagnant anywhere. The entire boundary of the site should be fenced all around with barbed wire so as to prevent the trespassing of humans and animals. Green belt should be provided along the boundary and it should be integrated with storm water drain and sedimentation trenches to reduce the surface run off as per clauses in EMAP. No. of trees planted should not be less than three times the number of trees cut.

(iii) Drinking Water: The Contractor should provide potable water within the precincts of every workplace in a cool and shaded area, which is easily accessible as per standards set by the Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996. All potable water storage facilities will be on a safely raised platform that is at least 1m above the surrounding ground level. Such facilities shall be regularly maintained from health and hygiene point of view. If necessary water purifier units shall be installed for providing potable water.

As far as possible shallow wells should not be used as potable source of water. However, if water is drawn from any existing well, irrespective of its location from any polluting sources, regular disinfection of the water source (which may include application of lime, bleaching power and potassium permanganate solution) has to be ensured at weekly/fort nightly interval. All open wells will be entirely covered and will be provided with a trap door to prevent accidental fall and contamination from dust, litter etc. The trap door will be kept locked and opened only for cleaning or inspection, which will be done at least once in a month. A reliable pump will be fitted to each covered well. A drain shall be constructed around the well to prevent flow of contaminated water into the well from road, camp or other sources. Water quality testing of all potable water sources will be done every six months as per parameters prescribed in IS 10500:1991.

(iv) Sanitation Facilities: Adequate no. of toilets shall be provided separately for males and females (depending on their strength), screened from those of men and provided with markings in vernacular

language. All such facilities must have adequate water supply with proper drainage and disposal facility. They shall be maintained, cleaned and disinfected daily using proper disinfectants. Location and design of soak pit should be in such a way that it doesn't pollute the ground water. Drains and ditches should be treated with bleaching powder on a regular basis. The sewage system for the camp must be properly designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place.

Portable toilets may be brought to use and the night soil from such units has to be disposed through designated septic tanks so as to prevent pollution of the surrounding areas. In the main camp, no night soil or sewerage shall be disposed of at any place other than the septic tanks constructed at the site. All these facilities shall be inspected on a weekly basis to check the hygiene standards.

(v) Waste Disposal: The Contractor should provide garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner. No incineration or burning of wastes shall be carried out by the Contractor. Separate bins shall be provided for biodegradable, non-biodegradable and domestic hazardous wastes. The disposal of kitchen waste and other biodegradable matter shall be carried out in pits covered with a layer of earth within the camp site. The Contractor may use the compost from such wastes as manure in the plantation sites. Discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, hessian, metal containers, strips and scraps of metal, PVC pipe scrubber and poly urethane foam, auto mobile spares, tubes, tires, belts, filters, waste oil, drums and other such materials shall be either reused or sold /given out for recycling.

(vi) Day Crèche Facility: At every construction site, provision of a day crèche shall be made so as to enable women to leave behind their children while going to work. At least one attendant shall be provided to take care of the children at the crèche. At construction sites where 20 or more women are employed, there shall be at least one shelter for use of children under the age of 6 years belonging to such women.

Shelters shall not be constructed to a standard lower than that of thatched roof, mud walls and floor with wooden planks spread over mud floor and covered with matting. Such areas shall be safely barricaded (no sharp sheets or barbed wires that may injure a child) from rest of the camp for the safety of children. Shelters shall be provided with suitable and sufficient openings for light and ventilation. There shall be adequate provision to keep the place clean. The size of a crèche may vary according to the number of children on a camp site.

(vii) Mess and Kitchen Facilities: The Contractor shall adhere to the sanitary/hygiene requirements of local medical, health and municipal authorities at all times. Adopt such precautions as may be necessary to prevent soil and water pollution at the site while operating mess or kitchen facilities.

(viii) Fire Safety: requirements on fire safety are common and are likely to apply to housing facilities of any type. This can include provision on fire extinguishers, fire alarms, number and size of staircases and emergency exits, restrictions on the use of certain building materials

(ix) First aid facilities: At every workplace, a readily available first-aid unit including an adequate supply of sterilized dressing materials and appliances should be provided. Workplaces remote and far away from regular hospitals should have indoor health units with one bed for every 250 workers. Suitable transport should be provided to facilitate taking injured and ill persons to the nearest hospital. Adequate personal

protective equipments and fire fighting equipments as detailed out in EMP should be made available in the camp and provided to the staff / workers.

(x) Health Care Facilities: Health problems of the workers should be taken care of by providing basic health care facilities. If there is no hospital or clinic, which can be accessed in half an hour's time, then a temporary health center should be set up for the construction camp. The health centre should have at least a doctor and a nurse, duty staff, medicines and minimum medical facilities to tackle first aid requirements or minor accidental cases, linkage with nearest higher order hospital to refer patients of major illnesses or critical cases.

The health centre should have MCW (Mother and Child Welfare) units for treating mothers and children in the camp. Apart from this, the health centre should be provided with regular vaccinations required for children. The health centre should carryout quarterly awareness programme of HIV – AIDS with the help of AIDS control society as well as about community living and hygiene practices in day to day living. Posters should be exhibited in the health care clinic.

E. OPERATION OF LABOUR CAMP

Through out the functioning period of the camp, hygienic environment must be ensured by (i) provision of safe drinking water, (ii) proper maintenance of toilets including daily cleaning and disinfection using proper disinfectants, (iii) regular cleaning of drains by removing the silt and solid waste, (if any) and iv) appropriate waste management practices. While it is of utmost importance to ensure that fire-fighting equipments like fire extinguishers are in working condition, it should also be monitored that construction workers use the personal protective equipments provided to them and they are replaced when necessary. All these facilities should be inspected on a weekly basis to achieve the desired levels of safety and hygiene standards.

F. PREPARATION OF LABOUR CAMP MANAGEMENT AND RE-DEVELOPMENT PLAN

After the site for the labour camp has been finalized and approved by CSC, the Contractor should prepare a labour camp management and redevelopment plan to be submitted to CSC for approval prior to setting up of the camp and it should comprise the following details:

Section–1: Details of site: Copy of approved site identification report along with location plan on a village map or an FMB, showing the site, its survey no., access road, project stretch, distance form the project stretch, surrounding features and land use like residences, agricultural land, water bodies etc., photograph of the site showing the topography and other existing features.

Section-2: Site preparation: Activities that should be undertaken for preparing the site based on EMP and this guideline.

Section-3: Arrangements/ facilities within the camp: List of facilities to be provided along with its details like area, no of people to be accommodated and a layout plan showing the plan of the site with all the facilities planned like quarters, labour camps, mess, common facilities, toilet facilities and the vehicular and pedestrian movement paths.

Section-4: Mitigation measures that should be undertaken as per the EMP and this guideline while setting up of the camp and operation of the camp should be separately listed out here.

Sectoin-5: Other details: Any other relevant detail like list of awareness camps to be provided to workers, details of information dissemination etc. should be included.

Section 6: Re-development plan: which should indicate following points: (i) List of structures to be demolished and list of the clean up activities that needs to be undertaken, (ii) Proposed use of the land in the post construction phase, if it is a public property, (iii) Presence of existing facilities that could be put in use by the land owner if it is a leased out private land or by the community in case of a public property.

Section-7: Annexure-(a) Working drawings: Electrical plan showing the electrical network planned for the site, location of generators, master switch boards etc. and plumbing drawing showing the network of water supply lines, water tank, drainage facilities etc. **(**b) Copy of permissions obtained from local governing body / community etc. as applicable, (c) Copy of agreement entered with site owner, in case of leased out sites.

All the drawings should have north direction marked in it along with prevailing wind direction. Necessary dimensions and specifications should be provided where ever necessary. The labour camp management plan should be submitted to the CSC for a written approval before any physical work is undertaken on a particular site. The CSC will carefully examine the proposals in light of the various EMP and regulatory provisions and provide suggestions, as necessary to the Contractor who shall incorporate it in the management plan. Contractor shall be responsible for satisfactory and timely completion of these EMP requirements.

Contractor needs to prepare this document for each different site identified and CSC shall undertake a thorough analysis of the said management and redevelopment plan through a site investigation and suggest additional mitigation measures depending on the site and as demanded by the features of the specific site.

G. RE DEVELOPMENT OF THE LABOUR CAMP

The Contractor should clear all temporary structures; dispose all building debris, garbage, night soils and any other waste as per the approved debris management plan. All disposal pits or trenches should be filled in, disinfected and effectively sealed off. Residual topsoil, if any will be distributed or spread evenly in plantation sites, on adjoining/near-by barren land or affected agricultural land adjacent to the RoW that has been impacted on account of any accidental spillage. Entire camp area should be left clean and tidy, in a manner keeping the adjacent lands neat and clear, at the Contractor's expense, to the entire satisfaction of landowner and the CSC.

These activities should be completed by the Contractor prior to demobilization. Once the Contractor finishes his job, he needs to obtain a certificate from the owner, stating that the site has been re-developed to his/her satisfaction and in tune with the agreement. Then following documents needs to be submitted to the CSC by the Contractor:

Copy of approved site identification report

Photographs of the concerned site 'before' and 'after' setting up the camp.

Certificate from the owner stating his/her satisfaction about status of re-development of the site.

CSC shall ensure, through site verification that all clean-up and restoration operations are completed satisfactorily and a written approval should be given to the Contractor mentioning the same before the

'works completion' certificate is issued/recommended. The PIU shall ensure through site inspection that the Contractor and CSC have complied with all these provisions. The site can then be handed over to the concerned owner or local bodies or for local communities as the case may be.

Certification/documentation pertaining to approval for clean-up and restoration operations and thereafter handing-over to the owner shall be properly maintained by the Contractor, Supervision Consultant and PIU.

ANNEXURE 3. 3. GUIDELINES FOR SITING, MANAGEMENT AND REDEVELOPMENT OF QUARRYING AND STONE CRUSHING OPERATIONS

A. OVERVIEW

A quarry is a type of open-pit mine from which rock or minerals are extracted for building materials, such as dimension stone, construction aggregate, riprap, sand, and gravel. Quarrying causes lot of environmental damages like air and noise pollution, water logging etc. and requires permission from regulatory authorities like mining department. It requires a careful approach in the site selection process, scientific method of quarrying and appropriate measures to redevelop it.

B. CRITERIA FOR LOCATING THE SITE/S

The selection of a quarry is sole responsibility of the Contractor and should be undertaken in adherence to the rules & regulations of the authorities. Following criteria should be followed while selecting a quarry site:

To the extent possible barren land or waste lands shall be preferred during site selection and fertile land and agricultural land shall be avoided.

There shall be no quarrying of sand in any river bed or adjoining area or any other area which is located within 500 meters radial distance from the location of any bridge, water supply system, infiltration well or pumping installation of any of the local bodies or Central or State Government Department or any area identified for locating water supply schemes by any of the Government Department or other bodies.

Quarry site shall be located at a minimum distance of: 500 m from any human settlements, public road, railway line, national highway, state highway or major district road.

Stone quarry shall be located at a minimum distance of 50 m from any water body.

Locate the quarry and crusher at a min. distance of 500 m. away from forests / wildlife habitats / mangroves / ecologically sensitive areas.

The minimum distance between two stone crushers should be 1 km to avoid dust pollution influence of one over the other.

Stone crushing unit should be distanced for 500 m from the NH or SH or residential area or places of public and religious interests.

Access roads to quarry sites must be wide enough for heavy vehicle movement without inconvenience to local traffic.

After identification of the site, Contractor should fill up the prescribed reporting format and submit the same for approval to the CSC without which any activity shouldn't be started on the site.

C. FINALIZATION OF SELECTED SITE/S

After identification of the site, the Contractor should fill up the prescribed reporting format provided in EMAP and submit the same for approval to the CSC. The selected site/s shall be approved by Environmental Officer of CSC, after considering the compliance with the EMP clauses. No agreements or payments shall be made to the land owner/s (in case of a leased or rented out land) prior to receipt of a written approval from the CSC. Any consequence of rejection prior to the approval shall be the responsibility of the Contractor and shall be made good at his own cost. After obtaining a written

approval from the CSC for the selected site, the Contractor has to enter into an agreement with the land owner to obtain his/her consent before commencing any operation / activities in the land. The agreement should also mention its type, duration, amount and mode of payment as well as the preferences of the owner regarding site maintenance and redevelopment.

D. SETTING UP OF QUARRYING AND STONE CRUSHER

Quarrying involves not only extraction of material (rock) but also crushing and screening that makes the rock suitable for use as construction material. Following are the major parameters to be considered before the start of quarrying and stone crushing operations:

(i) Site preparation: The stripping, stacking and preservation of top soil will be mandatory and absolutely no activity should be allowed prior to the satisfactory completion of this conservation measure as per guidelines in EMAP. The boundary of the quarry should be demarcated using barbed wire fencing in order to avoid the future dispute over land as well as to avoid accidental trespassing of people. There should be recorded documents of exact no of trees cut. Green belt should be provided all along the quarry site to function as both noise attenuators and dust collectors and number of trees planted should not be less than three times the number of trees cut. Contour trenches should be dug along the borrow area boundary and at any other appropriate places considering the topography to reduce the surface run off and conserve soil and water. Side slopes shall be constructed with slope drains at applicable locations, to provide drainage and avoid any land slides. All the drainage constructed should be linked to existing drainages in order to avoid flooding and water logging.

(ii) Setting up of a quarry site: The layout of a quarry should provide a gravity flow of material from the face to the crusher, from the crusher to the storage bin and from the bin to the hauling equipment. Adequate arrangements should be made for avoiding fugitive emissions from quarry and crusher premises. This will include (i) housing the noise and dust producing units of the crusher unit in a building with wall of minimum 23 cm thickness and with suitable roofing, (ii) control of air pollution through provision of in-built dust extraction systems in the crusher unit and all transfer points, (iii) a chimney of appropriate height for the DG set (as specified by SPCB), (iv) water sprinkling facilities for the camp premises, (v) facilities to store water required for 3 days use.

Consent to operate the crusher unit should be obtained from SPCB under Air (Prevention and Control of Pollution) Act, 1981 before starting the operation.

(iii) Safety aspects: Blasting timings in quarry should be fixed avoiding the rush hours and these timings should be adhered to in order to avoid the conflict between the surrounding communities or population. Provide warning sirens 10 before each explosion as a warning alarm to people in and outside the quarry. Damaged explosives must be disposed off in a safe manner away from the operational area. Speed of the vehicles around the quarry should be restricted to a low speed in order to reduce the noise pollution and dust generation. Workers should not be exposed to sound of more than 85 – 90 DB for more than eight hours a day and shall be provided with adequate safety wears and personal protective equipments like ear muffs / plugs etc as detailed out in EMP. Fire extinguishers should be provided in the site office.

Traffic movements should be restricted along the access road around times that children walk to and from school. Proper first aid facilities should be provided within the site office and in case of an accident, quick access to nearby hospital /clinic should be provided.

(iv) Facilities for workers: Potable drinking water should be provided in the site office in a hygienic environment sufficient for all the people. Adequate no. of toilets shall be provided for the workers with adequate water supply, proper drainage and effluent treatment system like septic tank with soak pit. Soak pit should have a sealed bottom, honey comb wall and 75 cm. thick, 2mm sand envelope around that. The sewage system for the camp must be properly sited, designed, built and operated so that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place.

(v) Waste Disposal: The Contractor should provide separate garbage bins for biodegradable, non-biodegradable and hazardous wastes in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner. No incineration or burning of wastes shall be carried out by the Contractor. The disposal of any biodegradable matter shall be carried out in pits covered with a layer of earth within the camp site. Discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, hessian, metal containers, strips and scraps of metal, PVC pipe scrubber and poly urethane foam, auto mobile spares, tubes, tires, belts, filters, waste oil, drums and other such materials shall be either reused or sold /given out for recycling. POL (petroleum, oil and lubricants) waste shall be disposed off by transfer only to recycler/ re-refiners possessing valid authorization from the State Pollution Control Board and valid registration from the Central Pollution Control Board. Used lead batteries, if any, should be disposed as per the Batteries (Management and Handling) Rules 2001.

Quarry areas should be protected from illegal dumping of waste by third parties. The overburden should be kept as minimum to maximize the commercial efficiency of the quarry, it can be utilized for creating earth bunds to mitigate the noise and visual impacts and also for the site rehabilitation process. No quarry waste shall be dumped within a 100 m on either side of the road. The overburden should be reused or disposed properly. Site for overburden disposal should be planned within the quarry site or any other appropriate site.

(vi) Training to workers: Workers shall be trained in smooth and safe operation of plants and equipments, their regular maintenance and various safety measures to be followed as well as about the need and importance for adherence to these measures. All the drivers should be trained about safe driving and should be made aware about the need to observe caution while plying through access roads, especially during the time when children walk to and from school. Conduct education programs with the locals regarding the potential impacts of blasting, blasting warning systems, schedules etc.

(vii) Information dissemination: There should be a sign board of size 6' x 4' mentioning the project details and Contractor's details to disseminate the information to the public. There should be a second sign board displaying the latest air and noise monitoring date and data against the standards specified. Warning sign boards should be set up at the entrance gate for the public as well as at other required places for the workers to alert them about the nature of operation being undertaken.

Other mitigation measures: The quarry should not damage any building, work, property or rights of other persons. The quarry should not alter any right of way, well or tank. Roads inside the crusher premises should be tarred or concreted. Water course, if any, from a higher slope should be properly drained out. Strom water drainage shall be provided to prevent water logging and flooding in and around the area. The possibility of collecting the storm water in a pit or a tank should be explored so that it can be reused for dust suppression and the dependence on other water sources could be reduced. If this is not possible, the water should be safely channeled out of the quarry without disturbing any nearby

human settlement. A register should be provided in the camp site for public to record their grievances if any. Environmental monitoring should be conducted as per suggested frequency.

The concerned authority – CSC/ PIU should regularly review the environmental, health and safety aspects. If any adverse effect on environment, habitat and concern of safety is noticed, appropriate measures should be taken as suggested by CSC or should arrange an alternative for road construction materials. In the case of existing quarries and additional quarries, the Contractor has to ensure that all actions in these quarries are in compliance with EMP.

E. OPERATION OF QUARRY SITE AND STONE CRUSHING UNIT

No quarrying operation shall be done without the approval from the concerned authority. The equipment used in quarry should be wear faced, which extends the equipment life and reduce the demand for spare parts. Adopt controlled blasting techniques and conduct quarrying in a skillful, scientific and systematic manner. All units should operate only between 6 am and 10 pm. or as specified by SPCB in the consent letter.

Accessory facilities to be provided in the quarry includes sprinklers to spray water for dousing the dust generation, noise suppressers and rubberized mounting to reduce noise and vibration and tarpaulins or covers over material transporting vehicles. Provide sufficient water storage facility for 2 days' use. Measures have to be taken to reduce the dust generation during drilling operation. Deep wetting of drilling zones also to be done by water sprinkling and drilling machine shall be fitted with dust suppression, collection and disposal arrangements. In case of blasting, the storage and the operation should be as per the regulations. To avoid spillage of fuel and lubricants, the vehicles and equipment should be properly maintained and repaired. Maintenance should be carried out on impervious platforms with spill collection provisions.

Following conditions regarding sound generation should be complied with in a quarry / crusher unit:

The sound level (Leq) measured at a distance of 1 m from the boundary of the site shall not exceed 55 dB(A) during day time (6am - 6pm) and 45 dB(A) during night time (6 pm - 6am).

The DG set shall be provided with exhaust muffler /acoustic enclosure/acoustic treatment with an insertion loss of minimum 25 dB(A) and its emission levels should be within relevant SPCB guidelines.

A proper, routine and preventive maintenance procedure for the DG set shall be set and followed in consultation with the DG set manufacturer.

F. PREPARATION OF QUARRY MANAGEMENT AND REDEVELOPMENT PLAN

The Contractor after getting approval from the competitive authority for the selected site should submit a detailed Quarry Management Plan comprising the following details:

Section–1: Details of site: Copy of approved site identification report along with location plan on a village map or an FMB, showing the site, its survey no., access road, project stretch, distance form the project stretch, surrounding features and land use like residences, agricultural land, water bodies etc., photograph of the site showing the topography and other existing features.

Section-2: Site preparation: Activities that should be undertaken for preparing the site based on EMP and this guideline.

Section-3: Arrangements/ facilities within the camp: List of facilities to be set up within the site like site office, store room, rest room, sanitation facilities etc. and a layout plan showing all these details along with vehicular movement path, green belt, locations were digging of contour trenches should be undertaken etc.

Section-4: Mitigation measures that will be undertaken as per the EMP and this guideline while setting up of the camp and operation of the camp should be separately listed out.

Sectoin-5: Other details: Any other relevant detail like list of awareness camps to be provided to workers, details of information dissemination etc. date of quarry licence obtained from Dept of Mines, its validity, additional conditions laid down in it etc. should be included in the quarry management plan. Species wise no. of trees to be cut and the details of top soil to be removed and conserved like quantity, location of storing etc. shall also be provided.

Section 6: Re-development plan: which should indicate following points: (i) List of structures to be demolished and list of the clean up activities that needs to be undertaken, (ii) Proposed use of the land in the post construction phase, if it is a public property, (iii) Presence of existing facilities that could be put in use by the land owner if it is a leased out private land or by the community in case of a public property.

Section-7: Annexure-(a) Working drawings: Electrical plan showing the electrical network planned for the site, location of generators, master switch boards etc. **(b) Copy of** permissions obtained from local governing body / community etc. as applicable, **(c) Copy of agreement entered with site owner**, in case of leased out sites.

All the drawings should have north direction marked in it along with prevailing wind direction. Necessary dimensions and specifications should be provided where ever necessary. The quarry and crusher unit management plan should be submitted to the CSC for a written approval before any physical work (includes storage of materials, equipment etc.) is undertaken on a particular site. The CSC will carefully examine the proposals in light of the various EMP and regulatory provisions and provide suggestions, as necessary to the Contractor who will implement it within the stipulated time period.

Contractor needs to prepare this document for each different site identified and CSC shall undertake a thorough analysis of the said management and redevelopment plan through a site investigation and suggest additional mitigation measures depending on the site and as demanded by the features of the specific site.

G. REDEVELOPMENT OF QUARRY AREA

The main objective of the redevelopment of quarries is to make the area a safe and secure place and adapt it to a suitable land use like leisure place or fishing place etc. which is suitable for the physical environment as well as for the community around. Along with the preparation of quarry and crusher management plan the Contractor should also prepare a re-development plan, which will be submitted for approval to CSC who in turn will be responsible for approving and monitoring these plans. The redevelopment plan should indicate following points:

List of structures to be demolished and list of the clean up activities that needs to be undertaken.

Presence of existing facilities that could be put in use by the land owner if it is a leased out private land or community in case of a public property.

The proposed use of the quarry site with a layout plan showing the proposed facilities / improvement measures, list of local plant species that could be planted etc.

Photographs of the site before, during and after the quarrying process.

Possible re-development options include the following:

Re-vegetation of the quarry to merge with surrounding landscape with reuse of top soil mixed together with farm yard manure.

Development of exhausted quarries as water bodies, where the quarry pit is developed into pond or a rainwater harvesting structure.

Pits created as a result of blasting could be filled with over burden which are removed and stockpiled in other areas or with construction debris. Top soil should be spread back and trees should be planted along the boundary.

Tree plantation where ever possible depending on the proposed use, erosion control measures etc should be taken up as part of the redevelopment plan.

The Contractor should clear all temporary structures; dispose all debris, garbage, night soils and any other waste as per the approved debris management plan. All disposal pits or trenches should be filled in, disinfected and effectively sealed off. Residual topsoil, if any will be distributed or spread evenly in plantation sites, on adjoining/near-by barren land or affected agricultural land adjacent to the RoW that has been impacted on account of any accidental spillage. Entire camp area should be left clean and tidy, in a manner keeping the adjacent lands neat and clear, at the Contractor's expense, to the entire satisfaction of land owner and the CSC.

These activities should be completed by the Contractor prior to demobilization. Once the Contractor finishes his job, he needs to obtain a certificate from the owner, stating that the site has been re-developed to his/her satisfaction and in tune with the agreement. Then following documents needs to be submitted to the CSC by the Contractor:

Copy of approved site identification report

Photographs of the concerned site 'before' and 'after' setting up the camp.

Certificate from the owner stating his/her satisfaction about status of re-development of the site, this is applicable only in the case of a site to be returned to the owner.

CSC shall ensure, through site verification that all clean-up and restoration operations are completed satisfactorily and a written approval should be given to the Contractor mentioning the same before the 'works completion' certificate is issued/recommended. The PIU shall ensure through site inspection that the Contractor and CSC have complied with all these provisions. The site can then be handed over to the concerned owner or local bodies or for local communities as the case may be.

Certification/documentation pertaining to approval for clean-up and restoration operations and thereafter handing-over to the owner shall be properly maintained by the Contractor, Supervision Consultant and PIU.

ANNEXURE 3. 4. GUIDELINES FOR SITING, MANAGEMENT AND REDEVELOPMENT OF BORROW AREAS

A. BORROW AREA SELECTION

A borrow describes an area where material (usually soil or sand) has been dug for use at another location, for example, soil might be excavated to fill an embankment for a highway. In some cases, the borrow pits may become filled with ground water posing a danger to the surrounding community. If properly redeveloped, it can be turned into recreational areas or sustainable wildlife habitats. In other cases, borrow pits may be used for landfill and waste disposal also.

B. CRITERIA FOR SITE SELECTION

The contractor in addition to the established practices, rules and regulation shall also use the following criteria before finalizing the locations of borrow areas:

The borrow area should not be located in agriculture areas especially in paddy fields unless unavoidable i.e. barren land is not available. In case borrowing needs to be done on an agricultural land, top-soil stripping, stacking and preservation is a must.

Borrow pits shall not be located within a distance of 100 mts. from any NH, SH or other roads.

Site shall be located 30m away from toe of the embankment along road side.

Site should be located not less than 30m from the toe of the bank along the river side or irrigation tank bund.

Borrow area shall be located at a minimum distance of 30m from the toe of the irrigation tank bund.

Borrow site shall be located at a minimum distance of 500 m in down-wind direction of villages and settlements.

No borrow pits shall be located within 250 m. from schools, colleges, playgrounds, religious structures and health centers.

No borrow area shall be opened within 500 m. from a reserved or protected forest area/sites, wildlife movement zone and cultural heritage site.

Loss of vegetation shall be almost nil or minimum.

Borrow area near any surface water body will be at least 100mts. away from the toe of the bank or high flood level, whichever is maximum. After identification of borrow area location/s, the Contractor will fill the prescribed reporting format and submit the same for approval to the "Site Engineer" at least 7 working days before commencement of earth works. A written approval from SC shall be necessary before any activity/work is commenced.

Borrow pit location shall be located at least 0.8 km from villages and settlements. If unavoidable, they should not be dug for more than 30 cm and should be drained.

C. Finalization of the selected area

After identification of the site, the Contractor should fill up the prescribed reporting format provided in EMAP and submit the same for approval to the CSC. The selected site/s shall be approved by Environmental Officer of CSC, after considering the compliance with the EMP clauses. No agreements

or payments shall be made to the land owner/s (in case of a leased or rented out land) prior to receipt of a written approval from the CSC. Any consequence of rejection prior to the approval shall be the responsibility of the Contractor and shall be made good at his own cost. After obtaining a written approval from the CSC for the selected site, the Contractor has to enter into an agreement with the land owner to obtain his/her consent before commencing any operation / activities in the land. The agreement should also mention its type, duration, amount and mode of payment as well as the preferences of the owner regarding site maintenance and redevelopment.

D. BORROW AREA MANAGEMENT

Before the start of operations, the area to be borrowed shall be marked by the contractor with wooden or stone pegs to ensure that the land required for slope stabilization or bund creation is maintained. Supervision Consultant has to ensure that this marking is done on the ground to avoid issues at a later date. Any disregard of this condition shall be made good at the contractor's and/or consultant's own expense.

After receiving the approval, the contractor will begin operations keeping in mind the following points.

Top soil conservation is to be undertaken only if its reuse is envisaged for the proposed activity in the borrow area rehabilitation. Top soil that cannot be re-used in rehabilitation of borrow areas shall be used in the plantation belt/zone along the road.

Damage to productive and fertile areas has to be minimum. This includes appropriate planning of haul roads.

No excavated acceptable material other than surplus to requirements of the Contract shall be removed from the site. Contractor should be permitted to remove acceptable material form the site to suit his operational procedure, and then be shall make good any consequent deficit of material arising there from.

Where the excavation reveals a combination of acceptable and un-acceptable materials, the Contractor shall, unless otherwise agreed by the Engineer, carryout the excavation in such a manner that the acceptable materials are excavated separately for use in the permanent works without contamination by the un-acceptable materials. The acceptable material shall be stockpiled separately.

The Contractor shall ensure that he does not adversely affect the stability of excavation or fills by the methods of stockpiling materials, use of plants or siting of temporary buildings or structures.

The following principles shall be adhered to during borrow area operations:

A 15 cm topsoil layer will be stripped off from the borrow pit and this will be preserved in stockpiles in a designated area with a height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).

Borrowing of earth will be allowed up to a depth of 1.5 mtr from the existing ground level only.

Ridges of not less than 8m width will be left at intervals not exceeding 300m.Small drains will be cut through the ridges, if necessary, to facilitate drainage.

The slope of the edges will be maintained not steeper than 1:4 (vertical: Horizontal).

Rehabilitation shall be satisfactorily undertaken immediately after the use has ceased and at least three weeks prior to monsoon.

If the rehabilitation plan envisages re-use of top soil, then preserved top soil has to be spread uniformly over the land used as a borrow area.

Bunds and temporary fencing (using barbed wire) along with plantation should be provided in case the borrow area is developed as a pond to ensure safety of the residents and the cattle. However, the depth shall not exceed 1.5 m.

E. Preparation of Borrow Area Management and Redevelopment Plan

The Contractor after getting approval from the competitive authority for the selected site should submit a detailed Borrow Area Management and Redevelopment Plan comprising the following details:

Section–1: Details of site: Copy of approved site identification report along with location plan on a village map or an FMB, showing the site, its survey no., access road, project stretch, distance form the project stretch, surrounding features and land use like residences, agricultural land, water bodies etc., photograph of the site showing the topography and other existing features.

Section-2: Site preparation: Activities that should be undertaken for preparing the site based on EMP and this guideline.

Section-3: Layout plan: A layout plan showing all these details along with vehicular movement path, green belt, locations were digging of contour trenches should be undertaken etc.

Section-4: Mitigation measures that will be undertaken as per the EMP and this guideline while setting up of the camp and operation of the camp should be separately listed out.

Sectoin-5: Other details: Any other relevant detail like list of awareness camps to be provided to workers, details of information dissemination etc. date of quarry licence obtained from Dept of Mines, its validity, additional conditions laid down in it etc. should be included in the quarry management plan. Species wise no. of trees to be cut and the details of top soil to be removed and conserved like quantity, location of storing etc. shall also be provided.

Section 6: Re-development plan: which should indicate following points: (i)proposed use of the land in the post construction phase, (ii) preferences of land owner with respect to redevelopment, (iii) Presence of existing facilities that could be put in use by the land owner if it is a leased out private land or by the community in case of a public property, (iv) Extent of community involvement.

Section-7: Annexure-(a) Copy of permissions obtained from local governing body / community etc. as applicable, **(b) Copy of agreement entered with site owner**, in case of leased out sites.

All the drawings should have north direction marked in it along with prevailing wind direction. Necessary dimensions and specifications should be provided where ever necessary. The management plan should be submitted to the CSC for a written approval before any physical work (includes storage of materials, equipment etc.) is undertaken on a particular site. The CSC will carefully examine the proposals in light of the various EMP and regulatory provisions and provide suggestions, as necessary to the contractor who will implement it within the stipulated time period.

Contractor needs to prepare this document for each different site identified and CSC shall undertake a thorough analysis of the said management and redevelopment plan through a site investigation and suggest additional mitigation measures as demanded by the features of the specific site and its surroundings.

ANNEXURE 3. 5. GUIDELINES FOR SITING AND MANAGEMENT OF DEBRIS DISPOSAL SITE

A. OVERVIEW

Construction of highways generates huge quantity of building debris, which needs to be disposed off in previously identified sites suitable for such an activity. This process entails close scrutiny of the sites with respect to their location and this section details out the criteria to be followed in doing so. Moreover, it also guides the Contractor as to how to prepare the site without causing much impact on the surrounding environment.

B. CRITERIA FOR LOCATING THE SITE/S

The locations of waste disposal have to be selected such that:

The said site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, top-soil stripping, stacking and preservation should be undertaken prior to initiation of any activities.

Debris disposal site shall be at least 200 m away from surface water bodies[3].

No residential areas shall be located within 100 m downwind side of the site.

The site is minimum 250 m. away from sensitive locations like settlements, ponds/lakes or other water bodies, wetlands, protected areas, forests, wildlife habitats / Mangroves / Ecologically sensitive areas, seasonal streams, rivers, canals, flood plains, educational institutions, medical centers, religious sites, cultural or heritage sites and play grounds.

The local governing body and community shall be consulted while selecting the site.

The selected site shall meet with the local regulatory requirements (including those of SPCB, Municipalities etc.).

The site shall preferably be owned by government so that there is no need to acquire the land for the same.

After identification of the site the Contractor should fill up the prescribed reporting format and submit the same for approval to the CSC. Any activity on the site can be initiated only after obtaining permission form the CSC.

[3] In the absence of site meeting the stipulated criteria, an alternate site can be selected specifying the reasons. In such a case, the construction camp management plan should incorporate additional measures specific to the site as suggested by the CSC.

C. FINALIZATION OF SELECTED SITE/S

The selected site/s shall be approved by CSC and PIU, after considering compliance with the EMP clauses and this guideline. No agreements or payments shall be made to the land owner/s prior to receipt of a written approval from the CSC and PIU. Any consequence of rejection prior to the approval shall be the responsibility of the Contractor and shall be made good at his own cost.

D SETTING UP OF DEBRIS DISPOSAL SITE

Following steps has to be undertaken while setting up a debris disposal site:

Top soil conservation has to be undertaken as per the guidelines given in EMP.

Considering the topography of the site contour trenches as detailed in EMP should be made along the site boundary to prevent soil erosion.

Fencing should be provided for the debris disposal site to prevent trespassing of humans and animals into the area as well as to prevent spread of the waste material through action of wind, water, scavengers or rag pickers.

No of trees cut should be recorded and three times the same should be planted as green belt development or elsewhere as part of the project.

Provide proper drainage facility so that the run off from the site doesn't contaminate any near by water sources or rivers.

E PREPARATION OF DEBRIS DISPOSAL SITE MANAGEMENT AND REDEVELOPMENT PLAN

The Contractor after getting approval from the competitive authority for the selected site should submit a detailed Debris Disposal Site Management and Redevelopment Plan comprising the following details:

Section–1: Details of site: Copy of approved site identification report along with location plan on a village map or an FMB, showing the site, its survey no., access road, project stretch, distance form the project stretch, surrounding features and land use like residences, agricultural land, water bodies etc., photograph of the site showing the topography and other existing features.

Section-2: Site preparation: Activities that should be undertaken for preparing the site based on EMP and this guideline.

Section-3: Arrangements within the site: A layout plan showing the existing trees, green belt, locations were contour trenches should be dug etc.

Section-4: Mitigation measures that will be undertaken as per the EMP while preparing the site and dumping the waste should be separately listed out.

Sectoin-5: Other details: Any other relevant details like copy of approvals / clearances obtained, species wise no. of trees to be cut and the details of top soil to be removed and conserved like quantity, location of storing etc. shall also be provided.

Section 6: Re-development plan: which should indicate following points: (i) species wise no of tree to be planted, (ii) Proposed use of the land in the post construction phase, if it is a public property, (iii) Presence of existing facilities that could be put in use by the land owner if it is a leased out private land or

by the community in case of a public property and (iv) Other site specific mitigation measures to be undertaken as recommended by the CSC.

Section-7: Annexure-(a) Copy of permissions obtained from local governing body / community etc. as applicable, **(c) Copy of agreement entered with site owner**, in case of leased out sites.

All the drawings should have north direction marked in it along with prevailing wind direction. Necessary dimensions and specifications should be provided where ever necessary. The debris site management plan should be submitted to the CSC for a written approval before any physical work is undertaken. The CSC will carefully examine the proposals in light of the various EMP and regulatory provisions and provide suggestions, as necessary to the Contractor who will implement it within the stipulated time period.

Contractor needs to prepare this document for each different site identified and CSC shall undertake a thorough analysis of the said management and redevelopment plan through a site investigation and suggest additional mitigation measures as demanded by the features of the specific site and its surroundings.

F. REDEVELOPMENT OF WASTE DISPOSAL SITES

Along with the format seeking permission/approval for the disposal site/location from the Engineer/Supervision Consultant, the Contractor shall also submit a rehabilitation plan for the area. Following points have to be kept in view while undertaking the rehabilitation measure:

The dump sites shall be suitably rehabilitated by planting local species of shrubs and other plants. The species (region specific) shall be chosen from the list suggested in the EA/EMP. Local species of trees should be selected so that the landscape is coherent and is in harmony with the surrounding environment.

Rehabilitation can also include conversion into farm land, playground, parking area, block plantation area etc.

Some of the dumpsites could be used either for plantation or for growing agricultural products such as ginger, turmeric or oranges etc.

Care should always be taken to maintain the hydrological flow in the area.

ANNEXURE 3. 6. GUIDELINES FOR PREPARING COMPREHENSIVE WASTE MANAGEMENT PLAN

A. OVERVIEW

A comprehensive waste management plan shall be prepared by the Contractor prior to initiation of any works. The purpose of the plan is to provide standardized procedures for the clearance, removal and disposal of debris caused by major debris / waste generated during the construction work as well as to establish the most efficient and cost effective methods to resolve debris disposal issues.

B. PREPARATION OF COMPREHENSIVE WASTE MANAGEMENT PLAN

The Contractor should prepare a Comprehensive Waste Management Plan to be submitted to CSC for approval prior to setting up of construction and labour camp and it should comprise the following details:

Categorization of waste into degradable, biodegradable and hazardous categories and list of different types of waste that falls in each of these categories.

Estimates about the quantity of waste generated in each category and type of storage units required.

Detail the provisions for storage and handling of waste until disposed. A plan of the respective camps / areas like construction camp, labour camp etc. to be attached indicating in it the space allocated for storage and handling of wastes.

Detail the precautions to be taken while storing, handling and disposing each type of waste, trainings to be imparted to workers to create awareness about waste management.

Details of each debris disposal site: Copy of approved site identification report along with location plan on a village map or an FMB, showing the debris disposal sites, site, its survey no., access road, project stretch, distance form the project stretch, surrounding features and land use like residences, agricultural land, water bodies etc., photograph of the site showing the topography and other existing features.

C. TRAINING FOR PROJECT STAFF AND WORKERS

All staff and workers involved in the highway construction should be imparted training about comprehensive waste management plan including the need for such a plan, its components and measures adopted by the Contractor for implementing it. In addition, all personnel involved should be made aware about various steps and measures each of them has to follow so as to ensure the compliance to the comprehensive waste management plan.

D. PRECAUTIONS TO BE ADOPTED DURING DISPOSAL OF DEBRIS/WASTE MATERIAL

The Contractor shall take the following precautions during transportation and disposal of debris/waste material:

A register should be kept for recording the details of the waste generated and their disposal.

The pre-designated disposal sites should be a part of Comprehensive Solid Waste Management Plan and should be identified as per the EMP clauses prior to initiation of any work on a particular section of the road.

The Contractor will take full care to ensure that public or private properties are not damaged/ affected during the site clearance for disposal of debris and the traffic is not interrupted.

All arrangements for transportation during dismantling and clearing debris, considered incidental to the work, will be implemented by the Contractor in a planned manner as approved and directed by the CSC.

In the event of any accidental spill or spread of wastes onto adjacent parcels of land, the Contractor will immediately remove all such waste material/s and restore the affected area to its original state to the satisfaction of CSC.

Contractor should ensure that any spoils/materials unsuitable for embankment fill shall not be disposed off near any water course; water body; agricultural land; natural habitats like grass lands, wet lands, flood plains, forests etc. pasture; eroded slopes; and in ditches, which may pollute the surrounding including water sources.

Contractor should ensure effective water sprinkling during the handling and transportation of materials where dust is likely to be created.

Materials having the potential to produce dust will not be loaded beyond the side and tail board level and will be covered with a tarpaulin in good condition.

Any diversion required for traffic during disposal of debris shall be provided with traffic control signals and barriers after discussion with the local body and as approved by CSC.

During the debris disposal, Contractor will take care of surrounding features and avoid any damage to trees and properties.

Surplus fly ash, bottom ash and lime, if any, transported for use on this corridor shall not be left open and dumped at any disposal site. Contractor shall take care of such residual materials for use at any other location/s of new embankment construction wok with proper protection measures

No hazardous and contagious waste material shall be disposed at such locations.

E. WASTE DISPOSAL IN CONSTRUCTION CAMP

Concrete flooring and oil interceptors should be provided for hot mix plant area, workshops, vehicle washing and fuel handling area.

POL (petroleum, oil and lubricants) waste shall be stored safely in separate containers and should be disposed off by transfer only to recycler/ re-refiners possessing valid authorization from the State Pollution Control Board and valid registration from the Central Pollution Control Board.

Used lead batteries, if any, should be disposed as per the Batteries (Management and Handling) Rules 2001.

Water separated and collected from oil interceptor should be reused for dust suppression.

There should be a register to record the details of the oil wastes generated at the workshops and oil storage areas.

The Contractor will provide separate garbage bins in the camps and ensure that these are regularly emptied and disposed off in safe and scientific manner as per the Comprehensive Solid Waste Management Plans approved by the CSC.

No incineration or burning of wastes shall be carried out.

Discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, hessian, metal containers, strips and scraps of metal, PVC pipes, rubber and poly urethane foam, auto mobile spares, tubes, tires, belts, filters, waste oil, drums and other such materials shall be either reused or will be sold /given out for recycling.

Septic tank must be provided for toilets and the sludge should be cleared by municipal exhausters.

F. WASTE DISPOSAL IN LABOUR CAMP

The Contractor should provide separate garbage bins in the camps for bio-degradable, non-degradable and domestic hazardous waste and ensure that these are regularly emptied and disposed off in safe and scientific manner.

The disposal of kitchen waste and other biodegradable matter shall be carried out in pits covered with a layer of earth within the camp site to avoid smell and pests. The Contractor may use the compost from such wastes as manure in the plantation sites.

Non-biodegradable waste like discarded plastic bags, paper and paper products, bottles, packaging material, gunny bags, hessian, metal containers, strips and scraps of metal, PVC pipes, rubber and poly urethane foam, auto mobile spares, tubes, tires, belts, filters, waste oil, drums and other such materials shall be either reused or should be sold /given out for recycling.

No incineration or burning of wastes should be carried out.

Effluent treatment system like septic tank with soak pits provided for toilets should be sited, designed, built and operated in such a way that no health hazard occurs and no pollution to the air, ground or adjacent watercourses takes place.

Soak pits must be provided to collect waste water from bathrooms and kitchen.

G. DISPOSAL OF BITUMINOUS WASTE

The bituminous waste should be used for development of roads inside the construction camps, haul roads or for filling pot holes in rural roads.

At locations identified for disposal of residual bituminous wastes, the disposal will be carried out over a 60 mm thick layer of rammed clay so as to eliminate the possibility of leaching of wastes into the ground water.

The Contractor will suitably dispose off unutilized non-toxic debris either through filling up of borrows areas located in wasteland or at pre-designated disposal sites, subject to the approval of CSC.

Debris generated from pile driving or other construction activities along the rivers and streams 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.

H. DISPOSAL OF NON BITUMINOUS WASTE

Non-bituminous wastes other than fly ash may be dumped in borrow pits (preferably located in barren lands) where such borrow pits are not suitable to be re-developed as an economic source like pisci-culture or a source of irrigation. Such borrow pits can be filled up with non-bitumen wastes and then

covered with a minimum 30cm layer of the soil, where plantation of trees and shrubs will be taken-up by the Contractor as a part of site rehabilitation.

Local tree species suitable for such re-habitation work shall be selected in consultation with local community.

I. REUSE OF DEBRIS GENERATED FROM DISMANTLING STRUCTURES AND ROAD SURFACE

Debris generated due to the dismantling of existing road will be suitably reused in the proposed construction as follows

Eighty percent (80%) of the sub-grade excavated from the existing road surface, excluding the scarified layer of bitumen, shall be reused in the civil works after improving the soil below the subgrade through addition of sand and suitable cementing material for qualitative up-gradation.

The dismantled scraps of bitumen will be utilized for the paving of cross roads, access roads and paving works in construction sites and campus, temporary traffic diversions, haulage routes, parking areas along the corridor or in any other manner approved by the Environmental Officer of SC.

ANNEXURE 3. 7. GUIDELINES FOR TOP SOIL CONSERVATION AND REUSE

The top soil from all sites including road side widening and working area, cutting areas, quarry sites, construction camps, labour camps, haul roads in agricultural fields (if any) and areas to be permanently covered shall be stripped to a specified depth of 15 cm and stored in stock piles for reuse. A portion of temporarily acquired area and/or RoW edges will be earmarked for storing top soil. The locations for stacking will be pre-identified in consultation and with approval of environmental officer of SC. The following precautionary measures will be taken by the Contractor to preserve the stock piles till they are re-used:

Stockpiles will be such that the slope doesn't exceed 1:2 (vertical to horizontal), and height is restricted to 2 m.

To retain soil and allow percolation of water, the edges of pile will be protected by silt fencing.

Multiple handling kept to a minimum to ensure that no compaction occurs.

Such stockpiles shall be covered with empty gunny bags or will be planted with grasses to prevent the loss during rains.

Such stockpiled topsoil will be utilized for:

Covering reclamation sites or other disturbed areas including quarry areas.

Top dressing and raising turfs in embankment slopes

Filling up of tree pits

For developing compensatory afforestation plantation

In the agricultural fields of farmers, acquired temporarily that needs to be restored.

Residual top soil, if there is any, shall be utilized for the plantations works along the road corridor. The utilization as far as possible shall be in the same area from where top soil was removed. The stripping, preservation and reuse shall be carefully inspected, closely supervised and properly recorded by the SC.

ANNEXURE 3. 8. GUIDELINES FOR PROVISION OF NOISE BARRIERS

Mitigating the impact of increased noise levels at the sensitive receptor locations includes posting of signs prohibiting the use of horns, constructing a sound insulating wall and, to the extent possible, planting appropriate trees to serve as green noise barriers. Attenuation of sound can be achieved considerably by the combined effect of sound insulating walls and green barriers. Nevertheless the putting of green barriers requires at least 2-5m additional space between the solid barrier and the receptor. Principle of the designed barrier is explained in the design sections. Proposed project mitigation actions are cost effective when compared to the generally recommended expensive double glazed windows.

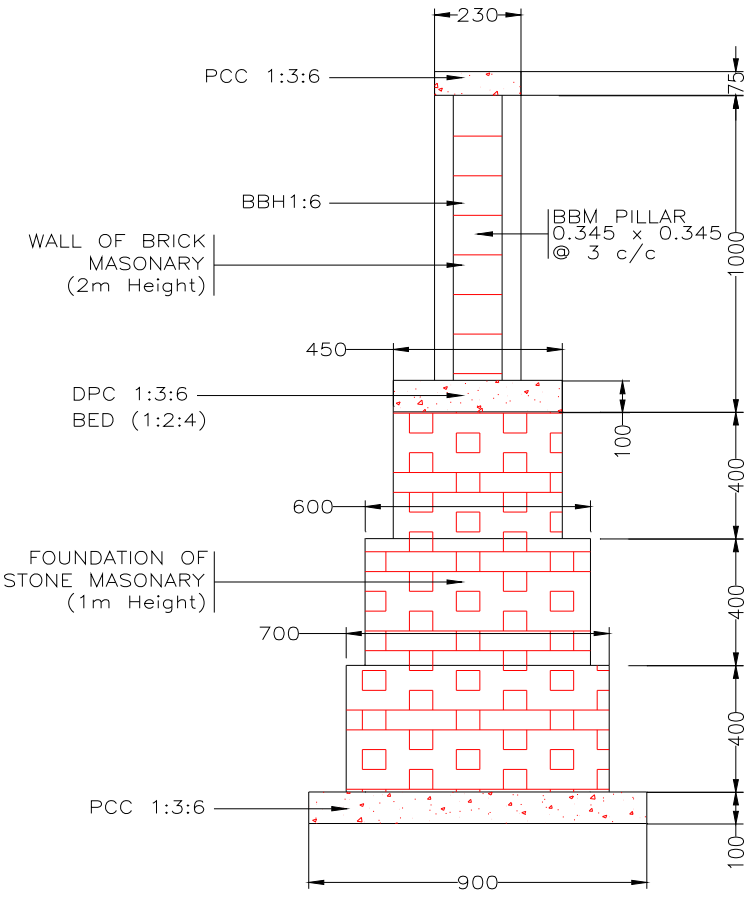
A. SOUND INSULATING WALLS FOR SILENCE ZONES

The design of a sound insulating wall comprises 23 cms. thick brick wall which will act as a sound barrier. The typical cross section for the same is given in Figure 1. This can be provided adjacent to the road corridor where hospitals, medical centre, schools and other educational institutions are affected by the traffic noise.

B. GREEN BARRIERS FOR SILENCE ZONES

These are simply a thick layer of green plantation with limited foliage (eg. Ashoka Tree) acting as noise absorbers. These trees may be planted just inside and adjacent to the wall. While contractors will be responsible for the implementation of the civil work, tree plantation will be carried out by the Forest department under the tree-planting scheme of the project. The implementation aspects are provided in the EMP. In addition to the noise mitigation, the thick green layer will act as an air quality filter for traffic emission. A typical green barrier of 100m lengths will have 200 trees in 4 rows.

Noise mitigation techniques will be employed as may be warranted at each of the sensitive receptor sites. Definitive noise levels will be empirically determined at each site and selection of the mitigation technique will be made on a site- specific basis in consultation with property owners. Co-ordination and implementation will be the responsibility of the Environmental officer of the supervision consultants (SC). Mitigation cost has been estimated as a part of the environmental costs of the project.



SOLID NOISE BARRIER

Figure 1. Typical Cross Section of a Noise Barrier

ANNEXURE 3. 9. GUIDELINES TO ENSURE WORKER'S SAFETY DURING CONSTRUCTION

In order to ensure worker's safety while undertaking various operations / stages of construction many safety measures needs to be followed, which are listed down below:

A. TREE FELLING

Use hard hats during tree felling

Ensure safe use and storage of tools such as axes, power chain saw, hand saw of different types, HDPE ropes of approved thickness to drag felled trees and logs.

Keep the saw blades in proper lubrication and sharpened state for efficient workability.

Determine proper foot and body position when using the implements for felling, cutting and dragging.

Wear appropriate foot protection

Avoid cutting branches overhead.

Keep first aid kits ready at the site.

Determine possible hazards in the area, e.g. electrical or telephone or other utility lines, buildings, vehicles and domestic cattle that may create unsafe work situations.

Prior to felling, determine the safest direction of fall and orient fixing of ropes and

Cutting positions accordingly.

Determine the proper hinge size before directing the fall.

Keep machineries and workers ready for speedy removal of the tree from the main traffic movement area.

Keep flag men and warning signal signage at either end of felling area to control movement of traffic and warn passers-by.

Use loud noise signals for warning by-standers and workmen about the impending fall, so as they move away from the direction of fall.

B. PLANT SITES, CONSTRUCTION CAMP AND QUARRY AREAS

Install perimeter fencing.

Ensure good visibility and safe access at site entrances.

Provide adequate warning signs at the entrance and exit, as necessary.

Provide adequate space/area for loading and unloading, storage of materials, plant and machinery.

Display emergency procedure and statutory notices at conspicuous locations.

Provide areas for collecting garbage and other waste material, and also arrange for their regular/periodic disposal.

Arrange appropriate storage, transportation and use of fuel, other flammable materials and explosives in line with the license requirements obtained from concerned authorities.

Provide defined access roads and movement areas within the site.

Ensure availability of first aid facilities and display notices at various work places showing the location of first aid facilities and emergency contact numbers. Provide and enforce use of PPE at plant and quarry sites.

C. HOUSE KEEPING PRACTICES

Provide proper slope in kitchen, canteens, washrooms, toilets and bathrooms for easy and immediate draining of water.

Keep all walkways and circulation areas clear and unobstructed at all times.

Ensure that spillages of oil and grease are avoided and in case of accidental spills, these are immediately collected.

Use metal bins for collection of oily and greasy rags.

Stack raw materials and finished products out of walkways.

Do not leave tools on the floor or in any location where they can be easily dislodged.

Keep windows and light fittings clean.

Maintain the workplace floors dry and in a non-slippery condition

Provide and maintain proper drainage system to prevent water logging and unhygienic conditions.

Ensure that protruding nails in boards or walls are moved or bent over or removed so that they do not constitute a hazard to people.

Store all flammable materials in appropriate bins, racks or cabinets with proper cover and labels – as required for various products.

Make sure that hazardous/dangerous chemicals are kept in the goods stores with the appropriate labeling, display of the material-safety-data-sheet (MSDS) and other precautionary measures.

Display 'no smoking' signs in areas with high risks of fire, (eg. near fuelling areas, diesel/oils/lubricant/paint storage area, hessians, rubber, wood and plastic etc.) in and around working area.

D. TRAFFIC SAFETY AND ROADS WORKS

Delineate advance warning zones, transition zones and construction zones at both ends of a work front. Use devices such as regulatory signs, delineators, barricades, cones, pavement markings, lanterns and traffic control lights, reflectors and signal men in appropriate manner round the clock.

No work front should be 'touched' without putting appropriate safety measures in place. SC will be responsible to ensure that the permission for any activity is not given without the required safety plan and practices in place.

Put signage at appropriate locations as per the road construction activity plan to warn the road users, construction vehicles/equipment operators, pedestrians and local residents about the work in progress, speed controls, hindrances/ blockages, diversions, depressions etc. in lines with contract requirements and IRC guidelines.

Express a regret signage for the inconvenience caused and alert about the dangers ahead on account of construction activity.

Signage has to be: (i) simple, easy-to-understand and should convey only one message at a time; (ii) has florescent and reflective properties of the paints; iii) broad, prominent and with appropriate size of letters and figures; (iv) placed at the appropriate 'point/s' as specified in the IRC guidelines to allow proper stoppage/reaction time to approaching vehicles.

Different sign boards shall have a mix of pictorial signs and messages in local language, Hindi and English.

While using barricades, ensure that traffic is kept away from work areas and the road user is guided to the safe, alternative movement track.

Ensure that excavation sites are provided with effective barriers and reflecting signage to prevent any accidental approach by vehicles during the day or night.

Prevent entry of cattle and wildlife through proper fencing/barricading around the excavation sites.

Provide proper uniform (light reflecting garments) to flagmen engaged in traffic control at diversions so that they can be singled out from the moving traffic.

Provide wide red and green flags or red and green lights to flagmen for controlling traffic.

In high traffic zones and congested areas, use of wireless communication devices with protective headgear and shoes by flagmen has to be ensured to prevent confusion and minimize the risk of accidents.

E. SAFETY DURING EXCAVATION

The risk of accidents involving people and vehicles remains high in excavated sites. All pits or excavations shall to be barricaded to warn the road users and residents and to avoid any unauthorized entry of persons, children, domestic cattle or wildlife. For deep excavations and culvert construction sites, painted GI sheets, delineators, lamps (as required) and retro-reflective signage shall be used.

For excavation in soft loose & slushy soil (above 2.00 m depth where sliding of earth or collapsing of sides may occur)

Excavation more than 1.5 m. is to be done in steps of minimum 500 mm offsets with plank and stuttering support, as required under contract clauses.

For excavation in slippery or water logged area (labour or machinery may slip or get caught in slush)

Try to dewater the area and spread minimum 150 mm thick sand layer to avoid slipping.

For excavation in rock where chiseling is involved (and hammer or stone pieces may fall and injure the hand, eyes or legs).

Only experienced and skilled labour should be employed. Chisel should be held with a tight fitting grip. Goggles and leg cover should be provided to protect the labour.

Excavation in rock where blasting is involved (risk of injury to workers and passer-by)

Blasting is to be carried out where absolutely necessary following all explosive handling regulations with mines safety principles including use of hooters, signage, protective gear, safety fuse, detonators, ignition

coils and wires, exploder dynamo etc. The danger zone has to be vacated at least 20 minutes before the actual firing. Sufficient warning through positioning of red flags, dander signs, painted drums and sirens for safety of men at work and for any passer-by is to be provided. After a lapse of minimum 15 minutes when a clear signal is given by the site-in-charge through use of whistle or horn or light, the blasting charge should be ignited. After blasting a minimum of 30 minutes gap is to be given for the rocks and earth or blocks of loose boulders to fall of so that safety and security of the staff at the operation zone is ensured. Heavy charges shall not be used in fragile rock systems, where rock disintegrating machinery could be brought to use.

The entire operation shall be conducted under the strict supervision of qualified staff and in the presence of safety officers.

For excavation for drain or manhole (risk of a passer-by falling into the excavated portion).

The area should be properly barricaded with sign boards and illumination/lamps for night time safety. In congested stretches, watchmen/guards can also be placed for vigil.

Snake bites or Scorpion Stings during excavation

In areas with vegetation, tall grasses and forest cover, the contractor shall provide the labour with gum boots and gloves. He shall also make snake antidotes available on site. Emergency ve`hicles should also be kept ready to rush the patient to the nearest hospital.

F. SAFETY DURING SOME TYPICAL CONSTRUCTION WORK

Centering and scaffolding (risk of framework collapse while construction, concreting or just before concreting especially when wooden ballies are used).

Many a times ballies joined together give away due to weak joints. Use of metal scaffolding and centering plates with metal fasteners are the safest and highly recommended materials for use in all road construction works for ensuring safety, stability and casting of structures. All such scaffolding should be placed on a firm and a level base on the ground for ensuring stability. No wooden scaffolding or bamboo scaffolding is to be used for any casting of heavy (RCC) structural construction as the risk to safety of workers is higher.

Railings are to be provided along working platforms and ladders for better safety. Nets shall be hung below the scaffolding or structures where work is on-going to prevent fall of debris, stones, bricks, equipments and other heavy objects and even workmen, which could be fatal.

Form-work for small/light beams and slabs

The collapse of bottom of the beam that may bring down the slab as well is a risk in such operations, which may injure the labour or supervision staff. Slender ballies without bracing are not be allowed for such works. No concreting should be allowed without bracing at 300 mm above ground and at mid way for normal beams and slabs. The bracings should be for the support of beams as well as the slabs. Direct ballies support from the ground and the practice of tying planks with binding wire to the steel reinforcement shall not be allowed. A temporary railing and properly based working platforms along the periphery of slab reduces risk to the life of labour and supervision staff.

Dismantling of Scaffoldings

Dismantled materials may fall on passer-by and workers. Workers could also get injured during the removal of such materials. Prior to dismantling of scaffoldings/working platforms, the area of operation should be closed for all outsiders. No one should be allowed within 50 mt. from the place of demolition. Helmets, safety belts and other PPE must be worn by all the workers engaged in such a work. This work requires careful handling by an experienced supervisor/work force and should be executed with utmost caution. Gradual dislodging and use of PPE is required.

Column Reinforcements

The tendency of bar-benders is to tie the vertical steel with coir rope or 8 mm steel rods as ties on all four sides of the column reinforcements. Reinforcement to columns shall be by welding MS rods with metal scaffolding to keep it in position till the final casting of RCC is done.

Fall of Objects or Debris from a Height

At bridges construction sites (or in work areas at a height above ground level) thick nylon net or hessian barriers shall be used to prevent any splinter, debris, mortar or concrete from falling onto the passers by or workmen around.

Water Storage Tanks (for General Use, Curing etc.)

A child of a worker or that of a near-by resident falling into the water tank is also a risk associated with construction sites. The water tanks therefore shall be provided with protective cover/lid with locking arrangement at every site of activity to prevent accidental drowning.

Site Cleaning

Throwing of waste materials, broken concrete pieces, brick bats, sand etc. straight from the top of a structure onto the ground can injure a worker or a passerby. Such materials should be brought to the ground with the help of lift or the use of rope over pully with a bucket.

G. OPERATION OF EXCAVATORS

Ensure that excavators are operated by authorized persons who have been adequately trained. Prevent any unauthorized use of the excavators.

Ensure that only experienced and competent persons are engaged in supervising all excavations and leveling activity.

Check and maintain as per the manufacturer's manual.

Issue relevant information, including that related to instructions, training, supervision and safe system of work in writing and provide expert supervision for guidance.

Ensure that the operation and maintenance manuals, manufacturer's specifications, inspection and maintenance log books are provided for the use of the mechanics, service engineers or other safety personnel during periodic maintenance, inspection and examination.

During tipping or running alongside the trenches, excavators must be provided with stop blocks. Avoid operating the machine too close to an overhang, ditch or hole, potential carving in edges, falling rocks and land slides, rough terrain with undulating obstacles.

Excavators must be rested on firm ground after field operation away from the road

Locate and identify underground services including telephone cables, OFC cables, sewerage and drainage lines, water supply, electrical cables etc by checking with all concerned underground utility providers.

When reversing or in cases where the operator's view is restricted, adequate supervision and signaling arrangements shall be provided.

Ensure that the type and capacity of the excavator are properly chosen for the intended purposes and site conditions. Never use a machine for any purposes other than it is designed for.

Check and report for excessive wear and any breakage of the bucket, blade, edge, tooth and other working tools of the excavator and ensure replacement/ repair to avoid mishap and break down.

Check that all linkages/hinges are properly lubricated and ensure that the linkage pins are secured. Never use improper linkage pins.

Never dismount from or mount on a moving machine.

H. OPERATION OF TRUCKS AND DUMPERS

Ensure that only trained, authorized and licensed drivers operate the vehicles.

Enlist help of another worker before reversing the vehicle.

Switch-off the engine when not in use to save fuel, prevent accidents and unnecessary noise and air pollution.

Lower the tipping bodies when the machine is unattended, but if it is necessary to leave them in the raised position they should be blocked to prevent their fall by fixing a sturdy support below.

Carryout periodic servicing as per the manufacturer's requirements. All records of maintenance and repairs should be in writing and available for verification.

Keep the vehicle tidy and the cabin free from clumsy utilities, which might obstruct the controls and create hazards.

Follow safe driving principles including speed limits as per traffic signage.

Avoid carrying additional passengers in the cabin or on the body of the dumper, while in field operation other than the connected workers.

Provide stop blocks when the vehicle is tipping into or running alongside excavations or when it is parked.

Do not overload the vehicle.

Carry only well secured loads and use proper covers and fasteners.

I. Manual Handling and Lifting

Avoid manual handling of heavy and hazardous objects and chemicals.

Pre-assess the actual requirement of manpower in case of emergency situations.

The hazardous and poisonous materials should not be manually handled without proper equipments/gears and prior declaration of the risks needs to be made to the involved workers.

All concerned persons shall be trained in proper methods of lifting and carrying.

In all manual operations where groups of workers are involved, a team leader with necessary training to handle the entire work force in unison has to be provided for.

Watch and ward to control/supervise/guide movement of equipments and machineries, loading and unloading operations, stability of the stockpiled materials and irregularly shaped objects have to be provided for safety and security of workers.

Carriageway used by the workers must be free from objects, which are dangerous.

Loading and unloading from vehicles shall be under strict supervision.

J. ELECTRICAL HAZARDS IN CONSTRUCTION AREAS

Statutory warning leaflets/posters are to be distributed/displayed by the Contractor in the vicinity of work sites for the benefit of all workers, officers and supervisors as well as the public, indicating the do's and don'ts and warning related to electrical hazards associated with operations to be executed/in progress.

All wires shall be treated as live wires.

Report about dangling wires to the site-in-charge and do not touch them.

Only a qualified electrician should attempt electrical repairs.

Train all workers about electrical safety.

Shut down the equipment that is sparking or getting over heated or emitting smoke at the time of operation, if it is not the normal way of working of such machines.

Inform technical person/s for required maintenance.

Never used damaged wires for electrical connection.

Demolition, tree felling and removal of overhead transmission lines shall be undertaken with strong, efficient and closely monitored arrangements to avoid accidents.

K. USE AND STORAGE OF GAS (LPG)

Store filled gas/LPG cylinder in a secure area – mark this as a no smoking area.

Transport, store, use and secure cylinders in upright position.

Ensure proper ventilation at the ground level in locations where LPG is in use.

Avoid physical damage to the cylinders.

Never weld near the cylinder.

Store empty cylinders secured and upright.

Make sure that the cylinder is closed immediately after use.

Investigate immediately if there is the smell of LPG or gas.

Never use destenched gas/LPG on site.

Make sure that there is no other unrelated fire in the vicinity of the cylinder.

L. GAS WELDING

The welders and welding units should follow all the basic principles of welding for safety and security.

Use face shield to protect the eyes.

Use goggles, particularly when chipping slag and cutting strips.

Use gloves long enough to protect wrists and forearms against heat, sparks, molten metal and radiation hazards.

Use high-top boots/gum boots to prevent sparks, splinters, sharp edges of metal and hot welded strips, welding rods, electric cables etc. from injuring the legs.

Avoid inhaling the noxious fumes and gasses from burning electrodes by using gas masks and screen of the work area to prevent the glair moving outside it.

Keep the key hung from the regulator control for split seconds operations to stop the valve in case of any accidental damage or leakage to supply pipeline that may catch fire and cause accidents in case acetylene or LPG cylinder.

The welding area should have sufficient openings with fixed exhaust ventilators or adequate air flow openings to remove poisonous fumes and gases.

Take precautions of wearing hard hats or fiber helmets to prevent injury due to fall of any object and accidental injury from projections while welding.

Welders operating above ground should have adequate safety belt secured to stable platform to prevent accidental fall or injury from the scaffold. All electrical and gas connection lines up to the welder should be sufficiently insulated and protected from sharp edges and sharp objects. These shall not come into contact with hot metal.

Do not use gas cylinders for supporting work or as rollers.

While using LPG or CNG cylinders for welding, follow all safety precautions as has been prescribed by the supplier company.

Avoid fire hazards and accidents by posting safety supervisors to oversee the activities of workers.

Do not store explosives, high inflammable materials, loose hanging overhead objects, hot welded strips etc. near gas cylinders.

Close all valves, switches and circuits while leaving the work place under proper lock and key. In case of mobile units, proper carriage procedures have to be followed for safety and security of men and materials.

M. FIRE SAFETY PRACTICES

Before fire breaks out

Designate fire officers.

Store flammable material in proper areas having adequate fire protection systems.

Display sufficient warning signs.

Install fire alarm wherever required and test regularly.

Inspect fire extinguishers regularly and replace as necessary.

Train selected personal on use of fire extinguishers

Fire escape route should be kept clear at all times and clearly indicated

Display escape route maps prominently on each side.

Provide sufficient exit signs at prominent locations for directing people to the escape staircases and routes.

Train workers about the escape route and assembly point/s.

Carryout fire drill periodically.

When fire breaks out

Alert all persons through fire alarms or other methods.

Put off the fire with appropriate fire extinguishers only when you are sure that you are safe to do so.

Escape if you are in danger through the fire escape route to assembly point.

Call-up Fire Service.

Fire officers to carryout head count at the assembly point.

N. NOISE HAZARDS AND ITS CONTROL

Plan camp lay-out in a manner that ensures barriers/buffers between residential/ office units and high noise generating zones.

Use sound meters to measure the level of noise and if it exceeds 75 dB(A), then ensure preventive measures.

Make personnel aware of noisy areas by using suitable warning signs and insist on use of ear protectors/ear plugs to prevent excess noise affecting the workmen.

Reduce noise at source by: use of improved equipments; regular and proper maintenance of the machinery as per the manufacturer's manual; by replacing rickety and noisy equipments and machineries. Screening locations with noise absorbing material; making changes in the process/equipment; controlling machine speeds; ensuring that two noise-generating machines are not running at the same time close to each other at same location; using cutting oils and hydraulic noise breakers; providing vibration and noise absorbing platform and firm embedding of equipments with fasteners.

Appoint a competent person to: carryout a detailed noise assessment of the site; designate ear protection zone/s; give training/instructions on the necessary precautionary measures to be observed by site personnel including using suitable type of ear protection equipments.

O. PERSONAL PROTECTIVE EQUIPMENT

General

Provision of personal protective equipment has to be made over and above all measures taken for removing or controlling safety hazards on a work site.

Ensure that sufficient personal protective equipments are provided and that they are readily available for every person who may need to use them.

The Contractor's Project Manager shall ensure that all persons make full and proper use of the personal protective equipment provided.

Provide instruction/s and training for the proper use and care of personal protective equipment.

Ensure that the personal protective equipments are in good condition.

Train workers to report unintentional damages for replacement and to always keep the personal protective equipment clean.

PPE includes, but may not be limited to, hard hats, goggles, ear plugs, gloves, air filters/masks, boots, ropes etc.

Eye Protection

Road construction work sites, quarries and crushers are full of dust particles, sand, splinter, harmful gases, bright light and welding arc lights, which are injurious for the eyes. Therefore, eye protection and adequate lighting in work areas is required. All workers, supervisors and inspection officers and dignitaries coming over for study of works should be compelled to wear eye protecting glasses/goggles properly fitting the eye sockets to prevent damage due to dust, gases and other particles.

Head Protection

Hard hats are compulsory for all workers, supervisors and managers/officials while working and/or inspecting a work sites.

Hard hat areas shall be demarcated clearly.

Hearing Protection

Provide ear plugs or ear muffs to the workers and to those who need to get in and out of a high noise area frequently. Use re-usable earplugs when the reduction required (15-25 dBA) is not excessive. Use earmuffs where a large attenuation of upto 40 dBA is demanded.

Do not use dry cotton wool for hearing protection because it doesn't provide any such protection.

Provide disposable ear plugs for infrequent visitors and ensure that these are never re-used.

Replenish ear plugs from time to time for those who need to work continuously for a long period in a high noise area/s.

Use ear muffs with replaceable ear cushions because they deteriorate with age or may be damaged in use.

Avoid wearing spectacles with ear muffs.

Use soap and water or the recommended solvent for cleaning ear muffs.

Respiratory (Protective) Equipment

Wear suitable mask for protection when there is a potential for small particles entering the lungs, e.g. emptying of cement bags, working at crusher sites etc.

Provide training to all persons using the masks/respirators for their correct fitting, use, limitations and symptoms of exposure.

Clean and inspect all respirators before and after use.

Store respirators properly when not in use.

Safety Footwear

Wear suitable footwear for work

Use safety footwear on site or in other dangerous areas.

Wear suitable safety shoes or ankle boots when working anywhere where there is high risk of foot injuries from slippery or uneven ground, sharp objects, falling objects etc.

All safety footwear, including safety shoes, ankle boots and rubber boots, should be fitted with steel toecaps.

Avoid wearing flip flops, high heeled shoes, slippers, light sport shoes in situations where there is a risk of foot injury.

Keep shoelace knots tight.

Hand Protection

Wear suitable gloves for selected activities such as welding, cutting and manual handling of materials and equipment.

Do not wear gloves where there is a risk of them becoming entangled in moving parts of machinery.

Wash hands properly with disinfectant soap and clean water before drinking or eating.

Wash hands immediately after each operation on site when the situation warrants.

P. FIRST AID

Provide first aid boxes at every work site in a cool and shaded place.

Ensure that training on the use of the first aid box is provided to at least every supervisor on the site.

Display the list of persons along with their contact numbers who are trained on providing first aid.

Ensure that every first aid box is marked "First Aid" in English and in local language.

Check for expiry dates and replace the contents, as necessary.

Maintain a register on health records including injuries/accidents.

Q. ACCIDENT INVESTIGATIONS

Carryout the investigation/s as quickly as possible.

Investigation should be carried out both internally as well as through third party.

Conduct interviews with as many witnesses as necessary including the affected persons and supervising officials.

Do not rely on any one/limited source of evidence.

Check all the log books, stock registers, issue registers, movement registers on site

Safety regulations, traffic signals and signal men activities, signage, as well as other field positions and keep a record of all investigations through audio-visual and electronic medium for presenting an evaluation of the incident/s.

After completion of the investigation/enquiry, a summary of the facts recorded, sequence of happenings, persons-in-charge, persons examined, equipments and machineries tested, follow-up of action as per legal requirements, copy of station diary entry, hospital entry, safety regulations etc. to be prepared with a comparative analysis for proper assessment.

ANNEXURE 3. 10. GUIDELINES FOR PREPARATION OF TRAFFIC MANAGEMENT PLAN

The Contractor shall at all times carry out work on the road in manner creating least interference to the flow of traffic with the satisfactory execution. For all works involving improvements to the existing state highway, the Contractor shall, in accordance with the directives of the CSC, provide and maintain, during execution of the work, a passage for traffic either along a part of the existing carriageway under improvement, or along a temporary diversion constructed close to the state highway. The Contractor shall take prior approval of the CSC regarding traffic arrangements during construction.

A. ENSURING TRAFFIC SAFETY AND CONTROL

Where subject to the approval of the Engineer the execution of the works requires temporary closure of road traffic use, the Contractor shall provide and maintain temporary traffic diversions. The diversions shall generally consist of 200 mm thickness of gravel 4.5 meters wide laid directly upon natural ground and where any additional earthworks are required for this purpose that will be provided under the appropriate payment items.

Where the execution of the works requires single-lane operation on public road, the Contractor shall provide and maintain all necessary barriers, warning signs and traffic control signals to the approval of the Engineer.

With the exception of temporary traffic arrangements or diversions required within the first 4 weeks of the Contract, the Contractor shall submit details of his proposals to the Engineer for approval no less than 4 weeks prior to the temporary arrangement or diversion being required. Details of temporary arrangements or diversions for approval as soon possible after the date of the Letter of Acceptance.

The colour, configuration, size and location of all traffic signs shall be in accordance with the code of practice for road sign. In the absence of any detail or for any missing details, the signs shall be provided as directed by the Engineer (CSC).

The Contractor shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, marking, flags, lights and flagmen as may be required by the Engineer for the formation and protection of traffic approaching or passing through the section of the road under improvement. Before taking up any construction, an agreed phased programme for the diversion of traffic or closer of traffic on the road shall be drawn up in consultation with the SE.

At the points where traffic is to deviate form its normal path (whether on temporary diversion or part width of the Carriageway) the lane width path for traffic shall be clearly marked with the aid of pavement markings, painted drums or a similar device to the directions of the SE. At night, the passage shall be delineated with lanterns or other suitable light source.

One-way traffic operation shall be established whenever the traffic is to be passed over part of the carriageway inadequate for two-lane traffic. This shall be done with the help of temporary traffic signals or flagmen kept positioned on opposite sides during all hours. For regulation of traffic, the flagmen shall be equipped with red and green flags and lanterns/lights.

On both sides, suitable regulatory / warnings signs as approved by the SE shall be installed for the guidance of road users. On each approach, at least two signs shall be put up, one close to the point where

transition of carriageway begins and the other 120 m away. The signs shall be of design and of reflectory type, if so directed by SE.

Upon completion of the works for which the temporary traffic arrangements or diversions have been made, the Contractor shall remove all temporary installations and signs and reinstate all affected roads and other structures or installations to the conditions that existed before the work started, as directed by the Engineer.

B. MAINTENANCE OF DIVERSIONS AND TRAFFIC CONTROL DEVICES

Signs, lights, barriers and other traffic control devices, as well as the riding surface of diversion shall be maintained in a satisfactory condition till such time they are required as directed by the SE. The temporary traveled way shall be kept free of dust by frequent applications of water, if necessary. The signages and devices required includes the following:

Barricading

Men at work

Keep Left

Go slow

Flag men

Narrow signs

Lantern(Amber Blinker)

Traffic control Lights

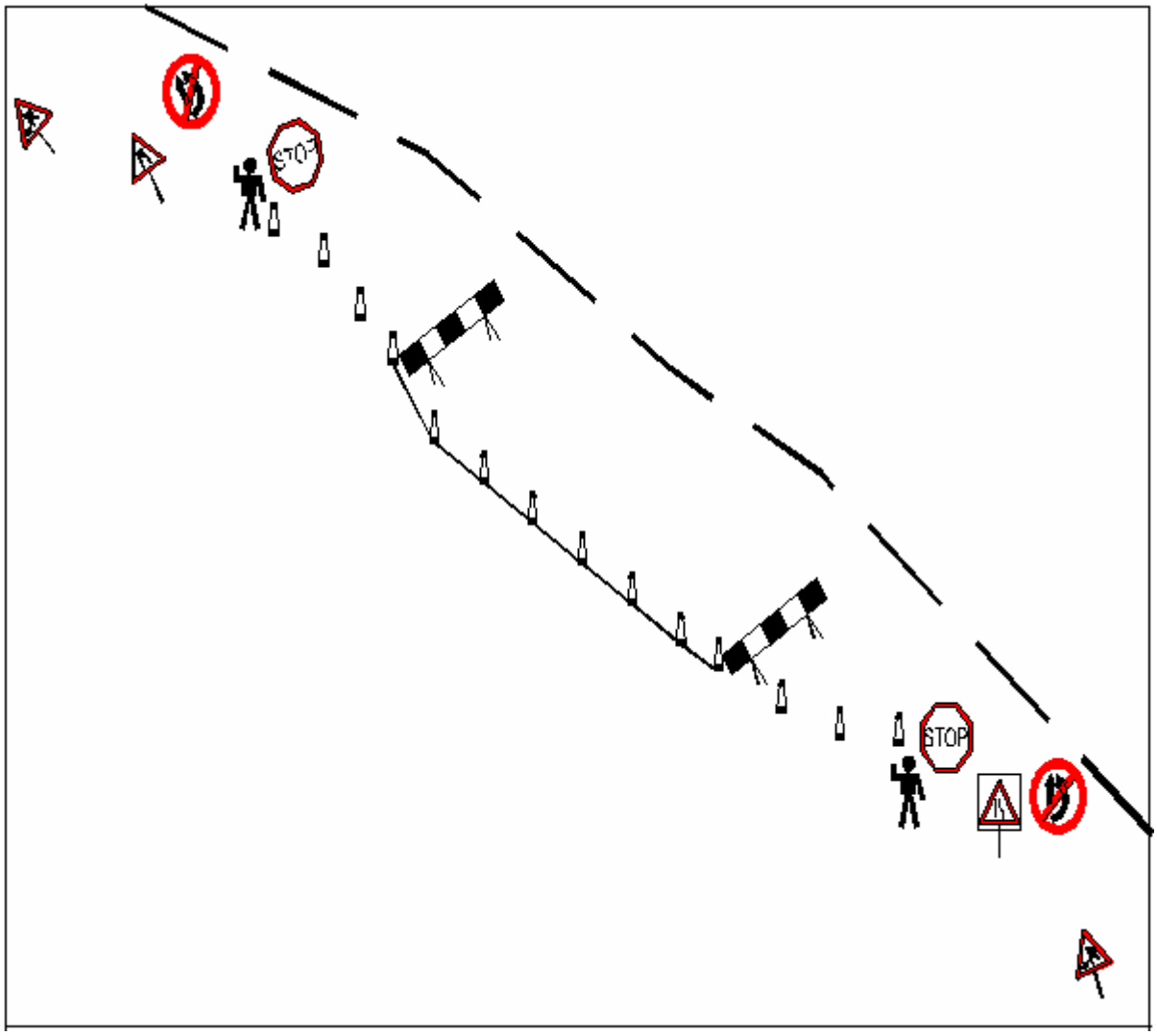
Cones

Safety jackets and helmets should be provided to all the workers/ Engineers working on the road.

Fixed mobile solid barricades must be placed between the workmen and traffic or pedestrian and traffic.

All the safety signs should be according to IRC: 67 and IRC: SP: 55: 2001

Examples of some good practice in traffic control during construction are shown in the figures below.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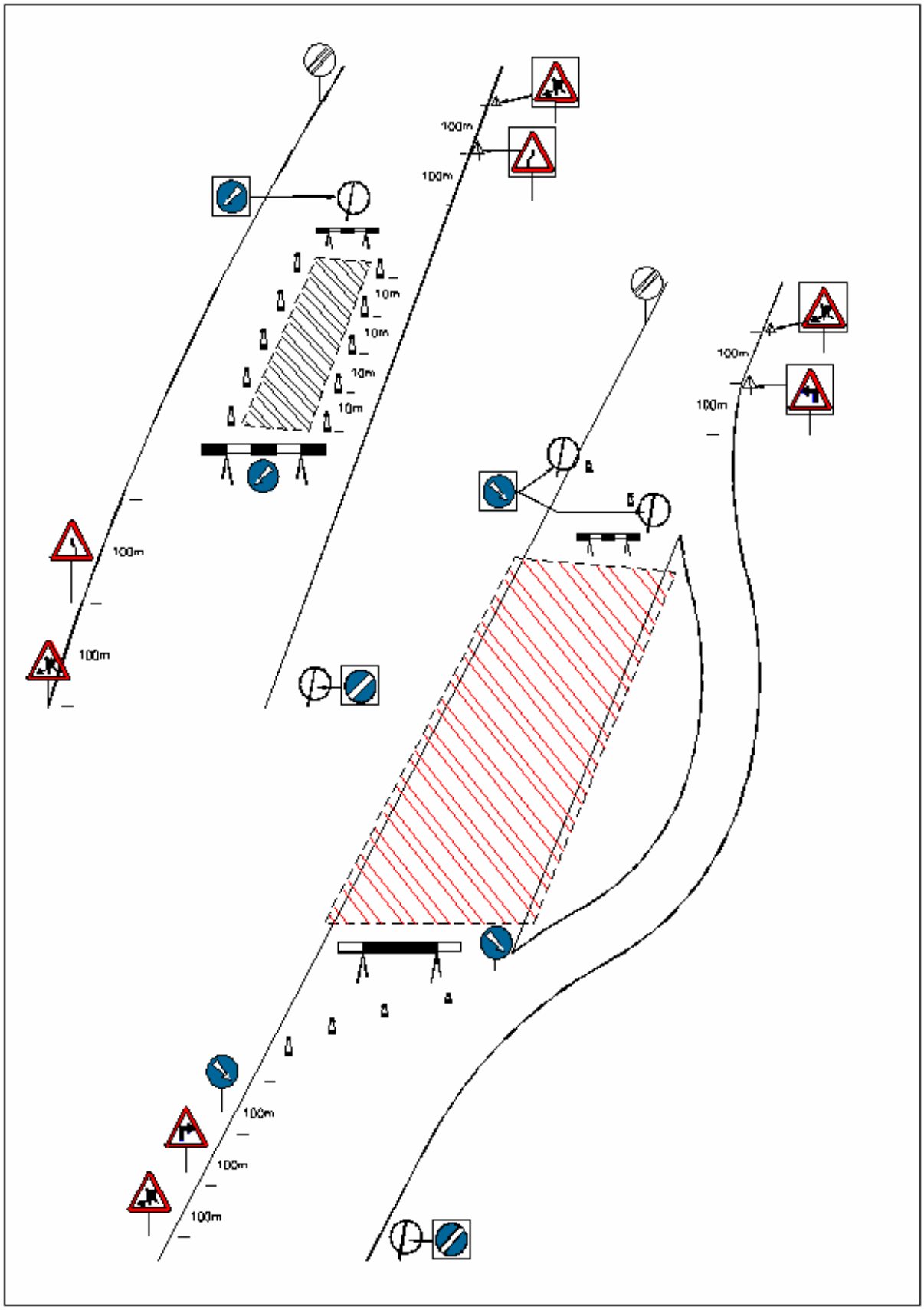
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ANNEXURE 3. 11. GUIDELINES FOR STORAGE, HANDLING, USE AND EMERGENCY RESPONSE FOR HAZARDOUS SUBSTANCES

A. HANDLING HAZARDOUS SUBSTANCES (INCLUDING CHEMICALS)

As far as practicable the hazardous materials will be stockpiled under proper mechanical loading, unloading and stacking aided by manual labour where necessary.

Exercise great care in the storage and use of chemicals because they may be explosive, poisonous, corrosive or combustible.

Separate different chemicals physically and store accordingly after proper labeling.

Stock taking of all hazardous will be mandatory together with enforcement of manufacturer's or supplier's safety standard/s and drill exercises.

New and less known chemicals and building materials, for which toxicological studies are wanted, need to be properly evaluated prior to their inclusion in the materials list.

All containers should be clearly labeled to indicate contents.

Maintain the Material Safety Data Sheet of all chemicals for reference on safety precautions to be taken and the use of suitable PPE.

Ensure use of correct personal protective equipment before allowing workers to handle chemicals.

When opening containers, ensure holding of a rag over the cap/lid or use of safety gloves, as some volatile liquids tend to spurt up when released.

Eye fountain, emergency shower and breathing apparatus should be available near the workplace.

Ensure immediate medical attention in case of spill/splash of a chemical.

Safety instructions for handling emergency situations shall be displayed prominently at both the storage and use locations.

B. TRANSPORTATION, REFUELING AND MAINTENANCE PROCEDURE

Truck or suitable containers will bring in all fuel and fluids.

There will be no storage of fuel, oil or fluids within 200m of a water line.

Prior to re-fueling or maintenance, drip pans and containment pans will be placed under the equipment.

Absorbent blankets may also be required to be placed under the equipment and hoses where there is a possibility of spillage to occur.

All used oils or fluids will be properly contained and transported to appropriately licensed (authorized) disposal facilities.

Following re-fueling and maintenance, the absorbent blankets (if any) and spill pans will be picked up and the fuel truck or container moved outside of the 100m (or 50m) wide area.

C. EMERGENCY SPILL PROCEDURE

Should a spill occur, either through accidental spillage or equipment failure, the applicable emergency spill procedure as outlined in sections below and/or as directed by the manufacturer/supplier shall be followed:

Spill Procedure (Inside a Stream)

In the case of a spill, overflow or release of fluid into the stream waterway (whether water is flowing during the spill or not), do what is practical and safely possible to control the situation, while sending SOS for help from the technical wings and fire brigade or any other govt. agency.

Stop the flow

Stop the release into the waterway

Shut down the equipments

Close valves and pumps.

Plug leaking of damage hosepipes or containers with suitable sealants or temporary plugs at the holes.

Remove Ignition Sources

Cut off the supply sources and shut down the sources of power supply.

Cordon up the area and salvage the spilled materials for recycling or disposal as would be suggested by the technical experts or as per the manufacturer's guidelines for the product. In case of inflammable materials, mobile phones, electrical switches and heat generating machines, sparking electrodes etc. shall not be operated.

Portable fire extinguishers need to be kept handy in such vehicles for immediate use as a damage control measure.

Clean-up and Disposal

Emergency Services shall be engaged for the containment, clean-up and disposal of contaminants released into the environment.

Reporting

The Contractor's Environmental Officer will document the event and submit the reports to the Engineer, the Client and appropriate regulatory agencies like the Pollution Control Board.

Procedure Review

The Engineer will review the report, determine if changes are required to be incorporated in the plan of activity under the revised guidelines and recommendation/s that have been suggested by the technicians/manufacturer/ supplier /fire brigade /SPCB /environment officer of the PIU, as the case may be.

Spill Procedure (On Land)

All types of spills are hazardous - whether liquid or amorphous or solid and accordingly the spill has to be dealt with. For liquids, sealing the leakage or emptying the container into another empty vessel may be considered. For solid or semi-solid or viscous products, special salvage equipments are to be used. For

fine particles and water soluble chemicals, neutralizing or scraping the affected soil from the area has to be resorted to with mechanical removal and depositing at a safe site as would be recommended by experts.

Notification

All legal authorities such as civil administration including the district Collector, the sub- divisional officer, Tehsildar, the local SHO of the police station, the SP, Divisional Forest Officer, the Inspector of Factories and Boiler, the SPCB authority monitoring the pollution in the area, site engineer/supervision consultant and environmental officer of OWD/PIU, local gram panchayat and people's representatives have to be informed about the incident, the probable damage, current and after effects, precautionary measures to be taken and already taken and restrictions imposed on movement of men, material, live stock etc in an around the site of spill.

Cleanup and Disposal

The Engineer's Environmental Officer will ensure that a proper cleanup and disposal method is determined. Absorbent pads will soak up the spilled material. The pads will be contained and removed from site for disposal at a licensed (authorized) facility.

Reporting

The Contractor's Environmental Officer will document the event and submit reports to the Engineer, the Client and appropriate regulatory agencies like the Pollution Control Board(s).

Procedure Review

The Engineer will review the report; determine, if changes are required to procedures and; recommend implementation of all required changes.

ANNEXURE 3. 12. REPORTING FORMAT FOR IDENTIFICATION OF CONSTRUCTION CAMP SITE

A	**Project Details**		Date of reporting:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
B	**Site Details**			
1.	Place Name		Landmark	
2.	Name of Panchayath / Municipality		Revenue Village	
3.	Taluk		District	
4.	Nearest Chainage (km) of the project road		location w.r.t. project road	LHS/ RHS
5.	Area of site		Current land use	
6.	Ownership of the land	Owned / leased	Survey no.	
7.	If leased / rented, name, address and contact details of owner			
8.	Distance* from any major settlement or village			
9.	Distance from any major surface water course or body			
10.	Distance from ecologically sensitive areas			
11.	Distance from the Project road			
12.	Width and type (paved or unpaved) of access road			

13.	No of trees with girth> 0.3m		
14.	No of trees to be cut		
15.	Is top soil conservation required (Yes/ No)		
List of enclosures:	(a) Location map		
	(b) Layout plan		
	(c) Photographs of the site		
	(d) List of machinery, equipments and vehicles to be used		
	(e) List of schools and hospitals with in 200 mts distance from the boundary of the camp		

C. Submission Details	**Submitted by (Environment & Safety Engineer of Contractor)**	**Approved / Rejected by (Environmental Officer of CSC)**
Signature & date		
Name		
Designation		
Remarks by CSC		

** All distances are to be measured from the boundary of the site.*

Note: Contractor has to fill and submit this format to the CSC upon identification of each construction camp site. Subsequently, the EO of CSC has to visit the site and approve / reject the site with reasons. The EO of CSC has to give a copy of this format to the contractor after his approval / rejection with remarks. On approval of a site, the Contractor has to prepare the Management and Redevelopment Plan for this site as per the Guidelines given in EMP and submit to CSC for approval.

ANNEXURE 3. 13. REPORTING FORMATS FOR IDENTIFICATION OF LABOUR CAMP SITE

A	**Project Details**		Date of reporting:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
B	**Site Details**			
1.	Place Name		Landmark	
2.	Name of Panchayath / Municipality		Revenue Village	
3.	Taluk		District	
4.	Nearest Chainage (km) of the project road		location w.r.t. project road	LHS/ RHS
5.	Area of site		Current land use	
6.	Ownership of the land	Owned / leased	Survey no.	
7.	If leased, name, address and contact details of owner			
8.	Distance* from any major settlement or village			
9.	Distance from any major surface water course or body			

10.	Distance from ecologically sensitive areas	
11.	Distance from the Project road	
12.	Width and type of access road	
13.	No of trees with girth> 0.3m	
14.	No of trees to be cut	
15.	Is top soil conservation required (Yes/ No)	

List of enclosure:	Location map	
	Layout Plan	
	Photographs of the site	

C. Submission Details	**Submitted by (Environment & Safety Engineer of Contractor)**	**Approved / Rejected by (Environmental Officer of CSC)**
Signature & date		
Name		
Designation		
Remarks by CSC		

** All distances are to be measured from the boundary of the site.*

Note: Contractor has to fill and submit this format to the CSC upon identification of each Labour camp site. Subsequently, the EO of CSC has to visit the site and approve / reject the site with reasons. The EO of CSC has to give a copy of this format to the contractor after his approval / rejection with remarks. On approval of a site, the Contractor has to prepare the Management and Redevelopment Plan for this site as per the Guidelines given in EMP and submit to CSC for approval.

ANNEXURE 3. 14. REPORTING FORMAT FOR IDENTIFICATION OF QUARRY AND STONE CRUSHER SITE

A	**Project Details**		Date of reporting:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
B	**Site Details**			
1.	Place Name		Landmark	
2.	Name of Panchayath / Municipality		Revenue Village	
3.	Taluk		District	
4.	Nearest Chainage (km) of the project road		location w.r.t. project road	LHS/ RHS
5.	Area of site		Current land use	
6.	Ownership of the land	Owned / leased	Survey no.	
7.	If leased, name, address and contact details of owner			
8.	Type of material available and its quantity			
9.	Distance* of the site from:			
	(i) any major settlement or village			
	(ii) any major surface water course or body			
	(iii) any bridge, water supply system, infiltration well or pumping installation			
	(iv) any public road			
	(v) ecologically sensitive areas			
	(vi) nearest quarry / stone crusher			

10.	Distance from project road		
11.	Width and type of access road		
12.	No of trees with grid >0.3m		
13.	No of trees to be cut		
14.	Is top soil conservation required: Yes/ No		
15.	Place identified for top soil conservation		
List of enclosure:		(a) Location map	
		(b) Layout plan	
		(c) Photographs of the site	
		(d) List of schools and hospitals with in 200 mts distance from the boundary of the site	

C. Submission Details	**Submitted by (Environment & Safety Engineer of Contractor)**	**Approved / Rejected by (Environmental Officer of CSC)**
Signature & date		
Name		
Designation		
Remarks by CSC		

* *All distances are to be measured from the boundary of the site.*

Note: Contractor has to fill and submit this format to the CSC upon identification of each quarry and stone crusher site. Subsequently, the EO of CSC has to visit the site and approve / reject the site with reasons. The EO of CSC has to give a copy of this format to the contractor after his approval / rejection with remarks. On approval of a site, the Contractor

has to prepare the Management and Redevelopment Plan for this site as per the Guidelines given in EMP and submit to CSC for approval.

ANNEXURE 3. 15. REPORTING FORMAT FOR IDENTIFICATION OF BORROW AREAS

A	**Project Details**		Date of Reporting:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
B	**Site Details**			
1.	Place Name		Landmark	
2.	Name of Panchayath / Municipality		Revenue Village	
3.	Taluk		District	
4.	Nearest Chainage (km) of the project road		location w.r.t. project road	LHS/ RHS
5.	Area of site		Current land use	
6.	Ownership of the land	Owned / leased	Survey no.	
7.	If leased, name, address and contact details of owner			
8.	Distance* from any major settlement or village			
9.	Distance from any major surface water course or body			
10.	Distance from ecologically sensitive areas			
11.	Distance from the Project road			
12.	Width of and type of access road			
13.	No of trees with girth> 0.3m			
14.	No of trees to be cut			
15.	Is top soil conservation required (Yes/ No)			
List of enclosure:		Location map		
		Layout Plan		

	Photographs of the site	

C. Submission Details	**Submitted by (Environment & Safety Engineer of Contractor)**	**Approved / Rejected by (Environmental Officer of CSC)**
Signature & date		
Name		
Designation		
Remarks by CSC		

** All distances are to be measured from the boundary of the site.*

Note: Contractor has to fill and submit this format to the CSC upon identification of each borrow area. Subsequently, the EO of CSC has to visit the site and approve / reject the site with reasons. The EO of CSC has to give a copy of this format to the contractor after his approval / rejection with remarks. On approval of a site, the Contractor has to prepare the Management and Redevelopment Plan for this site as per the Guidelines given in EMP and submit to CSC for approval.

ANNEXURE 3. 16. REPORTING FORMAT FOR IDENTIFICATION OF DEBRIS DISPOSAL SITE

A	**Project Details**		Date of Reporting:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
B	**Site Details**			
1.	Place Name		Landmark	
2.	Name of Panchayath / Municipality		Revenue Village	
3.	Taluk		District	
4.	Nearest Chainage (km) of the project road		location w.r.t. project road	LHS/ RHS
5.	Area of site		Current land use	
6.	Ownership of the land	Owned / leased	Survey no.	
7.	If leased, name, address and contact details of owner			
8.	Distance* from any major settlement or village			
9.	Distance from any major surface water course or body			
10.	Distance from ecologically sensitive areas			
11.	Distance from the project road			
12.	Width and type of access road			
13.	No of trees with girth> 0.3m			
14.	No. of trees to be cut			
15.	Is top soil conservation required (Yes/ No)			
List of enclosure:	Location map			
	Layout Plan			

	Photographs of the site	
C. Submission Details	**Submitted by (Environment & Safety Engineer of Contractor)**	**Approved / Rejected by (Environmental Officer of CSC)**
Signature & date		
Name		
Designation		
Remarks by CSC		

* *All distances are to be measured from the boundary of the site.*

Note: Contractor has to fill and submit this format to the CSC upon identification of each debris disposal site. Subsequently, the EO of CSC has to visit the site and approve / reject the site with reasons. The EO of CSC has to give a copy of this format to the contractor after his approval / rejection with remarks. On approval of a site, the Contractor has to prepare the Management and Redevelopment Plan for this site as per the Guidelines given in EMP and submit to CSC for approval.

ANNEXURE 3. 17. REPORTING FORMAT FOR IDENTIFICATION OF SOURCES OF WATER FOR CONSTRUCTION

A	**Project Details**		Date of Reporting:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
B	**Site Details**			
1.	Place Name		Landmark	
2.	Name of Panchayath / Municipality		Revenue Village	
3.	Taluk		District	
4.	Nearest Chainage (km) of the project road		location w.r.t. project road	LHS/ RHS
5.	Type of water body (River / Canal / lake)			
6.	Existing users			
7.	Ownership of the water body			
8.	Authority responsible for giving permission			
9.	If private, name, address and contact details of owner			
10.	Distance from project road			
11.	Width and type of access road			
List of enclosure:		Location map		
		Photographs of		

	the site	
C. Submission Details	**Submitted by (Environment & Safety Engineer of Contractor)**	**Approved / Rejected by (Environmental Officer of CSC)**
Signature & date		
Name		
Designation		
Remarks by CSC		

***** *All distances are to be measured from the boundary of the site. Ground water should not be used for construction.*

Note: Contractor has to fill and submit this format to the CSC upon identification of each water source for construction. Subsequently, the EO of CSC has to visit the site and approve / reject the site with reasons. The EO of CSC has to give a copy of this format to the contractor after his approval / rejection with remarks.

ANNEXURE 3. 18. FORMAT FOR REGISTER OF COMPLAINTS AND IT'S REPORTING

A	**Project Details**	**Information**			
1.	Name of project stretch and link no.				
2.	Name and address of the Contractor				
3.	Contract date and duration				
B	**Details of Complaint Received**		**Site Name**		
Sl. No.	**Date of Complaint**	**Name and address of person with contact details**	**Complaint**	**Action taken with date**	**Signature of ESE of Contractor**
1					
2					
3					

A register in this format shall be maintained at each site office of the contractor. This same format shall be used to compile and report the details of complaints received at all sites to the CSC along with the Monthly Report of the Contractor. The EO of CSC has to give instruction to the Contractor, if any further action has to be taken on any complaint.

ANNEXURE 3. 19. FORMAT FOR REGISTER OF SITES OPENED AND CLOSED AND IT'S REPORTING

A.	**Project Details**	**Information**
1.	Name of project stretch and link no.	
2.	Name and address of the Contractor	
3.	Contract date and duration	

B.	**Site Details**										
Sl. No.	**Site Opening Date**	**Type of Site***	**Address of Site (Place name, Landmark, Revenue Village, Survey No., Panchayath, Taluk and District)**	**Name and Address of the Owner**	**List of Clearances Required**	**Issue Date of each Clearance**	**Expiry Date of each Clearance**	**Site Closing Date**	**Redevelopment Status**	**Remarks**	**Signature of ESE of Contractor**
1											
2											

* *Construction Camp / Labour camp / Quarry Area and Stone Crusher Unit / Borrow Area / Debris Disposal Site / Water Source.*

A site should be opened only after submitting the Management and Redevelopment Plan prepared as per the Guidelines given in EMP and got it approved by the EO of the CSC. A register in this format (preferably in A3 size paper) should be maintained by the contractor for each road. This same format shall be used to report the details of sites opened and closed to the CSC along with the Monthly Report of the Contractor. The EO of CSC has to give instruction to the contractor if any clearance is pending for any site.

ANNEXURE 3. 20. CHECKLIST FOR MONITORING OF CONSTRUCTION CAMP MANAGEMENT

A	**Project Details**		Date of Monitoring:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
5.	Name of Construction Camp with sl. no. in Register of Sites			
B.	**Monitoring Details**			
Sl. No.	**Environmental Management Measures**	**CSC's observation (Yes / No / Not Applicable)**	**Corrective Actions Proposed**	**Remarks**
1.	Whether concrete flooring and oil interceptors are provided for hot mix plant area and work shop, vehicle washing and fuel handling area?			
2.	Are all the first aid facilities provided in the camp?			
3.	Whether the plant is located in such a way that there are no residences, public institutions or hospital with in a radius of 250 M from the centre of the plant?			
4.	Whether the vehicle movement in and out of the camp is in a controlled manner?			

5.	Does water in cross drainage channels block?			
6.	Whether all the plant and machineries are well maintained and regularly serviced?			
7.	Whether all the drains and channels are covered?			
8.	Whether a green belt is provided along the periphery of camp?			
9.	Whether water is stored for dust suppression in the camp?			
10.	Whether sanitation facilities are provided for male and female?			
11.	Whether separate garbage bins are provided to collect the garbage?			
12.	Whether septic tanks with soak pits are provided?			
13.	Whether the location of soak pit is in such away that it does not pollute the ground water?			
14.	Whether a qualified safety officer is appointed for ensuring safety?			
15.	Whether noise barriers near sensitive receptors are provided?			
16.	Whether personal protective equipments are provided?			

17.	Whether warning sign boards are set up at the entrance gate for the public?			
18.	Whether all applicable clearances are obtained and valid till date?			
Signature of Environment and Safety Engineer (ESE) of the Contractor with date			Signature of Environmental Officer of the CSC with date	

Note: The Environmental Officer of the CSC has to use this format to monitor the implementation of Environmental Management Measures for each Construction Camp Quarterly. Corrective actions with specific timeframe should be proposed for each Environmental Management Measure, which is not implemented satisfactorily. A copy of the filled up format should be given to the ESE of the Contractor. CSC has to attach this format to the Quarterly Report to be submitted to PIU, with details of corrective action taken by the Contractor.

ANNEXURE 3. 21. CHECKLIST FOR MONITORING OF LABOUR CAMP MANAGEMENT

A	**Project Details**		Date of Monitoring:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
5.	Name of Labour Camp with sl. no. in register of sites			
B	**Monitoring Details**			
Sl. No.	**Environmental Management Measures**	**CSC's observation (Yes / No / Not Applicable)**	**Corrective Actions Proposed**	**Remarks**
1.	Whether the camps are floored with concrete?			
2.	Are all the first aid facilities provided in the camp?			
3.	Whether the camp is located in such a way that there are no residences, public institutions or biosensitive area with in a radius of 500 M from the camp?			
4.	Whether the vehicle movement in and out of the camp is in a controlled manner?			
5.	Whether LPG for cooking is provided?			

6.	Whether safe drinking water is provided?			
7.	Whether all the drains and channels are covered?			
8.	Whether a green belt is provided along the periphery of camp?			
9.	Whether day care centres are provided with in the camp?			
10.	Whether sanitation facilities are provided separately for male and female?			
11.	Whether separate garbage bins are provided to collect the garbage?			
12.	Whether septic tanks with soak pits are provided?			
13.	Whether the location of soak pit is in such a away that it does not pollute the ground water?			
14.	Whether a qualified safety officer is appointed for ensuring safety?			
15.	Whether proper fencing of the camp is done?			
16.	Whether the workers are well aware of cleanliness, hygiene, community livings, AIDS etc.?			

17.	Whether all applicable clearances are obtained and valid till date?			
Signature of Environment and Safety Engineer (ESE) of the Contractor with date			Signature of Environmental Officer of the CSC with date	

Note: The Environmental Officer of the CSC has to use this format to monitor the implementation of Environmental Management Measures for each Labour Camp Quarterly. Corrective actions with specific timeframe should be proposed for each Environmental Management Measure, which is not implemented satisfactorily. A copy of the filled up format should be given to the ESE of the Contractor. CSC has to attach this format to the Quarterly Report to be submitted to PIU, with details of corrective action taken by the Contractor.

ANNEXURE 3. 22. CHECKLIST FOR MONITORING OF QUARRY AND STONE CRUSHER MANAGEMENT

A	**Project Details**		Date of Monitoring:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
5.	Name of Quarry & Crusher with sl. no. in register of sites			
B	**Monitoring Details**			
Sl. No.	**Environmental Management Measures**	**CSC's observation (Yes / No / Not Applicable)**	**Corrective Actions Proposed**	**Remarks**

1.	Whether the crusher units and/or other dust-producing units are housed in a building with a wall of minimum 23 cm thickness and with suitable roofing?			
2.	Whether quarry site is located at a distance of minimum 500 mts. from human settlement, railway line, national highway, state highway, eco-sensitive area or district road*?			
3.	Whether stone quarry is located at a minimum distance of 50mts. from a water body[4]?			
4.	Whether the vehicle movement in and out of the camp is in a controlled manner?			
5.	Whether a dust extraction with collection system is provided in the crusher unit and all transfer points?			
6.	Whether safe drinking water is provided for the workers?			
7.	Whether a dust extraction unit with collection system is provided in the crusher unit and all transfer points?			

[4] If this is not possible, given the topographical features of the region, pl specify the reasons clearly.

8.	Whether a green belt is provided along the periphery of quarry?			
9.	Whether adequate systems with water spray and sprinkling is provided for dust suppression?			
10.	Whether the roads inside the crusher premises is tarred or concreted?			
11.	Whether separate garbage bins are provided to collect the garbage?			
12.	Whether the crusher, impactor and other connecting unit working time is restricted to day time (6 am to 6 pm)?			
13.	Whether dust sealing arrangement is provided in the impactor to avoid fugitive emission?			
14.	Whether the ambient sound level (Leq) at a distance of 1 m away from the boundary of the site is with in 55 dB(A)?			
15.	Whether the occupier is conducting air monitoring on the suggested frequency?			
16.	Whether contour trenches are made to control soil erosion?			
17.	Whether workers are properly trained?			
18.	Whether sign boards of size 6' x 4' mentioning the project details and Contractor's details are placed for public?			

19.	Whether the stack height of the D.G set is adequate?			
20.	Whether arrangement made for avoiding fugitive emission from plants/ premises are adequate?			
21.	Whether natural drainage patterns are kept clear without not alteration or blockage?			
22.	Whether top soil conservation has been undertaken?			
23.	Whether all applicable clearances are obtained and valid till date?			
Signature of Environment and Safety Engineer (ESE) of the Contractor with date			Signature of Environmental Officer of the CSC with date	
Note: The Environmental Officer of the CSC has to use this format to monitor the implementation of Environmental Management Measures for each Quarry & Crusher Quarterly. Corrective actions with specific timeframe should be proposed for each Environmental Management Measure, which is not implemented satisfactorily. A copy of the filled up format should be given to the ESE of the Contractor. CSC has to attach this format to the Quarterly Report to be submitted to PIU, with details of corrective action taken by the Contractor.				

ANNEXURE 3. 23. CHECKLIST FOR MONITORING OF BORROW AREA MANAGEMENT

A	**Project Details**		Date of Monitoring:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
5.	Name of Borrow Area with sl. no. in register of sites			
B	**Monitoring Details**			
Sl. No.	**Environmental Management Measures**	**CSC's observation (Yes / No / Not Applicable)**	**Corrective Actions Proposed**	**Remarks**
1.	Whether the work at night is fully avoided?			
2.	Whether the approach road to the borrow area well maintained?			
3.	Whether the necessary traffic sign board is kept to control the traffic flow?			
4.	Whether any record is kept for the number of trees cut?			

5.	Whether a record on total quantity of earth evacuated is maintained?			
6.	Whether all waste materials from the borrow area is properly disposed?			
7.	Whether the relaying of the preserved top soil is carried out?			
8.	Whether required signages for the protection of the works or safety and convenience of public provided?			
9.	Whether effective measures are taken to control nuisance and disturbance arising from the execution work?			
10.	Whether the excavation is carried out in such a manner that the activity will not damage adjacent properties or cause contamination of nearby stream or other water bodies?			
11.	Whether the land is leveled after completion of work?			
12.	Whether the borrow pits are redeveloped?			
13.	Whether water logging is avoided?			
14.	Whether arrangements are made for regular sprinkling of water?			

15.	Whether all applicable clearances are obtained and valid till date?			
Signature of Environment and Safety Engineer (ESE) of the Contractor with date			Signature of Environmental Officer of the CSC with date	

Note: The Environmental Officer of the CSC has to use this format to monitor the implementation of Environmental Management Measures for each Borrow Area Quarterly. Corrective actions with specific timeframe should be proposed for each Environmental Management Measure, which is not implemented satisfactorily. A copy of the filled up format should be given to the ESE of the Contractor. CSC has to attach this format to the Quarterly Report to be submitted to PIU, with details of corrective action taken by the Contractor.

ANNEXURE 3. 24. CHECKLIST FOR THE MONITORING OF DEBRIS DISPOSAL SITE MANAGEMENT

A	**Project Details**		Date of Monitoring:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
5.	Name of Debris Disposal Site with sl. no. in register of sites			
B	**Monitoring Details**			
Sl. No.	**Environmental Management Measures**	**CSC's observation (Yes / No / Not Applicable)**	**Corrective Actions Proposed**	**Remarks**
1.	Whether the construction operations are carrying out in such a manner that no waste material is dumped or disposed off in an unhealthy manner that causes any environmental hazard?			
2.	Whether the debris forming work close to the streams and water bodies are generally avoided during the monsoon period?			
3.	Whether the debris disposal site is at least 200 meter away from the surface water body?			

4.	Whether the debris disposal site is at least 500 meter away from the ecologically sensitive are, residential area or main road?			
5.	Whether the debris disposal along the water courses and close to the drainage channels are in such a manner that it do not cause any blockage to the flow of water?			
6.	Whether the bituminous waste is used as a surfacing material to the access roads to base camps, quarries, borrow area, temporary diversion, haulage routes etc.?			
7.	Whether the waste disposal details are submitted to the CSC in the prescribed format?			
8.	Whether the spoils from excavation of the river bed are disposing off at specified area suggested by the engineers?			
9.	Whether the debris generated due to dismantling of existing permanent structure is reused in the temporary diversion?			
10.	Whether the preserved topsoil is used for redevelopment of the area?			
11.	Whether green belt is developed?			

12.	Whether all applicable clearances are obtained and valid till date?			
Signature of Environment and Safety Engineer (ESE) of the Contractor with date			Signature of Environmental Officer of the CSC with date	

Note: The Environmental Officer of the CSC has to use this format to monitor the implementation of Environmental Management Measures for each Debris Disposal Site Quarterly. Corrective actions with specific timeframe should be proposed for each Environmental Management Measure, which is not implemented satisfactorily. A copy of the filled up format should be given to the ESE of the Contractor. CSC has to attach this format to the Quarterly Report to be submitted to PIU, with details of corrective action taken by the Contractor.

ANNEXURE 3. 25. CHECK LIST FOR MONITORING OF REDEVELOPMENT OF CONSTRUCTION CAMP SITE

A	**Project Details**		Date of Monitoring:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
5.	Name of Construction Camp with sl. no. in register of sites			
B	**Monitoring Details**			
Sl. No.	**Environmental Management Measures**	**CSC's observation (Yes / No / Not Applicable)**	**Corrective Actions Proposed**	**Remarks**
1.	Are all the temporary structures cleared as per the list in the redevelopment plan?			
2.	Are all building debris, garbage, night soils and POL waste disposed off safely?			
3.	Are all disposal pits or trenches filled, disinfected and effectively sealed off?			
4.	Are the facilities that could be put to re-use maintained well ?			
5.	Are all the spills within the camp site effectively disposed off from the site?			

6.	All the area within the camp site is leveled and spread over with stored top soil.			
7.	Has the residual top soil been utilized effectively?			
8.	Has the entire camp area been made clean and tidy without disturbing the adjacent lands?			
9.	Are the plantations / green belt along the boundary of the camp maintained well?			
10.	Are the 'before' and 'after' scenarios of the site documented through photographs and submitted to CSC?			
11	Are the conditions mentioned by the owner in the agreement adhered to?			
12.	If not, mention the details of the conditions that are not adhered to and further steps to be taken.			
13.	Can 'works completion' certificate be issued to this site?			
Signature of Environment and Safety Engineer (ESE) of the Contractor with date			Signature of Environmental Officer of the CSC with date	

Note: The Environmental Officer of the CSC has to use this format to monitor the implementation of Environmental Management Measures for the redevelopment of each Construction Camp Site as and when it is closed. Corrective actions with specific timeframe should be proposed for each Environmental Management Measure, which is not implemented satisfactorily. A copy of the filled up format should be given to the ESE of the Contractor. CSC has to attach this format to the Quarterly Report to be submitted to PIU, with details of corrective action taken by the Contractor.

ANNEXURE 3. 26. CHECK LIST FOR MONITORING OF REDEVELOPMENT OF LABOUR CAMP SITE

A	**Project Details**		Date of Monitoring:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
5.	Name of Labour Camp with sl. no. in register of sites			
B	**Monitoring Details**			
Sl. No.	**Environmental Management Measures**	**CSC's observation (Yes / No / Not Applicable)**	**Corrective Actions Proposed**	**Remarks**
1.	Are all the temporary structures cleared as per the list in the redevelopment plan?			
2.	Are all building debris, garbage, night soils and POL waste disposed off safely?			
3.	Are all disposal pits or trenches filled, disinfected and effectively sealed off?			
4.	Are the facilities that could be put to re-use maintained well?			
5.	Are all the spills within the camp site effectively disposed off from the site?			

6.	All the area within the camp site is leveled and spread over with stored top soil.			
7.	Has the residual top soil been utilized effectively?			
8.	Has the entire camp area been made clean and tidy without disturbing the adjacent lands?			
9.	Are the plantations / green belt along the boundary of the camp maintained well?			
10.	Are the 'before' and 'after' scenarios of the site documented through photographs and submitted to CSC?			
11	Are the conditions mentioned by the owner in the agreement adhered to?			
12.	If not, mention the details of the conditions that are not adhered to and further steps to be taken.			
13.	Can 'works completion' certificate be issued to this site?			
Signature of Environment and Safety Engineer (ESE) of the Contractor with date			Signature of Environmental Officer of the CSC with date	

Note: The Environmental Officer of the CSC has to use this format to monitor the implementation of Environmental Management Measures for the redevelopment of each Labour Camp Site as and when it is closed. Corrective actions with specific timeframe should be proposed for each Environmental Management Measure, which is not implemented satisfactorily. A copy of the filled up format should be given to the ESE of the Contractor. CSC has to attach this format to the Quarterly Report to be submitted to PIU, with details of corrective action taken by the Contractor.

ANNEXURE 3. 27. CHECK LIST FOR MONITORING OF REDEVELOPMENT OF QUARRY AND STONE CRUSHER SITE

A	**Project Details**		Date of Monitoring:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
5.	Name of Quarry & Crusher with sl. no. in register of sites			
B	**Monitoring Details**			
Sl. No.	**Environmental Management Measures**	**CSC's observation (Yes / No / Not Applicable)**	**Corrective Actions Proposed**	**Remarks**
1.	Are all the temporary structures cleared as per the list in the redevelopment plan?			
2.	Are all debris, garbage, night soils and POL waste disposed off safely?			
3.	Are the facilities that could be put to re-use maintained well?			
4.	Has the conserved top soil been reused?			
5.	Are the improvement measures identified in the redevelopment plan implemented?			

6.	If not, mention the measures yet to be implemented.			
7.	Has the residual top soil been utilized effectively?			
8.	Has the entire area been made clean and tidy without disturbing the adjacent lands?			
9.	Are the plantations / green belt along the boundary of the camp maintained well?			
10.	Has additional tree plantation been undertaken as mentioned in the re-development plan?			
11	Has erosion control measures and slope stabilization measures been undertaken?			
12.	Whether pits created by blasting are filled with overburden soil.			
13.	Has the local community been involved in the implementation of redevelopment plan?			
14.	Are the required photographs submitted to CSC?			
15.	Are the conditions mentioned by the owner in the agreement adhered to?			
16.	If not, mention the details of the conditions that are not adhered to and further steps to be taken.			

17.	Can 'works completion' certificate be issued to this site?			
Signature of Environment and Safety Engineer (ESE) of the Contractor with date			Signature of Environmental Officer of the CSC with date	

Note: The Environmental Officer of the CSC has to use this format to monitor the implementation of Environmental Management Measures for the redevelopment of each Quarry and Crusher Site as and when it is closed. Corrective actions with specific timeframe should be proposed for each Environmental Management Measure, which is not implemented satisfactorily. A copy of the filled up format should be given to the ESE of the Contractor. CSC has to attach this format to the Quarterly Report to be submitted to PIU, with details of corrective action taken by the Contractor.

ANNEXURE 3. 28. CHECK LIST FOR MONITORING OF REDEVELOPMENT OF BORROW AREAS

A	**Project Details**		Date of Monitoring:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
5.	Name of Borrow Area with sl. no. in register of sites			
B	**Monitoring Details**			
Sl. No.	**Environmental Management Measures**	**CSC's observation (Yes / No / Not Applicable)**	**Corrective Actions Proposed**	**Remarks**
1.	Has slope stabilization been undertaken along the edges (if there is a level difference)?			
2.	Is all the waste material raised from the borrow area disposed off properly?			
3.	Has the preserved top soil been used in redevelopment of site?			
4.	Has the borrow areas been re-vegetated properly?			

5.	Is the cross drainage system and the flood water drains managed properly to avoid occurrence of flooding?			
6.	Are the borrow area pits re-developed ?			
7.	Is the leveling of depression after filling-in of wastes undertaken?			
8.	Selection of Species as per OSRP Project Guidelines for plantation.			
9.	Has bund creation and temporary fencing been undertaken?			
10.	Ponds including creation of new ones and enhancing capacity of existing ones (for irrigation; pissiculture and general uses by people and/or cattle)			
Signature of Environment and Safety Engineer (ESE) of the Contractor with date			Signature of Environmental Officer of the CSC with date	

Note: The Environmental Officer of the CSC has to use this format to monitor the implementation of Environmental Management Measures for the redevelopment of each Borrow Area as and when it is closed. Corrective actions with specific timeframe should be proposed for each Environmental Management Measure, which is not implemented satisfactorily. A copy of the filled up format should be given to the ESE of the Contractor. CSC has to attach this format to the Quarterly Report to be submitted to PIU, with details of corrective action taken by the Contractor.

ANNEXURE 3. 29. CHECK LIST FOR MONITORING OF REDEVELOPMENT OF DEBRIS DISPOSAL SITE

A	**Project Details**		Date of Monitoring:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
5.	Name of Borrow Area with sl. no. in register of sites			
B	**Monitoring Details**			
Sl. No.	**Environmental Management Measures**	**CSC's observation (Yes / No / Not Applicable)**	**Corrective Actions Proposed**	**Remarks**
1.	Rehabilitation of the dump site by planting local shrubs and other plant species.			
2.	Conversion of debris site into farm land, playground, parking area, block plantation area etc.			
3.	Maintenance of the hydrological flow in the area.			
Signature of Environment and Safety Engineer (ESE) of the Contractor with date			Signature of Environmental Officer of the CSC with date	

Note: The Environmental Officer of the CSC has to use this format to monitor the implementation of Environmental Management Measures for the redevelopment of each Debris Disposal Site as and when it is closed. Corrective actions with specific timeframe should be proposed for each Environmental Management Measure, which is not implemented satisfactorily. A copy of the filled up format should be given to the ESE of the Contractor. CSC has to attach this format to the Quarterly Report to be submitted to PIU, with details of corrective action taken by the

Contractor.

ANNEXURE 3. 30. REPORTING FORMAT FOR WORK FORCE MANAGEMENT

A	**Project Details**			Date of Reporting:	
1.	Name of project stretch and link no.				
2.	Name and address of the Contractor				
3.	Contract date and duration				
4.	Status of completion of the project				
5.	Name of Work Site with sl. no. in register of sites				
B.	**Status of work force**				
SI. No.	**Category of work force**	**Work force in the Previous Month (No.)**	**Work force added in the reporting month (No.)**	**Work Force left in the reporting month (No.)**	**Total work force in the reporting month (No.)**
1.	Unskilled labourers				
2.	Skilled labourers				
3.	Supervisors				
4.	Engineers				

5.	Office Staff				
	Sub Total				
	Grand Total				

C. Categorization of work force

SI. No.	**Category of work force**	**Male**		**Female**		**Employment Status**		**Residential Status**		**Accommodation Status**	
		< 18 yrs.	**> 18 yrs.**	**< 18 yrs.**	**> 18 yrs.**	**Regular**	**Temporary**	**Migrant**	**Local**	**Staying in Labour Camp / Quarters**	**Others**
1.	Unskilled labourers										
2.	Skilled labourers										
3.	Supervisors										
4.	Engineers										
5.	Office Staff										
	Sub Total										
	Grand Total										

D.	**Details of non-working migrated people, living in the Labour Camps / Staff Quarters as part of work force family**								
No. of children (0-6 yrs.)			**No. of children (7-18 yrs.)**			**No. of adults**			**Grand Total**
Male	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	

C.	**Submission Details**	
	Submitted by **(Environmental & Safety Engineer of Contractor)**	**Approved by** **(Environmental Officer of CSC)**
Signature & date		
Name		
Designation		
Remarks by CSC		

Note: Contractor has to fill and submit this format to the CSC along with the Monthly Report. In addition to that, the Contractor has to maintain the database of work force in the form of a register. An attendance register for the work force should also be maintained by the Contractor. Contractor has to report the details of migrant work force to the nearest police station. The CSC has to visit the sites and verify the details. The EO of CSC has to give back a copy of this format to the contractor after his approval with remarks.

ANNEXURE 3. 31. REPORTING FORMAT FOR OCCUPATIONAL HEALTH AND SAFETY MEASURES

A	**Project Details**		Date of Reporting:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
B	**Implementation Status of Health and Safety Measures**			
Sl. No.	**Health and Safety Measures**		**Implementation Status (Yes / No)**	**Remarks**
1	Appointment of qualified Environment and Safety Engineer			
2	Approval for Construction Safety Management Plan by the Engineer.			
3	Provision for flags and warning lights for potential hazards			
4	Provision of adequate staging, form work and access (ladders with handrail) for works at a height of more than 3.0 m			
5	Provision of adequate shoring / bracing / barricading / lighting for all deep excavations of more than 3.0 m depth.			

6	Provision for sufficient lighting especially for night time work		
7	Construction Workers safety - Provision of personnel protective equipments		
	A. Helmets		
	B. Safety Shoe		
	C. Dust masks		
	D. Hand Gloves		
	E. Safety Belts		
	F. Reflective Jackets		
	G. Earplugs for labour		
8	Workers engaged in welding work shall be provided with welder protective shields		
9	All vehicles are provided with reverse horns.		
10	All scaffolds, ladders and other safety devices shall be maintained in as safe and sound condition		
11	Regular health checkup for labour/ Contractor's personnel		
12	Ensuring the sanitary conditions and all waste disposal procedures & methods in the camps.		

13	Provision for insurance coverage to the workers		
C.	**Submission Details**		

	Submitted by **(Environment & Safety Engineer of Contractor)**	**Approved by** **(Environmental Officer of CSC)**
Signature & date		
Name		
Designation		

Remarks by CSC

Note: Contractor has to fill and submit this format to the CSC along with the Monthly Report. The CSC has to visit the sites and verify the details. Further mitigation measures, if required, can be suggested by the CSC. The EO of CSC has to give back a copy of this format to the contractor after his approval with remarks.

ANNEXURE 3. 32. REPORTING FORMAT FOR TOP SOIL CONSERVATION

A	**Project Details**		Date of Reporting:
1.	Name of project stretch and link no.		
2.	Name and address of the Contractor		
3.	Contract date and duration		
4.	Status of completion of the project		
5.	Name of Site with sl. no. in register of sites		
B	**Top Soil Conservation Details**		
SI. No.	**List of Activities**	**Status (Yes / No)**	**Remarks**
1.	Whether the location was pre-identified?		
2.	Whether the slope is < 1:2?		
3.	Whether height is less than 2 mts?		
4.	Whether edges of pile are protected by silt fencing?		
5.	Whether multiple handling is kept to a minimum		
6.	Whether measures are taken to prevent the loss during rains?		
7.	Whether any other measures are provided? If yes, What is it?		

C.	**Submission Details**	
	Submitted by **(Environment & Safety Engineer of Contractor)**	**Approved by** **(Environmental Officer of CSC)**
Signature & date		
Name		
Designation		
Remarks by CSC		

Note: Contractor has to fill and submit this format to the CSC along with the Monthly Report. This format is to be filled for each site, after opening the site. The CSC has to visit the sites and verify the details. Further mitigation measures, if required, can be suggested by the CSC. The EO of CSC has to give back a copy of this format to the contractor after his approval with remarks.

ANNEXURE 3. 33. REPORTING FORMAT FOR WATER SPRINKLING FOR DUST SUPPRESSION

A	**Project Details**	Month and Year of reporting:
1.	Name of project stretch and link no.	
2.	Name and address of the Contractor	
3.	Contract date and duration	
4.	Status of completion of the project	
5.	Location of water sprinkling	
B	**Water Sprinkling Details**	

Particulars	Days																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
No. of trips per day																															
Quantity of Water Sprinkled (KLD)																															
If not sprinkled, reason for the same																															

C.	**Submission Details**	
	Submitted by **(Environment & Safety Engineer of Contractor)**	**Approved by** **(Environmental Officer of CSC)**
Signature & date		
Name		
Designation		
Remarks by CSC		

Note: Contractor has to fill this format for each construction site (preferably in A3 size paper) and submit to the CSC along with the Monthly Report. The CSC has to visit the sites and verify the details. Additional water sprinkling, if required, can be suggested by the CSC. The EO of CSC has to give back a copy of this format to the contractor after his approval with remarks.

ANNEXURE 3. 34. REPORTING FORMAT FOR ROAD SAFETY MEASURES DURING CONSTRUCTION

A	**Project Details**		Date of Reporting:
1.	Name of project stretch and link no.		
2.	Name and address of the Contractor		
3.	Contract date and duration		
4.	Status of completion of the project		
B	**Details of Safety Measures**		
S.No	**Safety Measures**	**Compliance Status (Yes / No)**	**Remarks**
a.	**General**		
1	A qualified Environment and Safety Engineer should be appointed		
2	A Traffic Management Plan should be prepared in accordance with IRC: SP: 55-2001 and got approved by the Engineer		
3	Maintenance of existing road stretches handed over to the Contractor should be carried out		
b.	**Details of Construction Zone**		
1	Length of transition sub zone should be min 50 m for a speed of 50km/hr		
2	Length of work sub zone in urban stretch should be<2 km		
3	Length of work sub zone in rural stretch should be 5-10 km		
c.	**Signages in construction zones**		

1	Sign saying 'Men at Work' should be kept 1 km ahead of Transition sub zone		
2	Supplementary sign saying Diversion 1 km should be provided		
3	Sign saying 'Road Closed ahead' should be provided		
4	Compulsory Tum Right/Left sign should be provided		
5	Detour sign should be placed		
6	Sharp Deviation sign should be placed at end of advance warning sub zone		
7	Signage should be provided in Transition Sub Work Zone		
8	Signage saying 'Keep Right/Left should be provided		
9	Signage should be placed in work sub zone		
10	Hazard Marker should be placed where railing for CD structure on diversion starts		
11	Barricade should be provided on either side of work sub zone		
12	Flag persons should be provided for traffic control		
13	Flags and warning lights should be provided at Construction zones		
14	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 or Barricades/caution tapes should be		

	provided in construction zones		
15	Plastic crash barriers should be provided		
16	Demarcations (fencing, guarding and watching) should be provided at bridge / culvert construction sites		
17	Arrangements should be made for controlled access and entry to Construction zones		
18	Regular Inspection of Work Zone Traffic Control Devices should be carried out by authorized contractor personnel		
19	All vehicles should be provided with reverse horns		
20	Speed of construction vehicles should be controlled through road safety training of drivers		
d.	**Signage in Termination sub zone**		
1	Sign for indication of end of work zone should be placed 120m from end of termination sub zone		
e.	**Road Delineators**		
1	Roadway indicators should be provided		
2	Hazard markers should be provided		
3	Object markers should be provided		
C.	**Submission Details**		

	Submitted by **(Environment & Safety Engineer of Contractor)**	**Approved by** **(Environmental Officer of CSC)**

Signature & date		
Name		
Designation		
Remarks by CSC		

Note: Contractor has to fill this format and submit to the CSC along with the Monthly Report. The CSC has to visit the sites and verify the details. Additional safety measures, if required, can be suggested by the CSC. The EO of CSC has to give back a copy of this format to the contractor after his approval with remarks.

ANNEXURE 3. 35. FORMAT FOR REGISTER OF ACCIDENTS AND IT'S REPORTING

A	**Project Details**		Date of Reporting:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
B	**Details of Accident and People Involved in Accident**			
	Name of site where accident happened			
	Name and address of people involved in the accident			
	Whether Contractor's personnel or General public			
	Details of Injury			
	Details of treatment given			
	Details of compensation given			
C	**Type of Accident (√)**			
	Fall of person from a height			Explosion
	Slip, trip or fall on same level			Fire
	Struck against fixed objects			Contact with hot or corrosive substance
	Struck by flying or falling objects			Contact with poisonous gas or toxic substances.
	Struck by moving objects			Contact with poisonous gas or toxic substances
	Struck / caught by cable			Hand tool accident
	Stepping on hail etc.			Vehicle / Mobile plant accident
	Handling without machinery			Machinery operation accident
	Crushing / burying			Other (please specify)
	Drowning or asphyxiation			

D	**Agent Involved in Accident (√)**			
	Machinery			Stair edge
	Portable power appliance			Excavation / underground working
	Vehicle or associated equipment /machinery			Ladder
	Material being handled, used or stored			Scaffolding /gondola
	Gas, vapor, dust, fume or oxygen			Construction formwork, shuttering and false work.
	Hand tools			Electricity supply cable, wiring switchboard and associated equipment
	Floor edge			Nail, sllnter or chipping
	Floor opening			Other (Please specify)
	Left shaft			
E	**Unsafe Action Relevant to the Accident (√)**			
	Operating without authority			Failure to use proper footwear
	Failure to secure objects			Failure to use eye protector
	Making safety devices inoperative			Failure to use respirator
	Working on moving or dangerous equipment			Failure to use proper clothing
	Using un-safety equipment			Failure to use warn others or given proper signals
	Adopting unsafe position or posture			Horseplay
	Operating or working at unsafe speed			No unsafe action
	Unsafe loading, Placing, mixing et			Others (please specify)
	Failure to use helmet			
F	**Lack of Safety Measures Relevant to the Accident (√)**			
	No protective gear			Unsafe layout of job, traffic etc.
	Defective protective gear			Unsafe process of job methods
	Improper dress / footwear			Poor housekeeping
	Improper guarding			Lack of warning system
	Improper ventilation			Defective tool, machinery or materials
	Improper illumination			No unsafe condition
	Improper procedure			Others (please specify)

G	**Personal Factor Relevant to the Accident (√)**			
	Incorrect attitude /motive			No unsafe personal factor.
	Unsafe act by another person			Other (please specify)
H	**Details of Corrective and Preventive action taken**			
1				
2				
3				
4				
I	**Submission Details**			

	Submitted by **(Environment & Safety Engineer of Contractor)**	**Approved by** **(Environmental Officer of CSC)**
Signature & date		
Name		
Designation		
Remarks by CSC		

Note: Contractor has to fill this format as and when an accident happens and submit to the CSC along with the Monthly Report. The CSC has to visit the sites and verify the details. Additional safety measures, if required, can be suggested by the CSC. The EO of CSC has to give back a copy of this format to the contractor after his approval with remarks.

ANNEXURE 3. 36. REPORTING FORMAT FOR ENVIRONMENTAL POLLUTION MONITORING

A	**Project Details**			Date of Reporting:		
1.	Name of project stretch and link no.					
2.	Name and address of the Contractor					
3.	Contract date and duration					
4.	Status of completion of the project					
B	**Environmental Monitoring Details**					
SI. No	**Details of Monitoring Location**	**Period of Monitoring**	**Details of values exceeding the relevant standards**	**Reasons for pollution**	**Details of Corrective actions taken**	**Remarks**
a.	**Air Monitoring**					
1.						
2.						
3.						

b.	**Water Monitoring**					
1.						
2.						
3.						
c.	**Noise Monitoring***					
1.						
2.						
3.						

C	Submission Details	
	Submitted by (Environment & Safety Engineer of Contractor)	**Approved by (Environmental Officer of CSC)**
Signature & date		
Name		
Designation		
Remarks by CSC		

** Noise monitoring along the road will be done by the CSC, using the Noise Meter of PIU. The CSC has to give the monitoring results to the Contractor for corrective actions, if any, required and including in this report.*

Note: The Contractor has to conduct Environmental Monitoring through a NABL approved Laboratory as per the Environmental Monitoring Plan given in the EMP, fill this format and submit to the CSC along with the Monthly Report, if monitoring was due in that month. A copy of the monitoring report given by the Laboratory has to be attached to this format. The CSC has to visit the sites and verify the details. Additional mitigation measures, if required, can be suggested by the CSC. The EO of CSC has to give back a copy of this format to the contractor after his approval with remarks.

ANNEXURE 3. 37. REPORTING FORMAT FOR ENHANCEMENT AND MITIGATION OF CULTURAL PROPERTIES

A	**Project Details**		Date of reporting:
1.	Name of project stretch and link no.		
2.	Name and address of the Contractor		
3.	Contract date and duration		
4.	Status of completion of the project		
B	**Details of Enhancement and Mitigation of Cultural Properties**		
Sl. No.	**Location with chainage**	**% work completed**	**Remarks and reasons for delay, if any.**
C	**Submission Details**		

	Submitted by (Environment & Safety Engineer of Contractor)	**Approved by (Environmental Officer of CSC)**
Signature & date		
Name		
Designation		

Remarks by CSC

Note: The Contractor has to fill the details of cultural properties for which enhancement and mitigation measures were carried out during the reporting month in this format and submit to the CSC along with the Monthly Report. Overall progress in this activity for the entire project road is to be included in the Monthly Report. The CSC has to visit the sites and verify the details. Additional mitigation measures, if required, can be suggested by the CSC. The EO of CSC has to give back a copy of this format to the contractor after his approval with remarks.

ANNEXURE 3. 38. REPORTING FORMAT FOR NOISE BARRIER CONSTRUCTION

A	**Project Details**		Date of reporting:
1.	Name of project stretch and link no.		
2.	Name and address of the Contractor		
3.	Contract date and duration		
4.	Status of completion of the project		
B	**Details of Noise Barriers Constructed**		
Sl. No.	**Location with chainage**	**% work completed**	**Remarks and reasons for delay, if any.**
C	**Submission Details**		

	Submitted by (Environment & Safety Engineer of Contractor)	**Approved by (Environmental Officer of CSC)**
Signature & date		
Name		
Designation		

Remarks by CSC

Note: The Contractor has to fill the details of Noise Barriers constructed during the reporting month in this format and submit to the CSC along with the Monthly Report. Overall progress in this activity for the entire project road is to be included in the Monthly Report. The CSC has to visit the sites and verify the details. The EO of CSC has to give back a copy of this format to the contractor after his approval with remarks.

ANNEXURE 3. 39. REPORTING FORMAT FOR ENHANCEMENT MEASURES OTHER THAN CULTURAL PROPERTIES

A	**Project Details**		Date of reporting:
1.	Name of project stretch and link no.		
2.	Name and address of the Contractor		
3.	Contract date and duration		
4.	Status of completion of the project		
B	**Details of Enhancement Measures**		
Sl. No.	**Location with chainage**	**% work completed**	**Remarks and reasons for delay, if any.**
a	**Raising embankment height**		
b	**Public water sources**		
c	**Bus stops and bus bays**		

d	**Water bodies**		
e	**Auto / Jeep / Taxi stands**		
f	**Sign Boards**		
g	**Tree Plantation in Govt. premises**		
h	**Any other measures**		

C	**Submission Details**		
	Submitted by (Environment & Safety Engineer of Contractor)	**Approved by (Environmental Officer of CSC)**	
Signature & date			
Name			
Designation			
Remarks by CSC			

Note: The Contractor has to fill the details of enhancement measures carried out for amenities / facilities other than cultural properties during the reporting month in this format and submit to the CSC along with the Monthly Report. Overall progress in this activity for the entire project road is to be included in the Monthly Report. The CSC has to visit the sites and verify the details. Additional mitigation measures, if required, can be suggested by the CSC. The EO of CSC has to give back a copy of this format to the contractor after his approval with remarks.

ANNEXURE 3. 40. REPORTING FORMAT FOR TREE PLANTATION

A	**Project Details**		Date of reporting:	
1.	Name of project stretch and link no.			
2.	Name and address of the Contractor			
3.	Contract date and duration			
4.	Status of completion of the project			
B	**Details of Trees Planted**			
Sl. No.	**Location with chainage**	**No. of Trees to be Planted**	**% work completed**	**Remarks and reasons for delay, if any**
C	**Submission Details**			

	Submitted by **(Environment & Safety Engineer of Contractor)**	**Approved by** **(Environmental Officer of CSC)**
Signature & date		
Name		
Designation		

Remarks by CSC

Note: The Contractor has to fill the details of Trees planted during the reporting month in this format and submit to the CSC along with the Monthly Report. Overall progress in this activity for the entire project road is to be included in the Monthly Report. The CSC has to visit the sites and verify the details. The EO of CSC has to give back a copy of this format to the contractor after his approval with remarks.

ANNEXURE 3. 41. REPORTING FORMAT FOR MONTHLY REPORT FROM CONTRACTOR TO CSC

A	Project Details				Period of Reporting:				
1.	Name of project stretch and link no.								
2.	Name and address of the Contractor								
3.	Contract date and duration								
4.	Status of completion of the project								
B.	**Physical Progress Report**								
Sl. No.	**Enhancement Measure**	**Physical target (Nos.)**	**Units carried over from previous month**	**Units started in reporting month**	**Units completed in reporting month**	**Units carried over to next month**	**Cumulative units completed till end of reporting month**	**% target completed**	**Remarks / reasons for delay**
			(a)	(b)	(c)	(d=a+b-c)			

1.	Noise barrier								
2.	Hand pumps								
3.	Bus Shelter								
4.	Sign Boards								
5.	Preserving and landscaping cultural properties like shrines / hyundi								
Sl. No.	**Enhancement Measure**	**Physical target (Nos.)**	**Units carried over from previous month**	**Units started in reporting month**	**Units completed in reporting month**	**Units carried over to next month**	**Cumulative units completed till end of reporting month**	**% target completed**	**Remarks / reasons for delay**
			(a)	(b)	(c)	(d=a+b-c)			
6.	Constructing new well								
7.	providing new								

	water taps								
8.	Parking space for auto rickshaws, cars and jeep								
9.	Tree plantation in Govt. Premises								
10.	Planting trees along road side								
11.	Planting trees on inner side of sound insulating wall								
12.	Providing 1.2 mt. high fencing under via duct								
13.	Concrete flooring with slope drains and oil interceptors in construction camps								

C.	**Details of Sites for Project Ancillary facilities**					
Sl. No.	**Type of camp / site**	**Cumulative No of sites opened**	**No of sites operational**	**Cumulative No of sites redeveloped**	**Cumulative No of sites closed***	**Remarks**
1.	Construction camp					
2.	Labour camp					
3.	Quarry & stone crusher unit					
4.	Borrow Area					
5.	Debris disposal site					
6.	Water sources			NA		
** A site will be considered closed after redeveloping and obtaining closure certificate from CSC.*						

D.	Summary of machinery and equipment available			
SI. No.	**Type of equipment / machinery / vehicles**	**Nos. available**	**Validity date of PUC certificate (as applicable)**	**Remarks**
1.				

E.	**Details of lapses and notices**					
Sl. No.	**Details of notices issued by CSC**	**Date of notice**	**Type of lapse (Major / Minor)**	**Notice No. ***	**Corrective actions taken**	**Remarks**

**In case of minor lapse, specify whether original notice, first reminder or second reminder.*

F.	REPORTING FORMATS TO BE ANNEXED WITH THIS MONTHLY REPORT BY THE CONTRACTOR				
SL. NO.	REPORTING FORMAT	YES/NO	SL. NO	REPORTING FORMAT	YES/NO
1	Format for Register of sites opened and closed and its reporting		8	Reporting Format for Register of Accidents and it's Reporting	
2	Format for Register of complaints and its reporting		9	Reporting Format for Enhancement and Mitigation of Cultural Properties	
3	Reporting Format for Work Force Management		10	Reporting Format for Noise Barrier Construction	
4	Reporting Format for Occupational Health and Safety Measures		11	Reporting Format for Enhancement Measures Other than Cultural Properties	
5	Reporting Format for Top Soil Conservation		12	Reporting Format for Tree Plantation	
6	Reporting Format for Water Sprinkling for Dust Suppression		13	Reporting Format for Environmental Quality Monitoring	
7	Reporting Format for Road Safety Measures During Construction		-	-	-

G. SUBMISSION DETAILS	SUBMITTED BY (ENVIRONMENT & SAFETY ENGINEER OF CONTRACTOR)	APPROVED BY (ENVIRONMENTAL OFFICER OF CSC)
Signature & date		
Name		
Designation		
Remarks by CSC		

ANNEXURE 3. 42. REPORTING FORMAT FOR MONTHLY REPORT FROM CSC TO PIU

A	**Project Details**								
1.	Name of project stretch and link no.								
2.	Name and address of the Contractor								
3.	Contract date and duration								
4.	Status of completion of the project								
B.	**Physical Progress Report**								
Sl. No.	**Enhancement Measure**	**Physical target (Nos.)**	**Units carried over from previous month**	**Units started in reporting month**	**Units completed in reporting month**	**Units carried over to next month**	**Cumulative units completed till end of reporting month**	**% target completed**	**Remarks / reasons for delay**
			(a)	(b)	(c)	(d=a+b-c)			
1.	Noise barrier								
2.	Hand pumps								
3.	Bus Shelter								
4.	Sign Boards								

Sl. No.	Enhancement Measure	Physical target (Nos.)	Units carried over from previous month	Units started in reporting month	Units completed in reporting month	Units carried over to next month	Cumulative units completed till end of reporting month	% target completed	Remarks / reasons for delay
			(a)	(b)	(c)	(d=a+b-c)			
5.	Preserving and landscaping the cultural properties like shrines and hyundi								
6.	Constructing new well								
7.	providing new water taps								
8.	Parking space for auto rickshaws, cars and jeep								
9.	Tree plantation in Govt. Premises								
10.	Planting trees along road side								

11.	Planting trees on inner side of sound insulating wall								
12.	Concrete flooring with slope drains and oil interceptors								

C.	**Details of Sites for Project Ancillary facilities**					
SI. No.	**Type of camp / site**	**Cumulative No of sites opened**	**No of sites operational**	**Cumulative No of sites redeveloped**	**Cumulative No of sites closed***	**Remarks**
1.	Construction camp					
2.	Labour camp					
3.	Quarry & stone crusher unit					
4.	Borrow Area					
5.	Debris disposal site					
6.	Water sources			NA		

** A site will be considered closed after redeveloping and obtaining closure certificate from CSC.*

D.	**Summary of machinery and equipment available**			
SI. No.	**Type of equipment / machinery / vehicles**	**Nos. available**	**Validity date of PUC certificate (as applicable)**	**Remarks**
1.				

E.	**Details of lapses for which notices were issued during the previous reporting month**					
Sl. No.	**Details of notices issued by CSC**	**Date of notice**	**Type of lapse (Major / Minor)**	**Notice No. ***	**Corrective actions taken by Contractor**	**Remarks**

**In case of minor lapse, specify whether original notice, first reminder or second reminder.*

F.	**Details of major lapses for which notices were issued during the current reporting month**			
SI. No.	**List of major lapses**	**Date of issuing notice**	**Whether invoking penalty clause from next interim payment certificate is recommended?**	**Remarks**
1.				
2.				
3.				
4.				

G.	**Details of minor lapses for which notices were issued during the current reporting month**					
SI. No.	**List of minor lapses**	**Date of issuing notice**			**Whether invoking penalty clause from next interim payment certificate is recommended?**	**Remarks**
		Original notice	**First Reminder**	**Second Reminder**		

2.						
3.						
4.						
5.						
6						
7						
8						

H	**Reporting / Monitoring formats to be annexed with this monthly report by the CSC**				
Sl. No.	**Reporting / Monitoring format**	**Yes/No**	**Sl. No**	**Reporting / Monitoring format**	**Yes/No**
1	Format for Register of sites opened and closed and its reporting		13	Reporting Format for Environmental Quality Monitoring	
2	Format for Register of complaints and its reporting		14	Checklist For Monitoring Of Construction Camp Management	
3	Reporting Format for Work Force Management		15	Checklist For Monitoring Of Labour Camp Management	
4	Reporting Format for Occupational Health and Safety Measures		16	Checklist For Monitoring Of Quarry And Stone Crusher Management	
5	Reporting Format for Top Soil Conservation		17	Checklist For Monitoring Of Borrow Area Management	
6	Reporting Format for Water Sprinkling for Dust Suppression		18	Checklist For The Monitoring Of Debris Disposal Site Management	

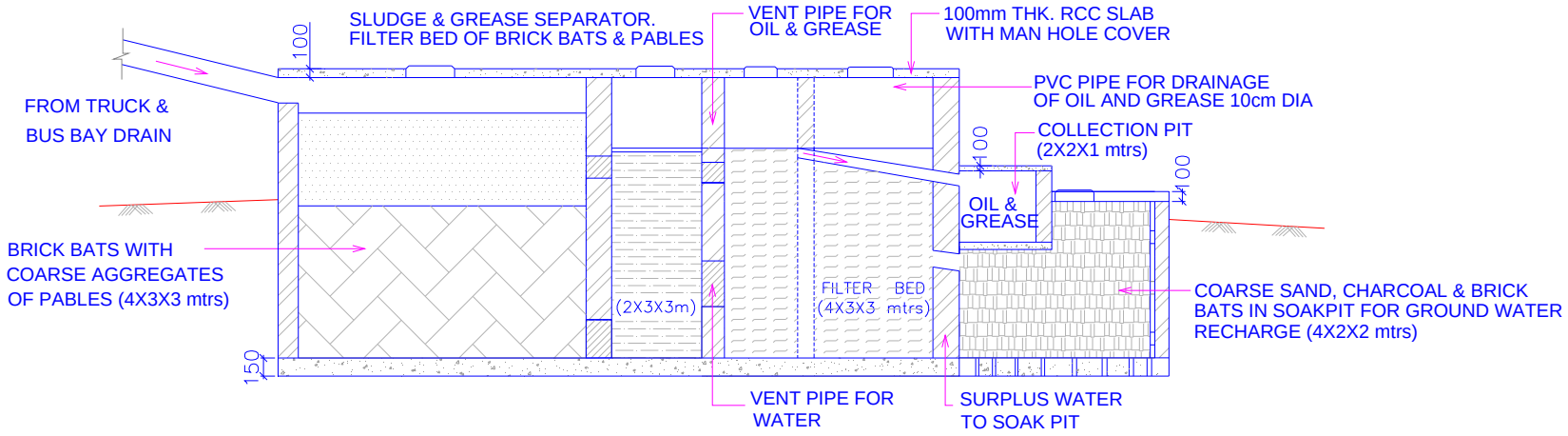
7	Reporting Format for Road Safety Measures During Construction		19	Check List For Monitoring Of Redevelopment Of Construction Camp Site	-
8	Reporting Format for Register of Accidents and it's Reporting		20	Check List For Monitoring Of Redevelopment Of Labour Camp Site	
9	Reporting Format for Enhancement and Mitigation of Cultural Properties		21	Check List For Monitoring Of Redevelopment Of Quarry And Stone Crusher Site	
10	Reporting Format for Noise Barrier Construction		22	Check List For Monitoring Of Redevelopment Of Borrow Areas	
11	Reporting Format for Enhancement Measures Other than Cultural Properties		23	Check List For Monitoring Of Redevelopment Of Debris Disposal Site	
12	Reporting Format for Tree Plantation				

I Submission Details	**Submitted by** **(Environmental Officer of CSC)**	**Approved by** **(Environmental Engineer of PIU)**
Signature & date		
Name		
Designation		
Remarks by PIU		

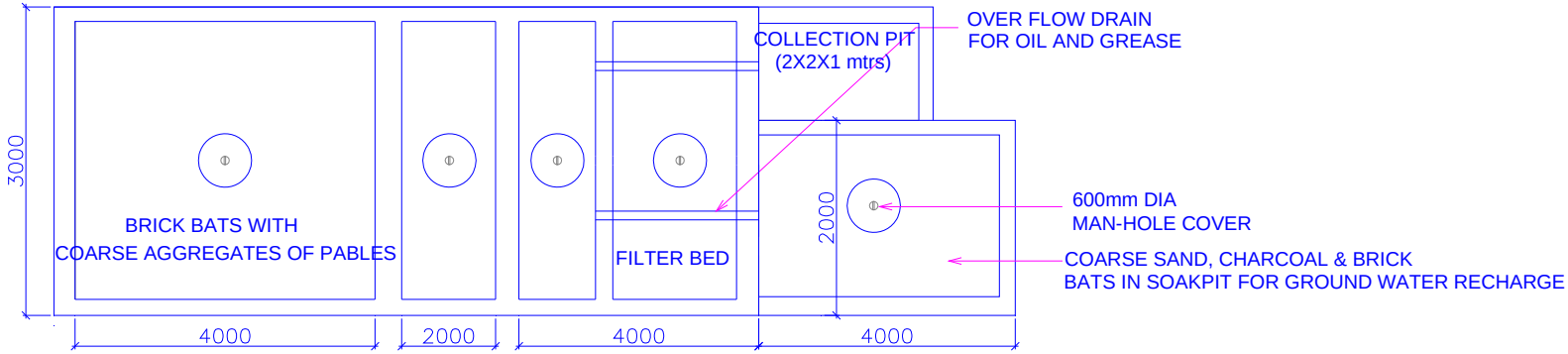
ANNEXURE 3. 43. LIST OF PERMISSION TO BE OBTAINED BY THE CONTRACTOR

SL. NO	TYPE OF CLEARANCE	STATUTORY AUTHORITY	APPLICABILITY	PROJECT STAGE	RESPONSIBILITY
1.	Consent to Establish under the Air (Prevention & Control of Pollution) Act, 1981 and The Water (Prevention & Control of Pollution) Act, 1974.	Tamil Nadu Pollution Control Board	For establishing hot mix plants, crushers and construction camps	Construction (Prior to work initiation)	Concessionaire / Contractor
2.	Consent to Operate under the Air (Prevention & Control of Pollution) Act, 1981 and The Water (Prevention & Control of Pollution) Act, 1974.	Tamil Nadu Pollution Control Board	For operating cold mix plants, crushers and construction camps	Construction (Prior to work initiation)	Concessionaire / Contractor
3.	Permission to store Hazardous Materials under Hazardous Waste (Management and Handling) Act 1989	Tamil Nadu Pollution Control Board	Storage and Transportation and disposal of Hazardous Materials	Construction (Prior to work initiation)	Concessionaire / Contractor
4.	Explosive license under The Explosives Act (& Rules), 1884 (revised in 1983)	Chief Controller of Explosives, petroleum & Explosive Safety Organisation	Storage of explosive materials	Construction (Prior to work initiation)	Concessionaire / Contractor
5.	PUC for vehicles for construction under Central Motor and Vehicle Act 1988	Transport Department of Tamil Nadu	For all construction vehicles	Construction (Prior to work initiation)	Concessionaire / Contractor
6.	Quarry lease deeds and license under The Mines Act, 1958	Mines and Geology Department of Tamil Nadu	Quarrying and borrowing operations	Construction (Prior to work initiation)	Concessionaire / Contractor
7.	Consent for ground water extraction	Central Ground Water Authority	Ground water extraction for construction camps	Construction (Prior to work initiation)	Concessionaire / Contractor

ANNEXURE 3. 44. SCHEMATIC DIAGRAM OF OIL INTERCEPTORS & SOAK PIT



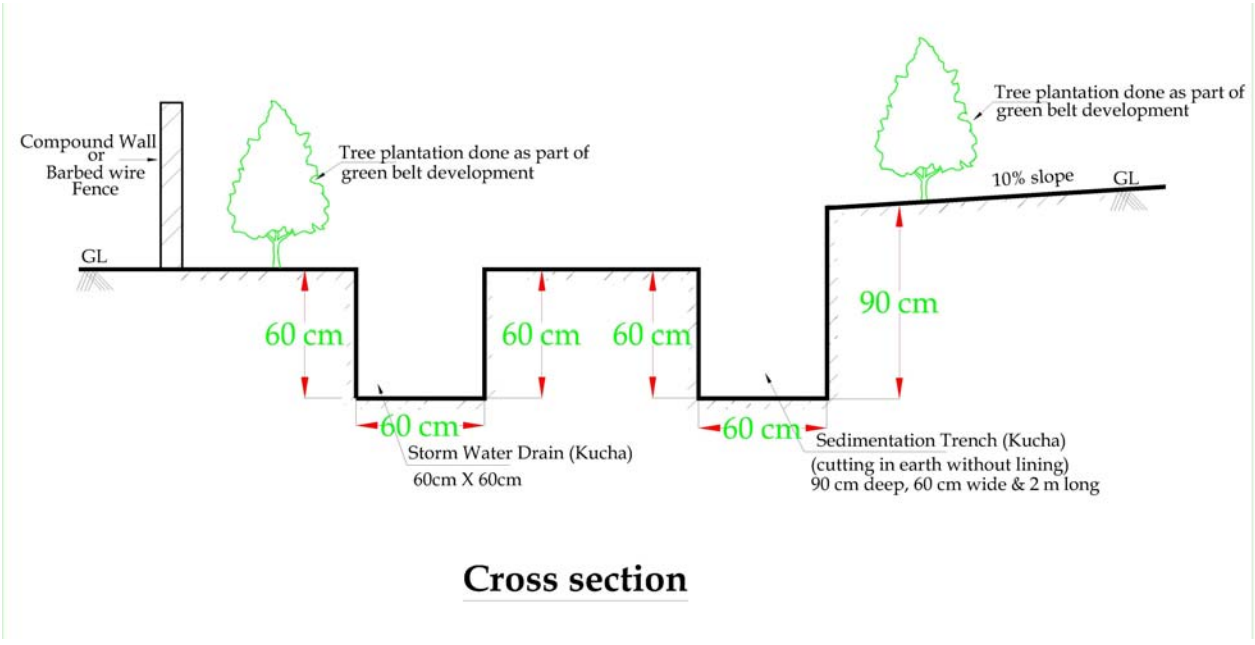
SECTION OF OIL INTERCEPTOR



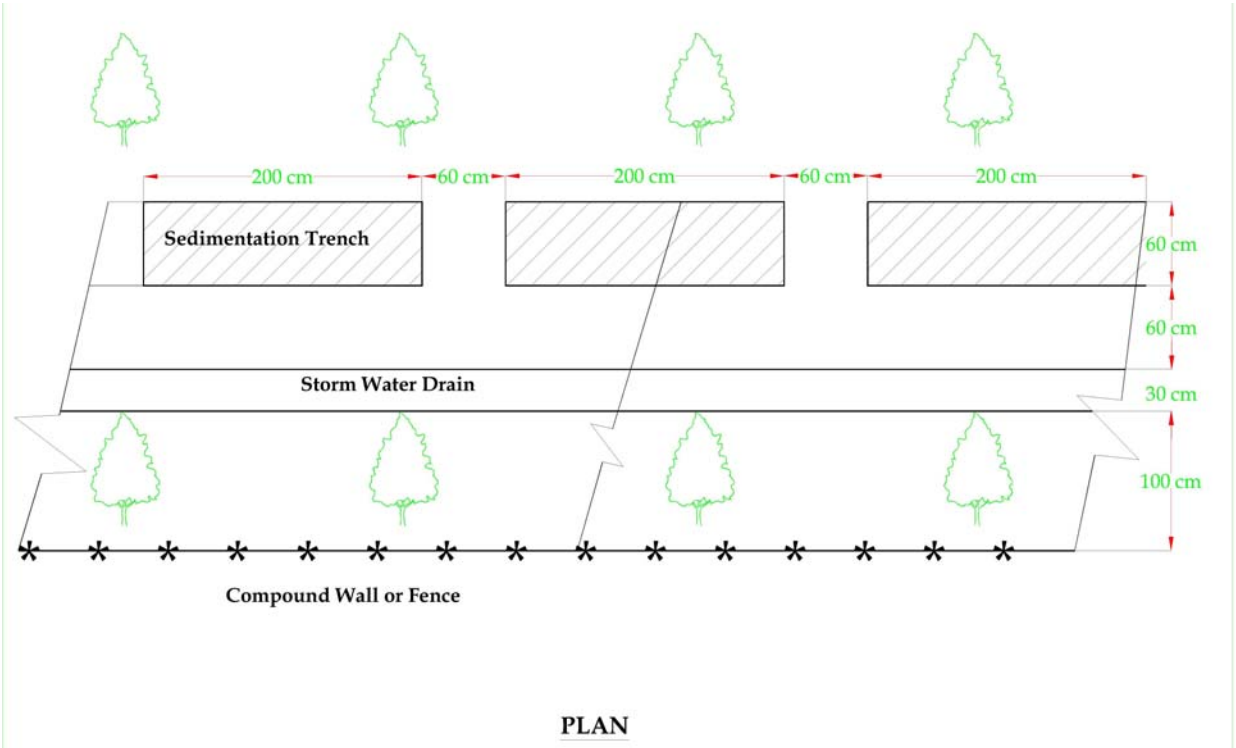
PLAN OF OIL INTERCEPTOR

Schematic Drawing of Oil Interceptor Tank and Soak pit

ANNEXURE 3. 45. TYPICAL DESIGN OF SEDIMENTATION TRENCHES, STROM WATER DRAIN AND GREEN BELT

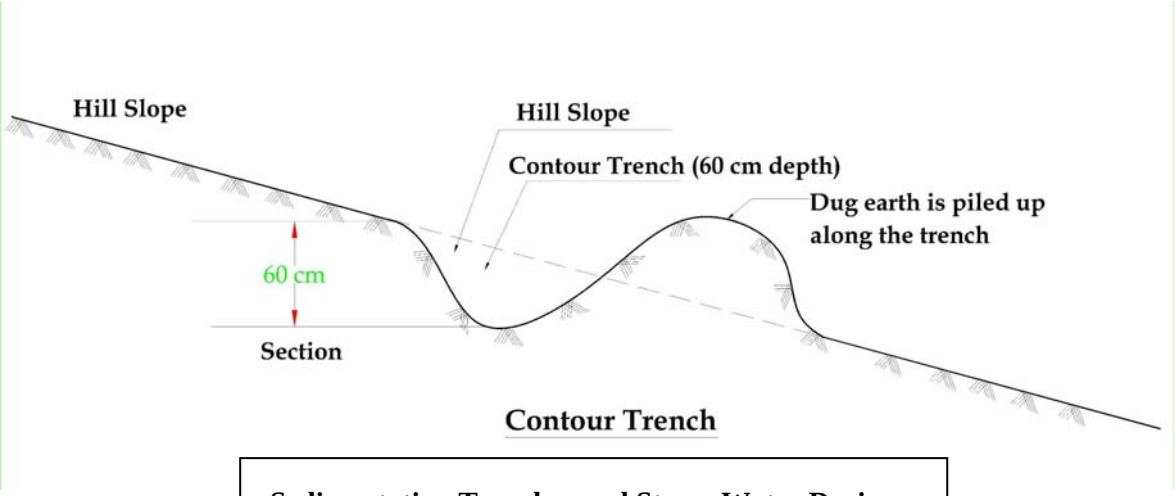


Cross section



PLAN

ANNEXURE 3. 46. TYPICAL DRAWING OF A CONTOUR TRENCH



Sedimentation Trenches and Storm Water Drain

ANNEXURE 3. 47. PROPOSED CHAINAGES OF RETAINING WALL LOCATION WHERE EMBANKMENT HEIGHT WILL BE RAISED

SL. NO.	DESIGN CHAINAGE		LENGTH OF RAISING SECTION (M)	REASON FOR RAISING
	FROM	TO		
1	2+070	2+440	2.5	Realignment with new minor bridge proposed
2	4+900	5+020	1	Correcting the existing vertical profile
3	6+630	6+880	1	Realignment

ANNEXURE 3. 48. LIST OF AFFECTED PUBLIC WATER SOURCES ALONG MOHANUR – NAMAKKAL SECTION OF ROAD NO.5 (SH95)

Surface Water Sources

Sl. No.	Chainage (Km.)	Name of Surface water Source	Location (Left / Right)	Distance from ECL (in mts)	Impact	Mitigation/Enhancement
1	1+050	Water Tank	RHS	7	Direct Impact	Will be Relocated
2	1+180	watrer tap	LHS	9	Direct Impact	Will be Relocated
3	1+410	Water Tap	LHS	12	No Direct Impact	
4	1+630	Water Tank	LHS	10	No Direct Impact	
5	1+680	Over Head Tank	RHS	13	No Direct Impact	
6	1+950	Water Tap	RHS	8	Direct Impact	Will be Relocated
7	1+900	Water Tap	RHS	9	Direct Impact	Will be Relocated
8	1+950	Water Tap	RHS	9	No Direct Impact	
9	3+100	Water Tank	RHS	17	No Direct Impact	
10	3+450	Water Tap	RHS	11	Direct Impact	Will be Relocated
11	5+250	Water Tap	LHS	6	Direct Impact	Will be Relocated
12	5+350	Water Tap	RHS	5	Direct Impact	Will be Relocated
13	6+390	Pipe Junction	LHS	5	Direct Impact	Will be Relocated
14	6+395	Pipe Junction	RHS	4	Direct Impact	Will be Relocated
15	6+400	Water Tank	LHS	15	No Direct Impact	
16	6+900	Water Tap	RHS	5	Direct Impact	Will be Relocated
17	7+195	Water Tap	RHS	5	Direct Impact	Will be Relocated
18	7+380	Water Tap	RHS	15	No Direct Impact	
19	7+380	Over Head Tank	RHS	15	No Direct Impact	
20	7+540	Water Tap	RHS	6.5	Direct Impact	Will be Relocated
21	8+190	Water tap	RHS	5	Direct Impact	Will be Relocated
22	8+420	Over Head Tank	LHS	13	No Direct Impact	
23	8+700	Water Tap	LHS	14	No Direct Impact	
24	8+700	Water Tap	RHS	7	Direct Impact	Will be Relocated
25	9+900	Over Head Tank	RHS	30	No Direct Impact	
26	9+990	Water Tap	LHS	7	Direct Impact	Will be Relocated
27	11+570	Water Tank	RHS	10	Direct Impact	Will be Relocated
28	11+610	Water Tap	RHS	10	Direct Impact	Will be Relocated
29	12+000	Over Head Tank	RHS	20	No Direct Impact	

Ground Water Sources

Sl. No.	Chainage (Km.)	Name of Surface water Source	Location (Left / Right)	Distance from ECL (in mts)	Impact	Mitigation/Enhancement
1	1+380	Open Well	LHS	12	No Direct Impact	
2	1+630	Bore Well	LHS	7	Direct Impact	Will be Relocated
3	2+920	Open Well	LHS	5	Direct Impact	Will be Relocated
4	4+020	Hand Pump	RHS	7	Direct Impact	Will be Relocated
5	6+400	Open Well	RHS	5	No Direct Impact	
6	6+500	Open Well	LHS	16	No Direct Impact	
7	7+400	Bore Well	RHS	15	No Direct Impact	
8	7+750	Open Well	LHS	15	No Direct Impact	
9	7+800	Open Well	LHS	15	No Direct Impact	
10	7+820	Open Well	LHS	16	No Direct Impact	
11	8+100	Hand Pump	RHS	7	Direct Impact	Will be Relocated
12	8+430	Bore Well	RHS	4	Direct Impact	Will be Relocated
13	10+000	Bore Well	RHS	5	Direct Impact	Will be Relocated

ANNEXURE 3. 49. DETAILS OF PROPOSED BUS STOPS AND BUS BAYS LOCATION ALONG MOHANUR – NAMAKKAL SECTION OF ROAD NO.5 (SH95)

Existing Bus Shelters, Impact & Mitigation Measures

SL. NO.	CHAINAGE (KM.)	LOCATION (LEFT / RIGHT)	IMPACT	MITIGATION/ ENHANCEMENT
1	0+720	Left	No Direct Impact	Mohanur Bus stand, Junction Improvement
2	1+370	Left	Partial Direct Impact	Proposed bus bay with passenger shelters
3	2+900	Left	Direct Impact	
4	5+150	Right	Partial Direct Impact	
5	6+400	Left	Direct Impact	
6	6+400	Right	No Direct Impact	
7	8+040	Left	Partial Direct Impact	
8	10+000	Left	No Direct Impact	
9	11+550	Left	No Direct Impact	
10	11+600	Left	Partial Direct Impact	
11	12+300	Left	Partial Direct Impact	
12	12+720	Left	Partial Direct Impact	
13	13+300	Left	Partial Direct Impact	

Proposed Bus Shelters Locations

SL. NO	DESCRIPTION	LOCATION	
		LHS	RHS
1	Mohanur Rly Stn	1+210	
2			1+340
3	Mohanur/Rasipalyam	1+900	
4			1+900
5	Maniyangalipatty /Rasipalyam/		2+800
6	Pottampalayam	3+000	
7	Thoppur		5+050
8		5+070	
9	Naikarampatti	6+250	
10			6+350
11	Moongilpatti	8+170	
12			8+170
13	SRG Eng College		9+120
14		9+220	
15	Aniyapuram		10+030
16		10+130	
17	Melechavari	11+640	
18			11+640
19	Nallayamgoundam pudur/Ladduvadi		12+200
20		12+300	
21	Ladduvadi	12+725	
22			12+830

ANNEXURE 3. 50. SENSITIVE NOISE RECEPTORS ALONG MOHANUR – NAMAKKAL SECTION OF ROAD NO.5 (SH95)

Sl. No.	Chainage (Km.)	Name of Sensitive receptor	Location (Left / Right)	Distance from ECL (m)	Dimensions		Impact	Mitigation/Enhancement
					Length	Breadth		
1	0+980	Malar Hospital	LHS	15			No Direct Impact	Additional Noise barrier with Mast trees (Nettilingam trees)
2	0+980	Ragevandra Physiotherapy Center	RHS	12			No Direct Impact	Additional Noise barrier with Mast trees (Nettilingam trees)
3	1+590	Government Girls' Higher Secondary School, Mohanur	RHS	16	120	200	No Direct Impact	Additional Noise barrier with Mast trees (Nettilingam trees)
4	1+800	Subramaniam Arts & Science College, Mohanur	LHS	15			No Direct Impact	Additional Noise barrier with Mast trees (Nettilingam trees)
5	2+800	Government Public Health Center	RHS	11			Compound wall affected	New Compound Wall (Noise barrier) will be constructed
6	5+200	Panchayth Union Elementary School, Thoppur	LHS	12	12	44	No Direct Impact	Additional Noise barrier with Mast trees (Nettilingam trees)
7	7+350	Saranga Dental Clinic	RHS	18			No Direct Impact	Additional Noise barrier with Mast trees (Nettilingam trees)
8	9+150	SRG Engineering College	LHS	20	300	130	No Direct Impact	Additional Noise barrier with Mast trees (Nettilingam trees)
9	10+020	Arumugham Udaiyar Govt Higher Secondary School, Aniyapuram	RHS	8	150	75	Compound wall affected	New Compound Wall (Noise barrier) will be constructed
10	11+550	Krishi Vigyan Kendra, Namakkal	LHS	15	103	167	No Direct Impact	Additional Noise barrier with Mast trees (Nettilingam trees)
11	11+800	Animal Feed Analytical & Quality Assurance Lab	LHS	15	190	96	No Direct Impact	Additional Noise barrier with Mast trees (Nettilingam trees)
12	12+000	National Agricultural Development Program (NADP)	LHS	15	104	75	No Direct Impact	Additional Noise barrier with Mast trees (Nettilingam trees)
13	12+200	Tamil Nadu Vetirinary & Animal Science University	LHS	15	567	621	No Direct Impact	Additional Noise barrier with Mast trees (Nettilingam trees)

ANNEXURE 3. 51. MOST LIKELY FLOOD PRONE SECTIONS ALONG MOHANUR – NAMAKKAL SECTION OF ROAD NO.5 (SH95)

There are no flood prone sections along the proposed corridor.

ANNEXURE 3. 52. WATER BODIES ALONG MOHANUR – NAMAKKAL SECTION OF ROAD NO.5 (SH95)

EX. CHAINAGE (KM)	WATER BODY	SIDE	IMPACT	MITIGATION MEASURES	REMARKS
2+240	Pond	RHS	Partially Affected (Area of affected : 82 Sq.m of 200 of Sq.m)	Retaining Wall will be provided. Other side of the Pond will be expanded in 160 Sq.m	Realignment Location
2+400	Canal	LHS	No Direct Impact		
8+900	Road side Drain	LHS	No Direct Impact		Parallel to road & Seasonal
9+600					

ANNEXURE 3. 53. QUARRY AND BORROW AREAS NEAR MOHANUR – NAMAKKAL SECTION OF ROAD NO.5 (SH95)

Borrow area for Embankment/Subgrade Material: Earth material will be obtained from approved borrow sources. Also Flyash will be used for rising of road embankments as alternative to borrow material.

Metal Quarry for Coarse/Fine Aggregates- Available type of coarse aggregates in the vicinity of the project road is crushed rock from igneous rocks of granites or granitic type, which are generally well suited as materials for road construction. The Cauvery river sand will be used for construction purpose.

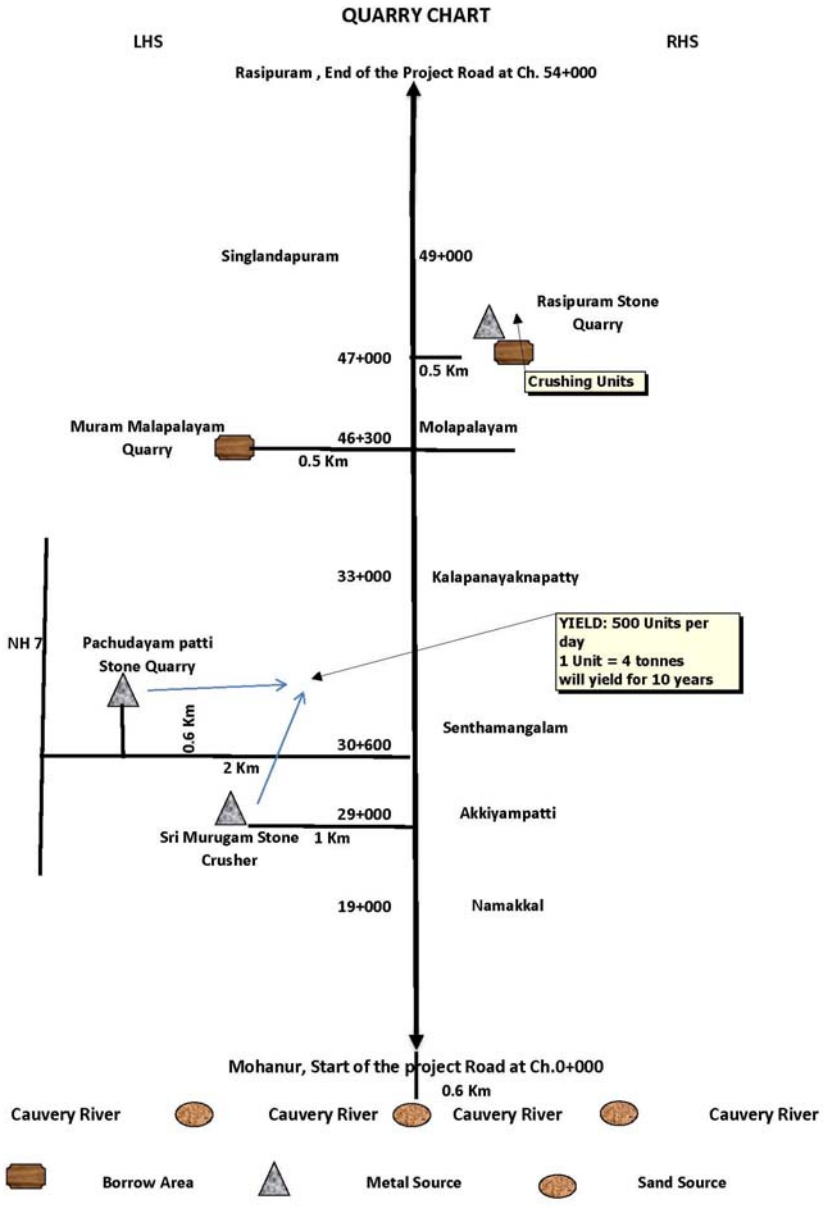


Figure 1: Chart Showing Row Material Sources

ANNEXURE 3. 54. MATERIAL SOURCES AVAILABLE NEAR MOHANUR – NAMAKKAL SECTION OF ROAD NO.5 (SH95)

Cement, Bitumen and Steel- Cement, bitumen, and Steel are the manufactured materials. Cement and steel with IS certification are available from nearby locality. Bitumen is available from MRL (Madras Refineries Limited) in Chennai which is about 362 km from km 19+000 Namakkal

ITEMS	UNITS	QUANTITY	SOURCES
Coarse aggregate	tonnes	170,609.00	Crusher units
Sand	tonnes	11,049.00	Mining area
Cement	tonnes	6,007.00	Plant
Bitumen	tonnes	1,810.00	Plant
Steel	tonnes	1,132.00	Plant
Diesel	litres	125,618.00	Refinery
Borrow material	Cum	33,407.00	Mining area

ANNEXURE 3. 55. DETAILS OF LIKELY TREE REMOVAL ALONG MOHANUR – NAMAKKAL SECTION OF ROAD NO.5 (SH95)

A. Total Trees Affected due to Proposed Project Improvement

DETAILS	NO. OF TREES ALONG PROJECT ROAD		NO. OF TREES IN REALIGNMENT LOCATIONS		TOTAL
	GOVERNMENT TREES	PRIVATE TREES	GOVERNMENT TREES	PRIVATE TREES	
Total	**959**	**7**	**74**	**21**	**1061**
Total in %	**90.4**	**0.7**	**7.0**	**2.0**	**100.0**

B. List of Govt. Trees to be Transplanted and Cut (along the Exist. Road) for the Proposed Project Road

SIDE	NO. OF TREES TO BE TRANSPLANTED USING MACHINERY (10-30CM)	NO. OF TREES TO BE CUT (>30CM)	TOTAL
Along Exis. Road			
LHS	70	365	435
RHS	84	440	524
Realignment Locations			
Realignments	21	53	74
Total	**175**	**858**	**1033**
Total in %	**16.9**	**83.1**	**100**

C. Details of Government Trees Affected Due to Proposed Project Road Improvement

CHAINAGE (KM)		CATEGORISATION OF TREES BASED ON GBH																TOTAL
		10 - 30 CM		30 - 60 CM		60 - 90 CM		90 - 120 CM		120 - 150 CM		150 - 180 CM		180 - 210 CM		>210 CM		
		LHS	RHS	LHS	RHS	LHS	RHS	LHS	RHS	LHS	RHS	LHS	RHS	LHS	RHS	LHS	RHS	
15+700	16+000	5	6	6	1	6	4	1	0	1	0	0	0	0	0	0	0	30
16+000	16+200	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
0+600	1+000	1	0	2	2	0	1	3	3	2	1	1	0	2	3	4	9	34
1+000	2+000	2	8	4	20	4	8	2	4	5	0	2	2	3	4	14	27	109
2+000	2+500	**Proposed Rasipalayam Realignment**																
2+500	3+000	8	3	4	3	1	0	2	1	1	2	1	0	2	1	2	3	34
3+000	4+000	0	8	3	3	0	1	0	2	0	0	0	0	0	0	0	0	17
4+000	5+000	0	5	6	1	8	3	1	0	0	3	1	3	0	0	2	7	40

5+000	6+000	3	9	3	5	1	1	0	2	1	4	2	3	0	1	11	10	56
6+000	6+600	2	2	1	2	1	1	1	4	1	3	2	3	2	0	14	12	51
6+600	6+900	**Proposed Neikkaranpatti Realignment**																
6+900	7+000	1	0	0	4	0	3	0	2	0	0	0	0	0	0	1	0	11
7+000	8+000	9	0	10	4	3	1	4	1	2	2	3	1	2	0	7	14	63
8+000	9+000	7	3	4	7	4	8	1	5	2	0	4	3	7	3	16	8	82
9+000	10+000	10	5	7	1	4	1	8	7	6	2	9	5	9	4	19	19	116
10+000	11+000	15	18	3	4	2	0	1	2	0	3	1	4	0	3	6	2	64
11+000	12+000	3	7	11	14	13	17	6	12	1	11	1	5	2	5	14	18	140
12+000	13+000	4	5	3	6	2	1	1	6	1	12	2	5	4	5	14	18	89
13+000	13+300	0	5	0	0	1	0	4	0	1	3	0	2	1	1	1	3	22
Sub Total		70	84	67	77	51	50	35	51	24	46	29	36	34	30	125	150	
Trees Present along LHS																		**435**
Trees Present along RHS																		**524**
Grand Total																		**959**

D. Details of Private Trees Affected Due to Proposed Project Road Improvement

Chainage (km)		Categorisation of Trees based on GBH																Total
		10 - 30 cm		30 - 60 cm		60 - 90 cm		90 - 120 cm		120 - 150 cm		150 - 180 cm		180 - 210 cm		>210 cm		
		LHS	RHS	LHS	RHS	LHS	RHS	LHS	RHS	LHS	RHS	LHS	RHS	LHS	RHS	LHS	RHS	
15+700	16+000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16+000	16+200	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0+600	1+000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1+000	2+000	1	0	5	0	0	0	0	0		0	0	0	1	0	0	0	7
2+000	2+500	**Proposed Rasipalayam Realignment**																0
2+500	3+000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3+000	4+000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4+000	5+000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5+000	6+000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6+000	6+600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6+600	6+900	**Proposed Neikkaranpatti Realignment**																0
6+900	7+000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7+000	8+000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8+000	9+000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9+000	10+000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10+000	11+000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11+000	12+000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12+000	13+000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13+000	13+300	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sub Total		1	0	5	0	0	0	0	0	0	0	0	0	1	0	0	0	
Trees Present along LHS																		**7**
Trees Present along RHS																		**0**
Grand Total																		**7**

E. Details of Trees coming in the Proposed Realignment Locations

Existing Chainage (km)		Categorisation of Trees based on GBH								Total
		10 - 30 cm	30 - 60 cm	60 - 90 cm	90 - 120 cm	120 - 150 cm	150 - 180 cm	180 - 210 cm	>210 cm	
Govt. Trees										
2+000	2+500	8	6	4	8	3	0	2	7	38
6+600	6+900	13	17	1	0	0	1	1	3	36
Total		**21**	**23**	**5**	**8**	**3**	**1**	**3**	**10**	**74**
Pvt. Trees										
2+000	2+500	0	0	0	8	0	0	0	0	8
6+600	6+900	0	0	3	7	3	0	0	0	13
Total		**0**	**0**	**3**	**15**	**3**	**0**	**0**	**0**	**21**
Grand Total										**95**

ANNEXURE 3. 56. LANDSCAPING, TREE PLANTING AND ENVIRONMENTAL ENHANCEMENT PLAN

1. INTRODUCTION

Landscaping refers to any activity that modifies the visible features of an area, Tree planting is an important feature in increasing the aesthetic appeal of a place. Avenue trees that are planted along the road give shade, absorb pollutants, moderates microclimate and also increase the scenic beauty of the region. This section discusses various aspects involved in landscaping, tree planting and the environmental enhancement plan proposed for the Mohanur – Namakkal section of corridor 5.

Public owned trees The plains of Tamil Nadu in which the current corridor is located are sparsely vegetated as compared to the Ghat section. However along old roads, the numbers of large specimen trees is high. Corridor 5 is no exception. These trees have been protected wherever possible with suitable changes in the design. Wherever such changes cannot be effected it may be necessary to remove them.

Private owned trees The number of private owned trees to be acquired outside the right of way will be low compared to the public trees within the right of way. The private trees that will be affected during widening and improvement will be subjected to compensation at the appropriate market rates.

In addition to this the project will plant ten trees for every tree removed as a compensatory tree planting measure irrespective of the size, species etc.

2. ADVERSE EFFECT OF AVENUE PLANTING

Beneficial effect of avenue plantation outweighs the adverse effects in this region. The major adverse effect due to avenue plantation are as follows

- Tree brances obstruct direct vision of drivers and can cause accidents. Some trees with huge canopy can cause a serious saftey hazard to passangers due to falling of branches.
- The droppings from trees (leaves, flowers etc) which are seldom cleared from the surface of the roads will increase the damage to the wearing surface besides making the riding surface more slippery and cause accidents, especially when these materials decay.
- The pavement will be wet for longer periods due to reduced rate of evaporation by sunlight.
- The growth of the tree roots will also damage the pavement.
- Trees obstruct sight distances as well as the view of the natural landscape

3. BENEFITS OF AVENUE PLANTING ALONG ROAD SIDES

- One of the objectives of planting trees on the roadsides is to produce an aesthetic greener landscape.
- The Second objective is to give shade to travellers.
- The Third objective can be to absorb excessive noise and air pollutants.
- The Fourth objective is to raise social forestry; One of the axillary benefit of avenue

plantation is to provide connectivity between habitats for the avian and tree dwelling fauna.

- The Fifth objective is to act as a natural filter to the traffic emissions.
- Tree planting control soil erosion and provide increased slope stability.

4. TREE REMOVAL FROM THE AVAILABLE CORRIDOR OF THE ROAD

The road widening under the Tamil Nadu Road Sector Project will necessitate removal of large number of trees from the roadsides. To minimise the tree cutting, trees falling within the formation width (toe to toe) was considered for the project road. Also trees less than 30cm girth size will be transplanted, so that very few trees can be impacted. The details of the tree removal from SH95 are presented in Annexure 3.55. The details are also elaborated in the EIA documents as well as in the Environmental Management Plans available for each corridor.

4.1 ROAD SIDE AVENUE PLANTATION

In the TNRSP project corridors, there is no continuous avenue plantation. The trees present within corridor of impacts of the proposed project road was surveyed and tabulated and presented in Annexure 3.55. The common tree species found along the TNRSP II roads are Neem, Palm, Pongamia, Tamarind, Morinda, Jamun, Gulmohar etc.

The total number of trees affected in Road No. 5 - is estimated as 1061 numbers this includes 1033 public and 28 private trees along the existing road. In the realignment locations 74 public trees and 21 private trees will be affected. Total 858 Public trees will be felled and 175 trees will be transplanted within the proposed formation width. The tree removal is largely based on the widening of the existing road to accommodate project traffic and partly to ensure the road safety issues.

4.2 COMPENSATORY TREE PLANTING

The compensatory tree planting strategy is based on the survival rate. The survival rate in the project region is low due to the unfavourable climatic conditions as evidenced by the existing biomass.

Public trees: Following the latest judgement of Honourable High Court of Tamil Nadu at least ten times the number of trees that will be removed from the TNSRP-II road corridors will be planted in compensation.

The total numbers of plants that will be necessary to be planted against the expected loss of 858 trees is about 8580. The project however targets much higher planting rates along the additional land available as a result of the road realignments.

As an environmental enhancement measure the project will also aim to undertake landscaping at cultural property resources and junction locations.

4.3 SELECTION OF LOCATIONS FOR AVENUE PLANTATION

Criteria adopted for selection of locations for avenue tree plantation is based on availability of land margin within TNRSP road boundary. Proposed RoW of the Road 5 varies from min. 16m

to max. 33m depending on the landuse pattern of the corridor. Detailed survey was undertaken during tree inventory along the entire road stretch to estimate the length of land available along the corridor. The 175 trees having girth size less than 30cm shall be transplanted in these land margin available within the RoW. Table 2.0 shows the length of road stretch having 1.5, 3 and 9 meter width of land for one, two and three row plantation respectively. 8687 trees can be planted in this available area. Alignment Plan showing avenue tree plantation are presented in **Figure 1.0**.

Table 1. Chainage Wise Location Proposed for Avenue Plantation in Rural Areas

1 ROW TREE			2 ROW TREES			3 ROW TREES		
FROM	TO	TOTAL LENGTH M	FROM	TO	TOTAL LENGTH M	FROM	TO	TOTAL LENGTH M
LHS								
2+450	2+470	20	2+440	2+450	10	4+770	5+000	230
2+520	2+550	30	4+300	4+330	30	5+390	5+420	30
4+330	4+340	10	4+650	4+770	120	5+630	5+650	20
4+630	4+650	20	5+030	5+060	30	6+940	7+260	320
5+900	5+950	50	5+420	5+470	50	7+470	7+800	330
7+280	7+290	10	5+600	5+630	30	8+220	8+270	50
8+640	8+660	20	5+650	5+900	250	8+370	8+430	60
10+510	10+530	20	7+260	7+270	10	8+880	8+930	50
12+900	12+910	10	7+290	7+470	180	9+040	9+180	140
0	0	0	7+800	7+830	30	9+220	9+860	640
0	0	0	8+270	8+370	100	11+020	11+530	510
0	0	0	8+430	8+470	40	12+030	12+230	200
0	0	0	8+660	8+850	190	12+260	12+430	170
0	0	0	8+870	8+880	10	12+840	12+860	20
0	0	0	9+860	9+870	10	12+940	13+200	260
0	0	0	10+530	10+690	160	0	0	0
0	0	0	11+680	12+030	350	0	0	
0	0	0	12+430	12+500	70	0	0	0
0	0	0	12+860	12+900	40	0	0	0
0	0	0	12+920	12+940	20	0	0	0
RHS								
2+500	2+510	10	0	0	60	0	0	0
4+560	4+650	90	0	0	30	0	0	0
11+390	11+400	10	0	0	0	0	0	0
TOTAL		**300**	**TOTAL**		**1820**	**TOTAL**		**3030**
TOTAL TREES		**200**	**TOTAL TREES**		**2427**	**TOTAL TREES**		**6060**
GRAND TOTAL								**8687**

FIGURE 1.0 . ALIGNMENT PLAN SHOWING AVENUE TREE PLANTATION

To Mohanur

To Namakkal

2+400

2+500

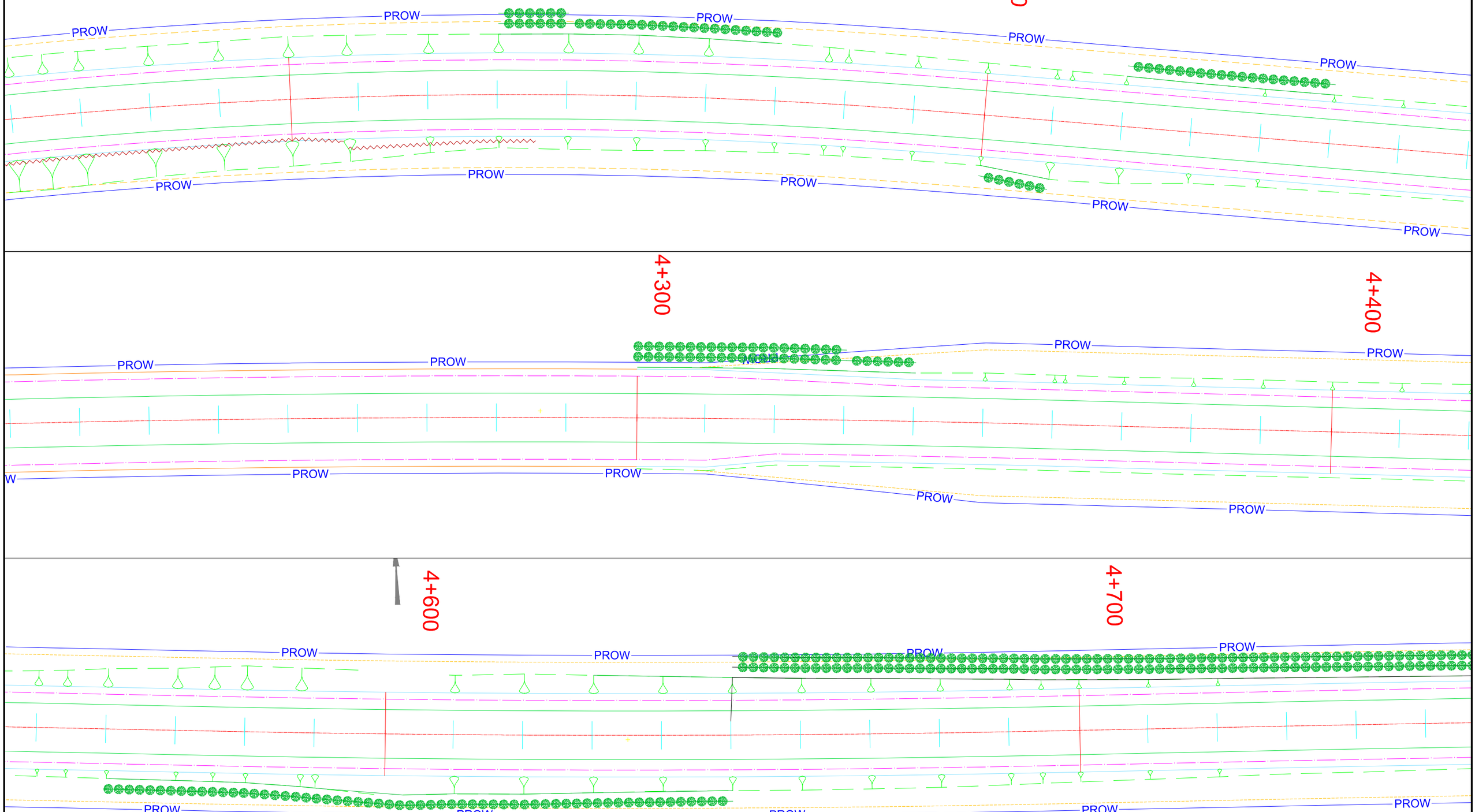
4+300

4+400

4+600

4+700

PROW



Legend :-

- PROPOSED CENTRE LINE
- CARRIAGEWAY
- PAVED SHOULDER
- EARTHEN SHOULDER
- UTILITY CORRIDOR
- PROW — PROPOSED RIGHT OF WAY
- OPEN DRAIN
- FOOTPATH CUM DRAIN
- TREE

NOTE:-

Client: TAMILNADU ROAD SECTOR PROJECT

Consultant: **CDM SMITH INDIA PVT LTD** (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

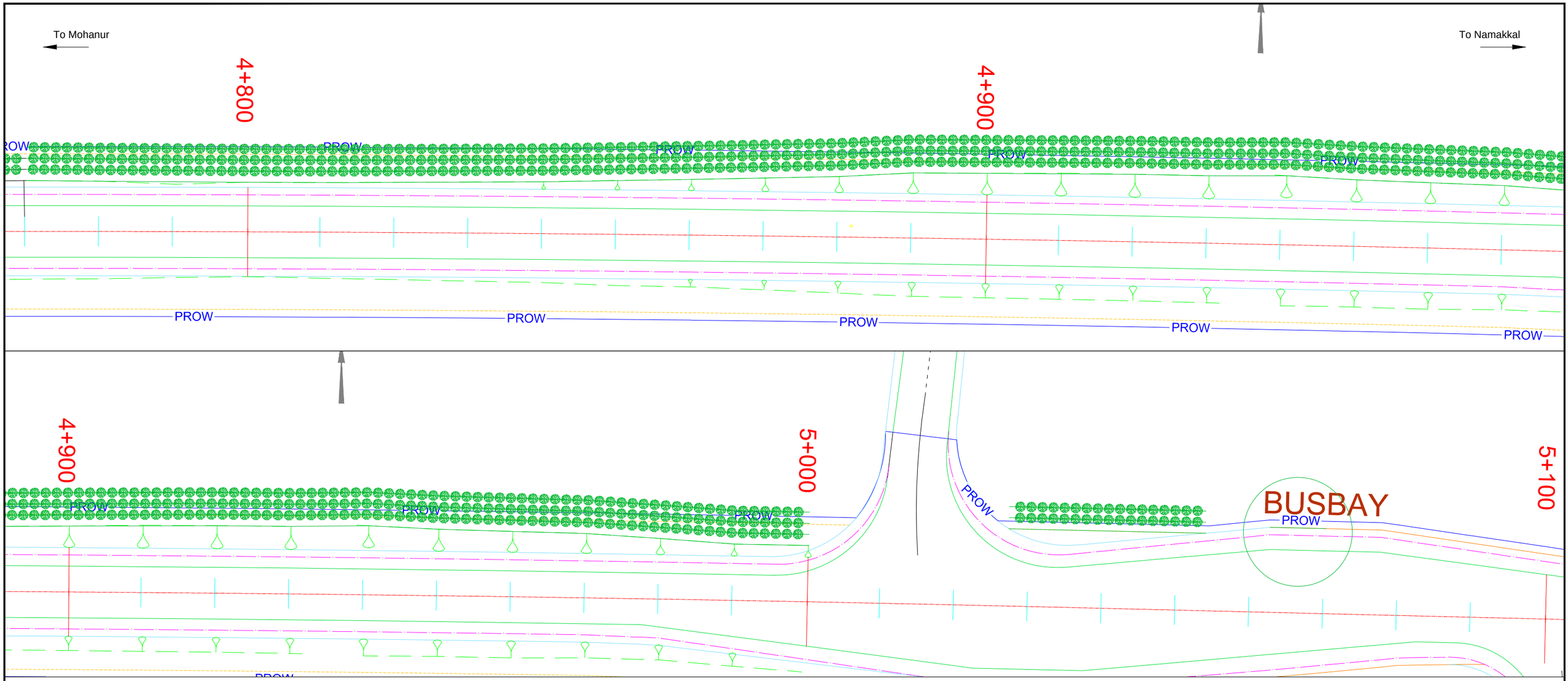
Designed: | Drawn: | Checked: | Approved:

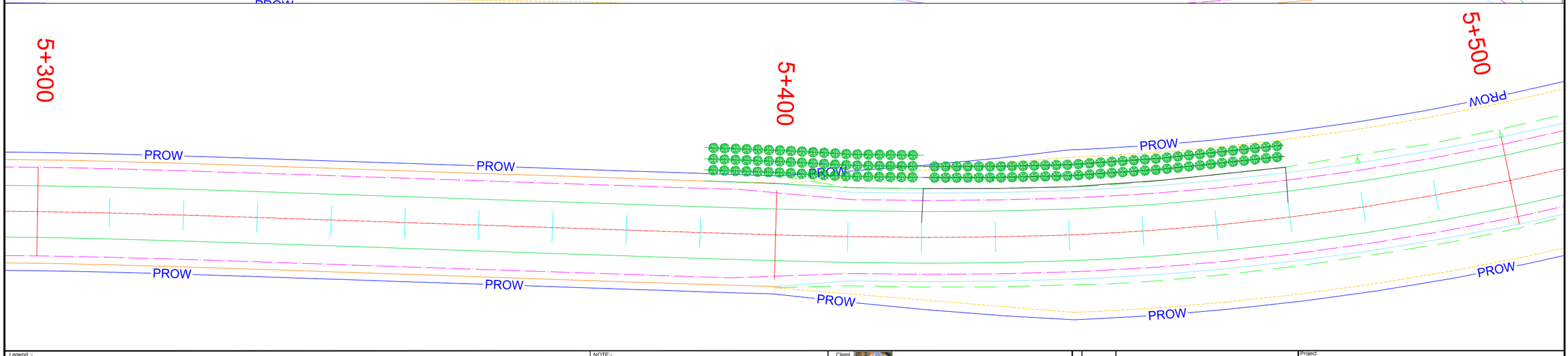
Scale: Not to Scale

Project: **PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03**

Drawing Title: Avenue Tree Plantation
Mohanur (Km0+000) to Namakkal (Km 13+300)
Section of Road No. 5

Date	Project No.	Drawing No.	Sheet No.	Rev.
	1314044		1 of 12	





Legend :-

- PROPOSED CENTRE LINE
- CARRIAGEWAY
- PAVED SHOULDER
- EARTHEN SHOULDER
- UTILITY CORRIDOR
- PROW
- PROPOSED RIGHT OF WAY
- OPEN DRAIN
- FOOTPATH CUM DRAIN
- TREE

NOTE:-

Client: TNRSP

TAMILNADU ROAD SECTOR PROJECT

Consultant: CDM Smith

CDM SMITH INDIA PVT LTD
(Formerly Wilbur Smith Associates Pvt Ltd.)

	Date	Revision

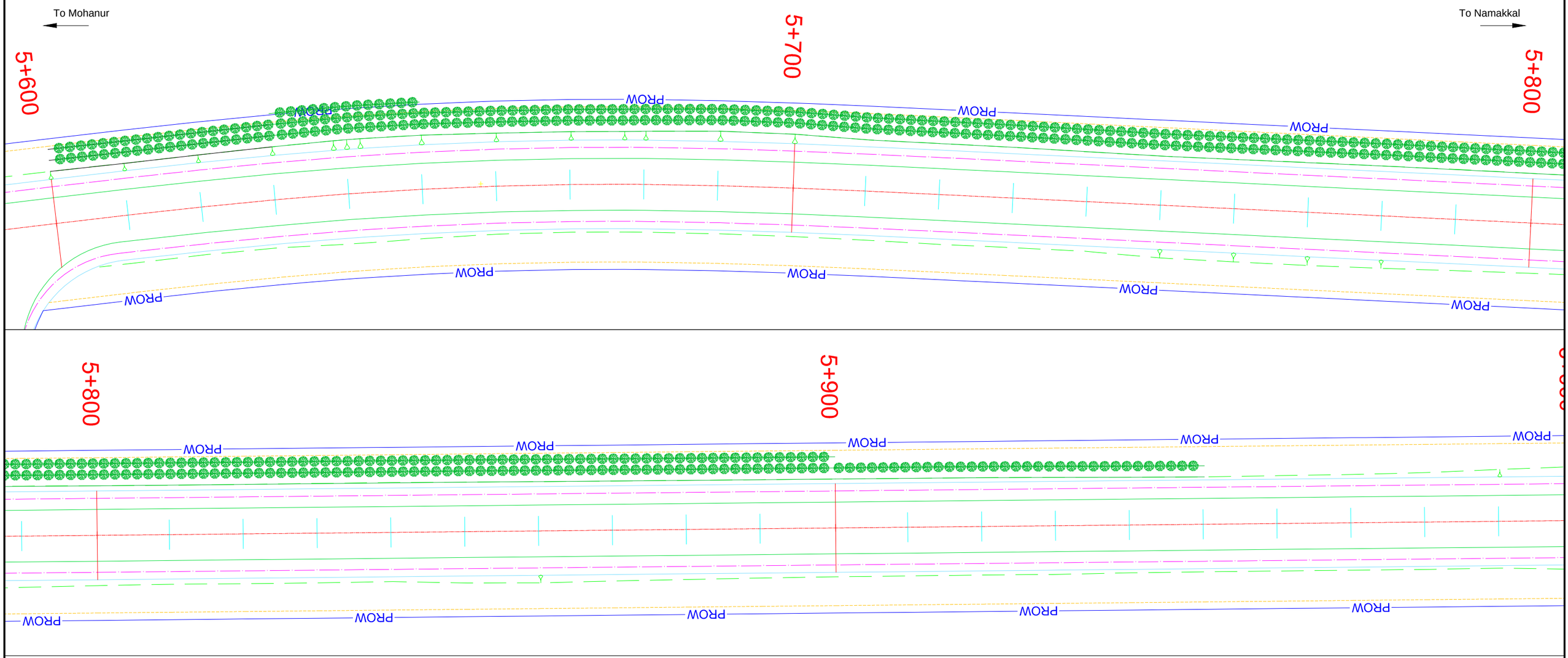
Designed:
Drawn:
Checked:
Approved:

Scale: Not to Scale

Project: **PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03**

Drawing Title: Avenue Tree Plantation
Mohanur (Km0+000) to Namakkal (Km 13+300)
Section of Road No. 5

Date	Project No.	Drawing No.	Sheet No.	Rev.
	1314044		2 of 12	



Legend :-

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- CARRIAGEWAY
- PAVED SHOULDER
- EARTHEN SHOULDER
- UTILITY CORRIDOR
- PROW — PROPOSED RIGHT OF WAY
- OPEN DRAIN
- FOOTPATH CUM DRAIN
- TREE

NOTE:-

Client: TAMILNADU ROAD SECTOR PROJECT (TNRSP)

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

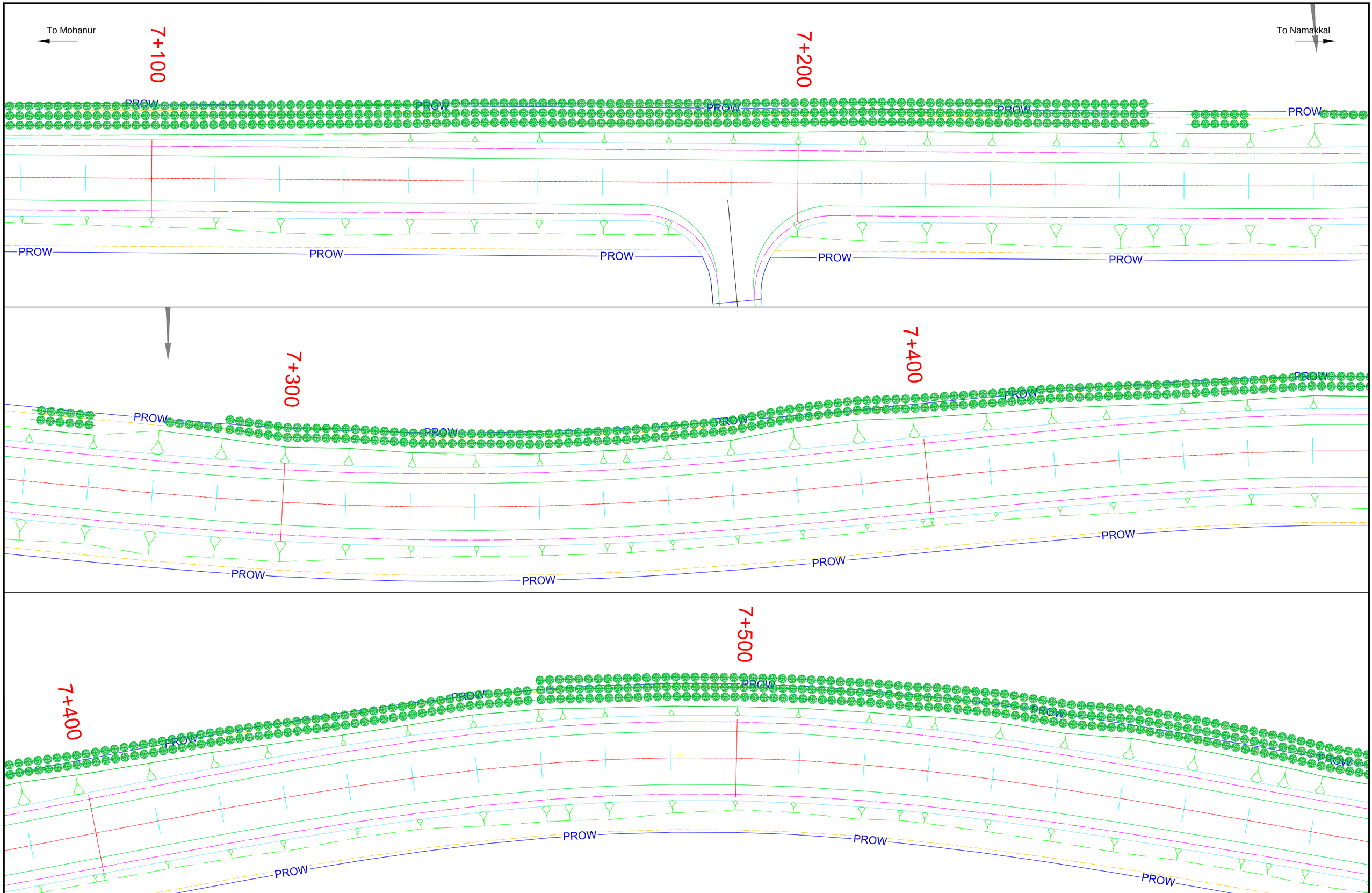
Designed: | Drawn: | Checked: | Approved:

Scale: Not to Scale

Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

Drawing Title: Avenue Tree Plantation
Mohanur (Km0+000) to Namakkal (Km 13+300)
Section of Road No. 5

Date	Project No.	Drawing No.	Sheet No.	Rev.
	1314044		3 of 12	



Legend :-

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- CARRIAGEWAY
- PAVED SHOULDER
- EARTHEN SHOULDER
- UTILITY CORRIDOR
- PROW
- PROPOSED RIGHT OF WAY
- OPEN DRAIN
- FOOTPATH CUM DRAIN
- TREE

NOTE:-

Client: TNRSP — TAMILNADU ROAD SECTOR PROJECT

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

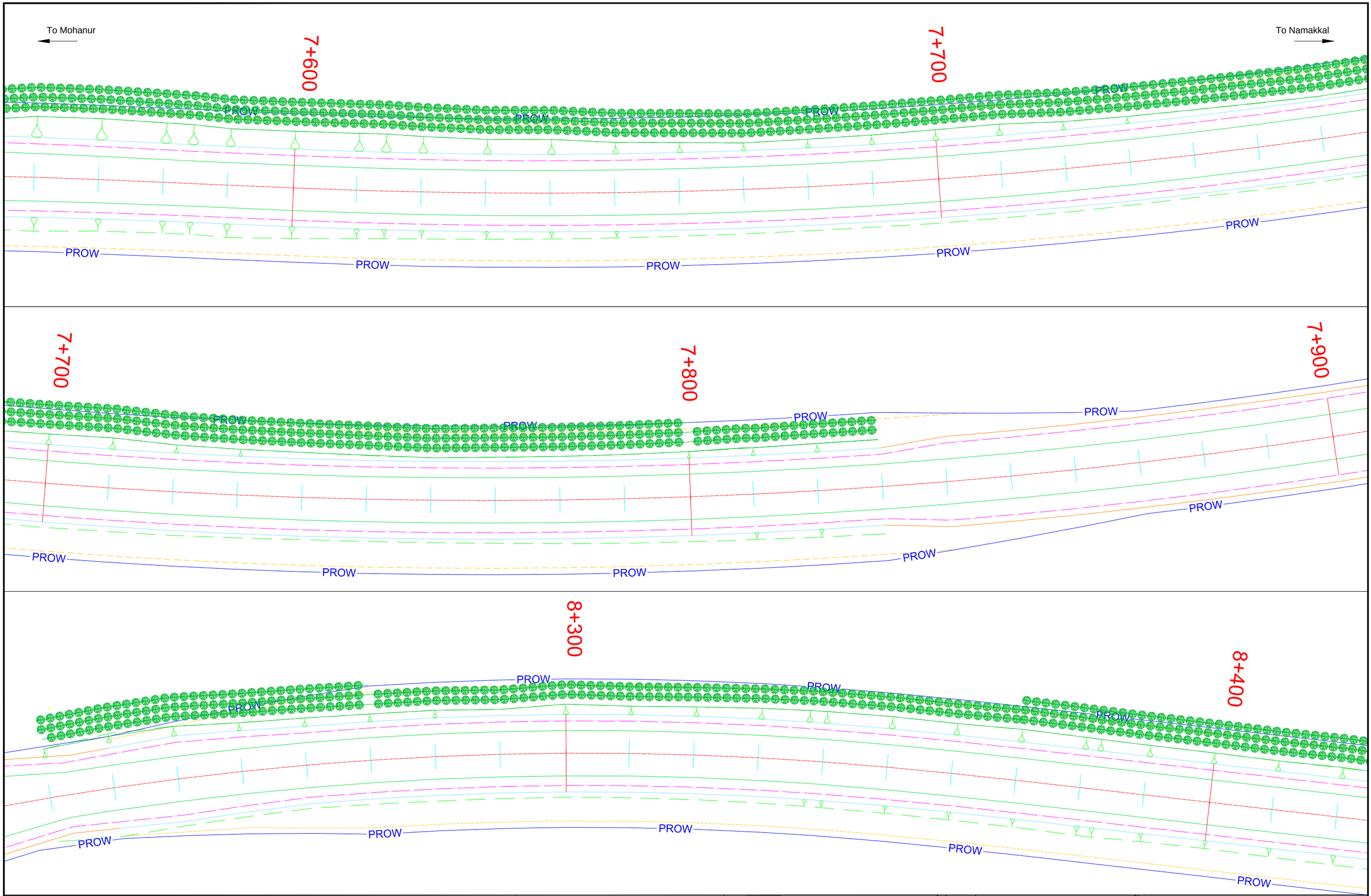
Designed: | Drawn: | Checked: | Approved:

Scale: Not to Scale

Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

Drawing Title: Avenue Tree Plantation
Mohanur (Km0+000) to Namakkal (Km 13+300)
Section of Road No. 5

Date.	Project No.	Drawing No.	Sheet No.	Rev.
	1314044		4 of 12	



Legend :-

- PROPOSED CENTRE LINE
- CARRIAGEWAY
- PAVED SHOULDER
- EARTHEN SHOULDER
- UTILITY CORRIDOR
- PROW — PROPOSED RIGHT OF WAY
- OPEN DRAIN
- FOOTPATH CUM DRAIN
- TREE

NOTE:-

Client: TNRSP — TAMILNADU ROAD SECTOR PROJECT

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

Designed: | Drawn: | Checked: | Approved:

Scale: Not to Scale

Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

Drawing Title: Avenue Tree Plantation
Mohanur (Km0+000) to Namakkal (Km 13+300)
Section of Road No. 5

Date.	Project No.	Drawing No.	Sheet No.	Rev.
	1314044		5 of 12	

To Mohanur

To Namakkal

8+400

8+500

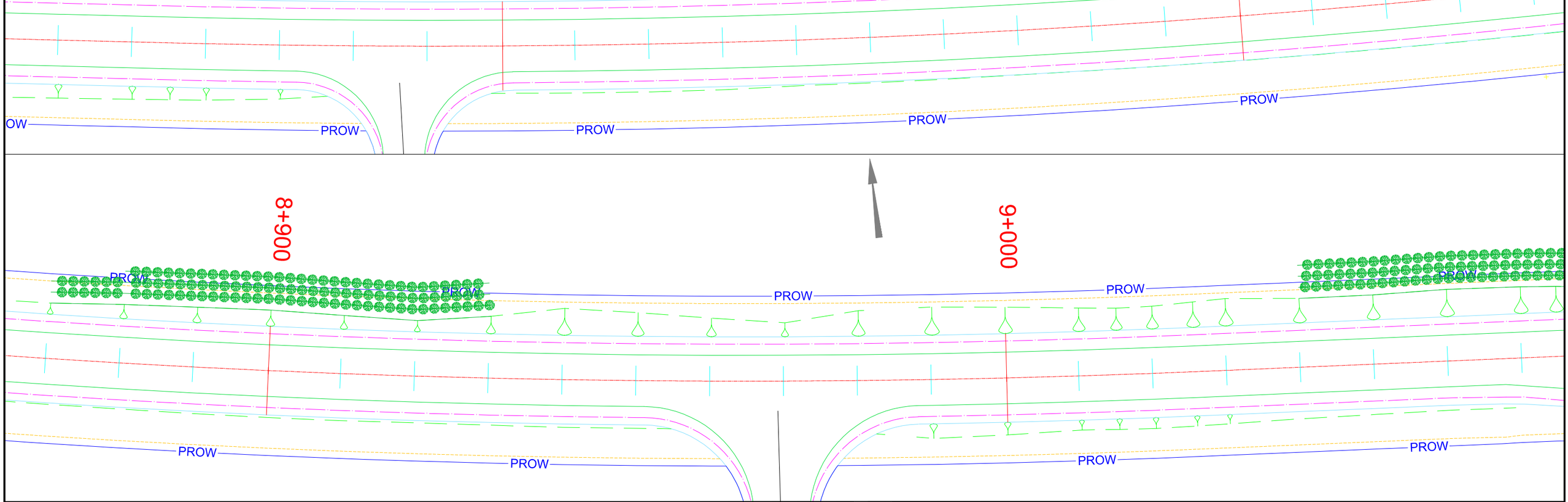
8+700

8+800

8+900

9+000

PROW



Legend :-

- PROPOSED CENTRE LINE
- CARRIAGEWAY
- PAVED SHOULDER
- EARTHEN SHOULDER
- UTILITY CORRIDOR
- PROW — PROPOSED RIGHT OF WAY
- OPEN DRAIN
- FOOTPATH CUM DRAIN
- TREE

NOTE:-

Client: TAMILNADU ROAD SECTOR PROJECT (TNRSP)

Consultant: **CDM SMITH INDIA PVT LTD** (Formerly Wilbur Smith Associates Pvt Ltd.)

Designed: | Drawn: | Checked: | Approved:

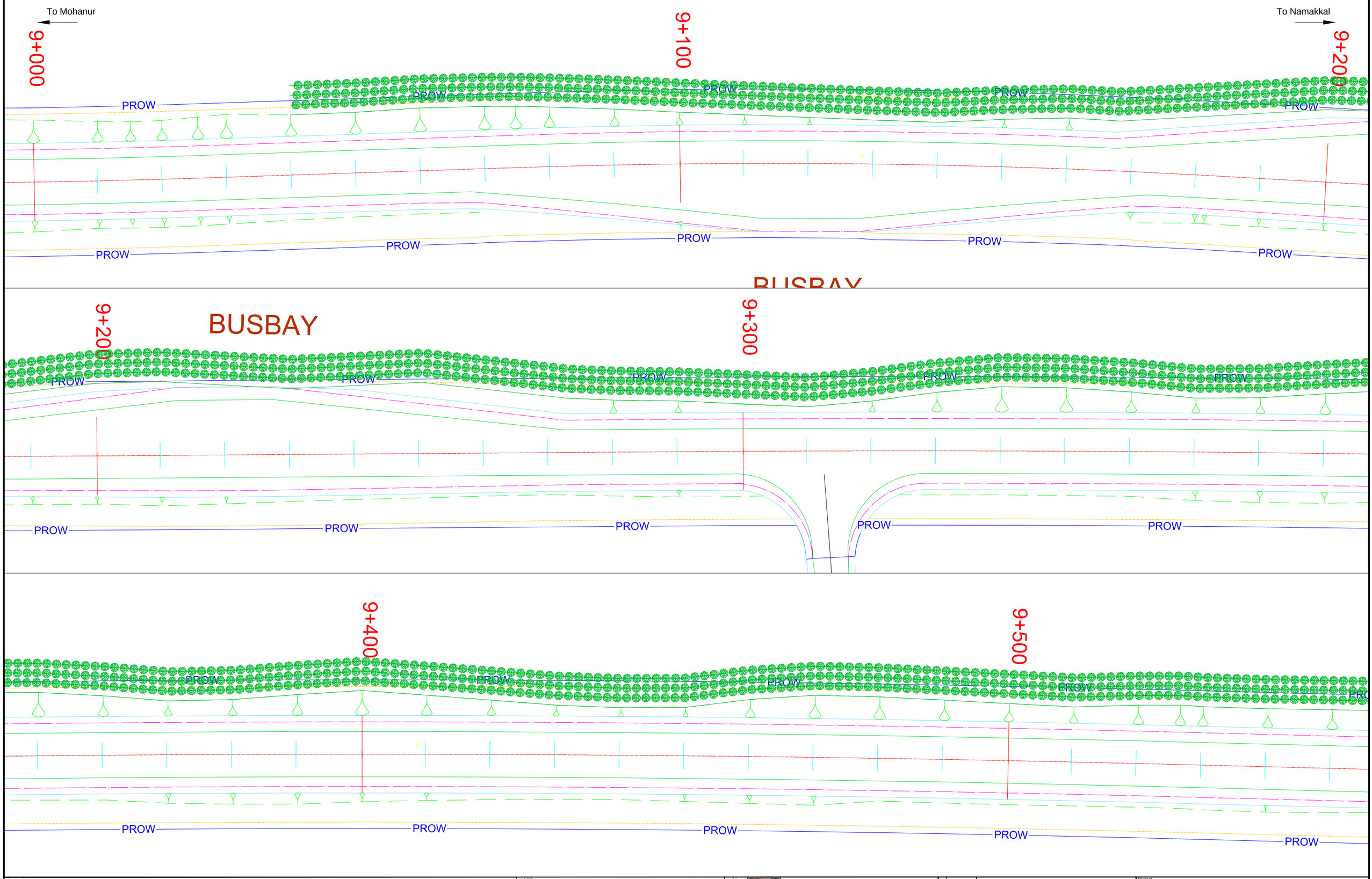
Date | Revision

Scale: Not to Scale

Project: **PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03**

Drawing Title: Avenue Tree Plantation
Mohanur (Km0+000) to Namakkal (Km 13+300)
Section of Road No. 5

Date.	Project No.	Drawing No.	Sheet No.	Rev.
	1314044		6 of 12	



Legend :-

- PROPOSED CENTRE LINE
- CARRIAGEWAY
- PAVED SHOULDER
- EARTHEN SHOULDER
- UTILITY CORRIDOR
- PROW — PROPOSED RIGHT OF WAY
- OPEN DRAIN
- FOOTPATH CUM DRAIN
- TREE

NOTE:-

Client: TAMILNADU ROAD SECTOR PROJECT (TNRSP)

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

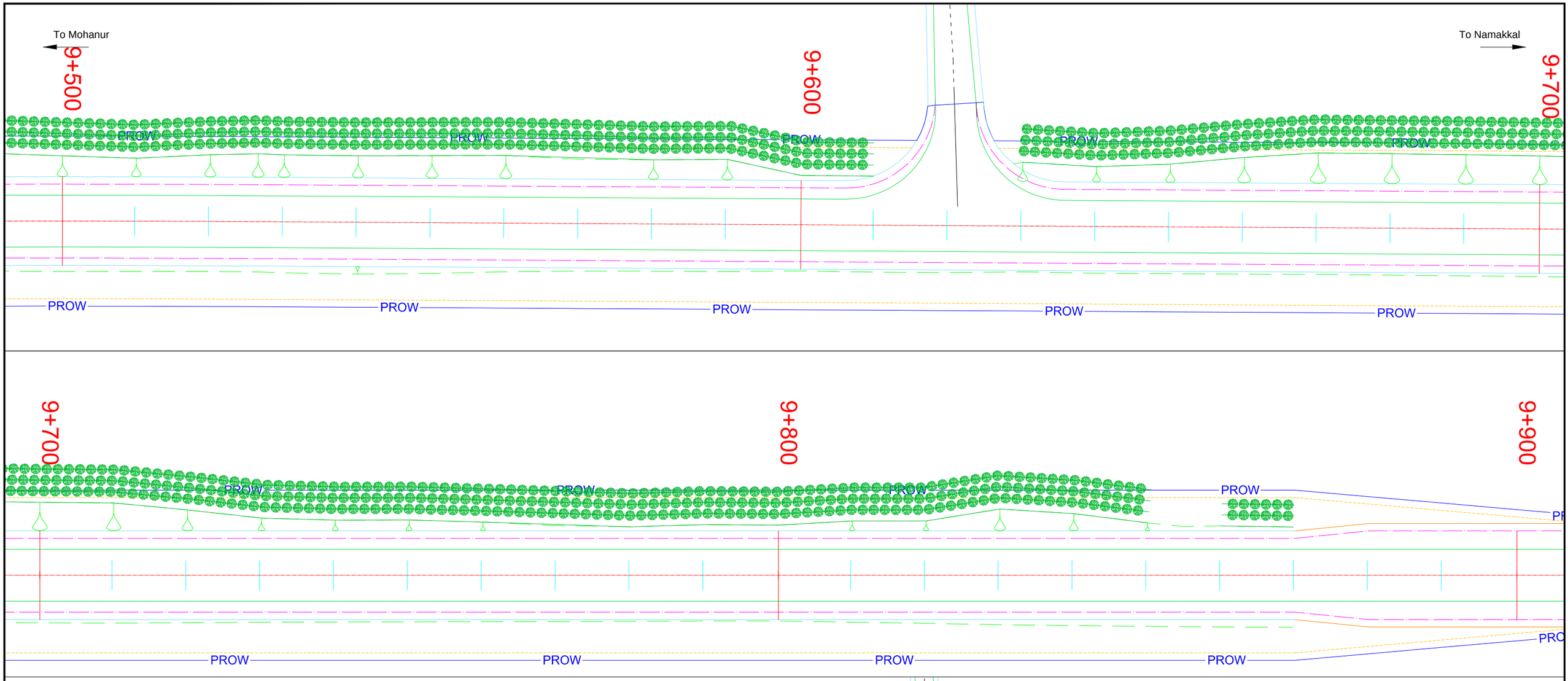
Designed: | Drawn: | Checked: | Approved:

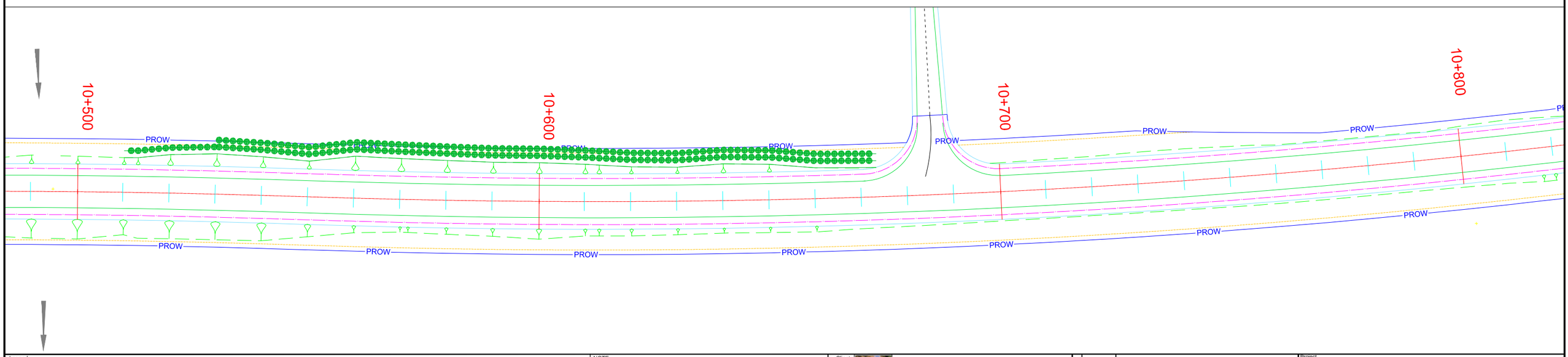
Scale: Not to Scale

Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

Drawing Title: Avenue Tree Plantation
Mohanur (Km0+000) to Namakkal (Km 13+300)
Section of Road No. 5

Date.	Project No.	Drawing No.	Sheet No.	Rev.
	1314044		7 of 12	





Legend :-

- PROPOSED CENTRE LINE
- CARRIAGEWAY
- PAVED SHOULDER
- EARTHEN SHOULDER
- UTILITY CORRIDOR
- PROW — PROPOSED RIGHT OF WAY
- OPEN DRAIN
- FOOTPATH CUM DRAIN
- TREE

NOTE:-

Client: TAMILNADU ROAD SECTOR PROJECT

Consultant: **CDM SMITH INDIA PVT LTD** (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

Designed: | Drawn: | Checked: | Approved:

Scale: Not to Scale

Project: **PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03**

Drawing Title: Avenue Tree Plantation
Mohanur (Km0+000) to Namakkal (Km 13+300)
Section of Road No. 5

Date.	Project No.	Drawing No.	Sheet No.	Rev.
	1314044		8 of 12	

Legend :-

- PROPOSED CENTRE LINE
- CARRIAGEWAY
- PAVED SHOULDER
- EARTHEN SHOULDER
- UTILITY CORRIDOR
- PROW — PROPOSED RIGHT OF WAY
- OPEN DRAIN
- FOOTPATH CUM DRAIN
- TREE

NOTE:-

Client: TNRSP — TAMILNADU ROAD SECTOR PROJECT

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

Designed: | Drawn: | Checked: | Approved:

Scale: Not to Scale

Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

Drawing Title: Avenue Tree Plantation
Mohanur (Km0+000) to Namakkal (Km 13+300)
Section of Road No. 5

Date.	Project No.	Drawing No.	Sheet No.	Rev.
	1314044		9 of 12	

Legend :-

- PROPOSED CENTRE LINE
- CARRIAGEWAY
- PAVED SHOULDER
- EARTHEN SHOULDER
- UTILITY CORRIDOR
- PROW — PROPOSED RIGHT OF WAY
- OPEN DRAIN
- FOOTPATH CUM DRAIN
- TREE

NOTE:-

Client: TAMILNADU ROAD SECTOR PROJECT (TNRSP)

Consultant: **CDM SMITH INDIA PVT LTD** (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

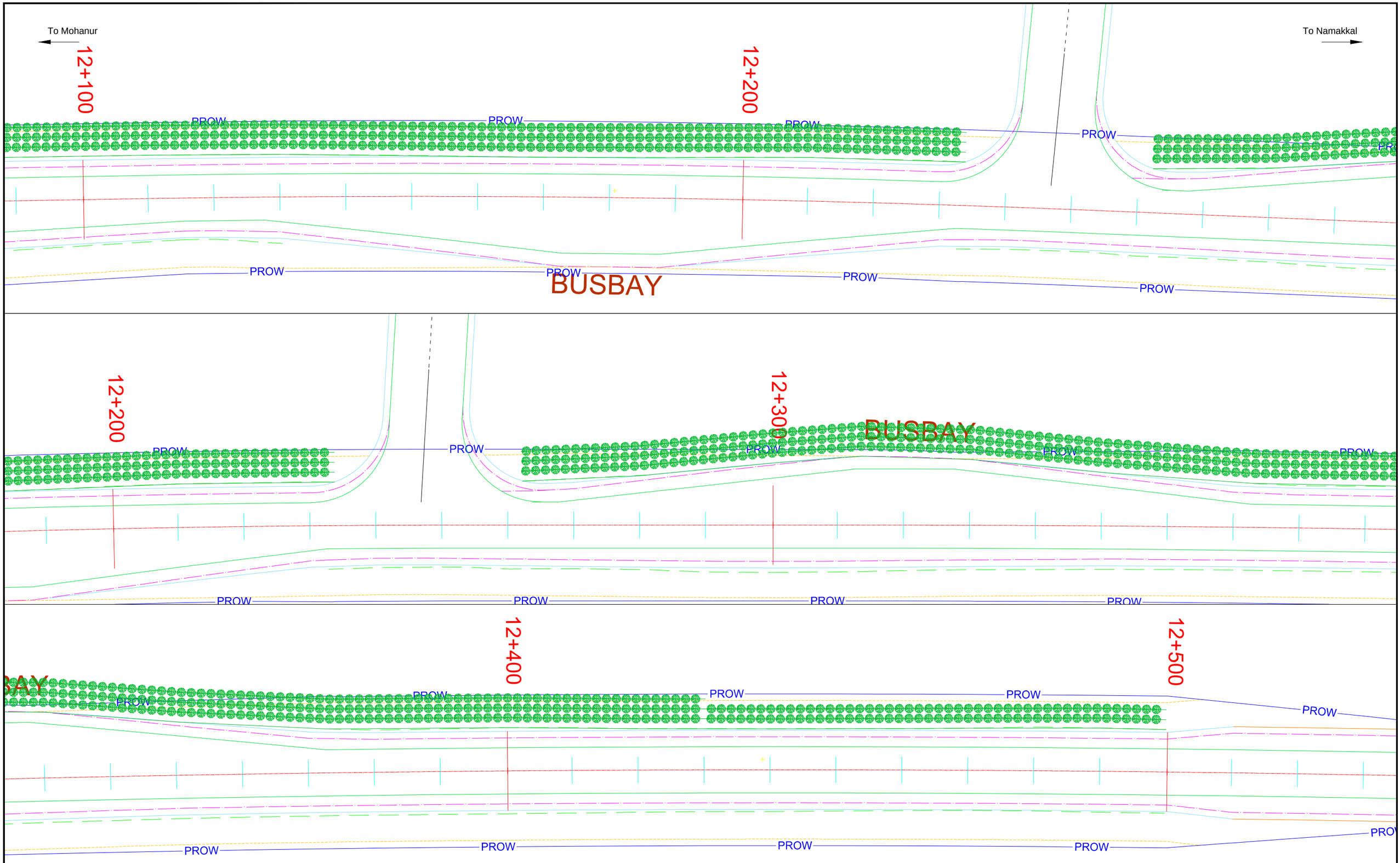
Designed: | Drawn: | Checked: | Approved:

Scale: Not to Scale

Project: **PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03**

Drawing Title: Avenue Tree Plantation
Mohanur (Km0+000) to Namakkal (Km 13+300)
Section of Road No. 5

Date	Project No.	Drawing No.	Sheet No.	Rev.
	1314044		10 of 12	



Legend :-

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- PAVED SHOULDER
- EARTHEN SHOULDER
- UTILITY CORRIDOR
- PROW
- PROPOSED RIGHT OF WAY
- OPEN DRAIN
- FOOTPATH CUM DRAIN
- TREE

NOTE:-

Client: TAMILNADU ROAD SECTOR PROJECT (TNRSP)

Consultant: **CDM SMITH INDIA PVT LTD** (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

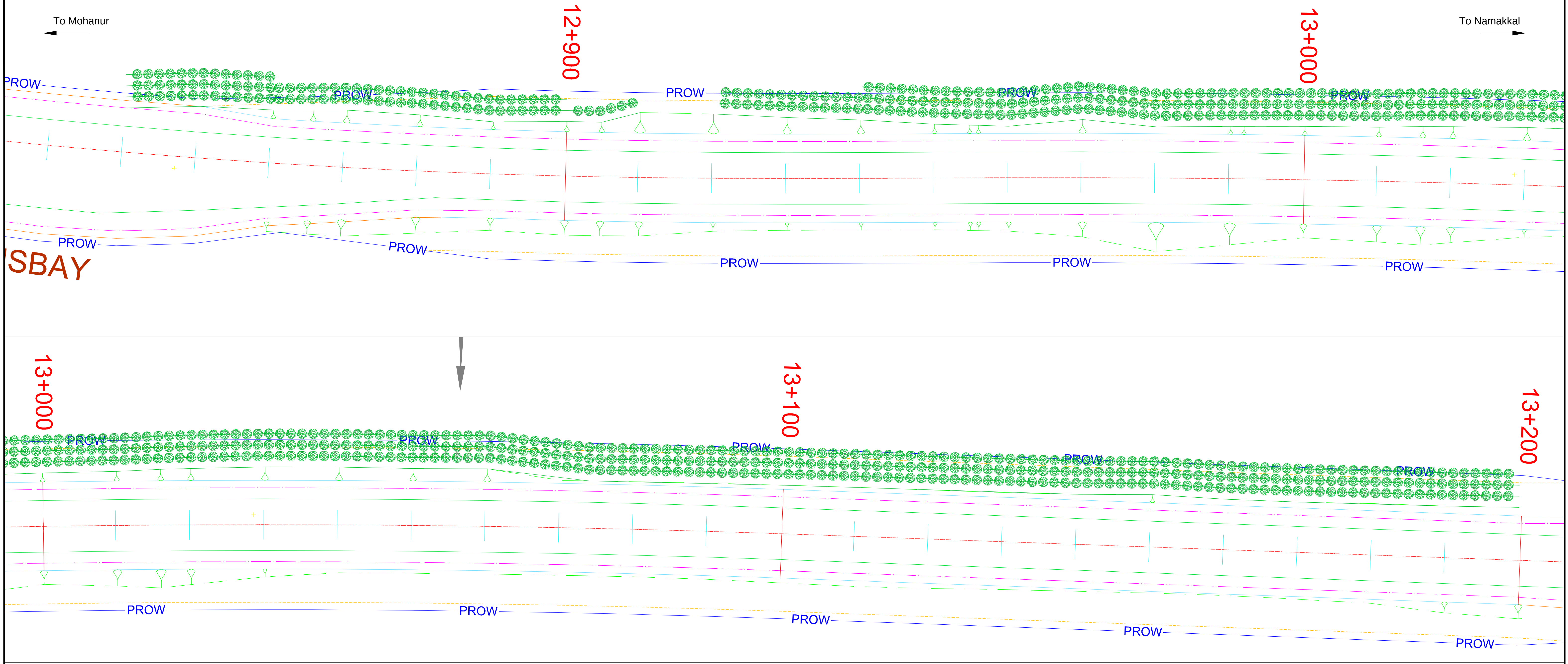
Designed: | Drawn: | Checked: | Approved:

Scale: Not to Scale

Project: **PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03**

Drawing Title: Avenue Tree Plantation
Mohanur (Km0+000) to Namakkal (Km 13+300)
Section of Road No. 5

Date	Project No.	Drawing No.	Sheet No.	Rev.
	1314044		11 of 12	



Legend :-

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	CARRIAGEWAY	PROW	PROPOSED RIGHT OF WAY
	PAVED SHOULDER		OPEN DRAIN
	EARTHEN SHOULDER		FOOTPATH CUM DRAIN
			TREE

NOTE:-

Client

TNRSP

TAMILNADU ROAD SECTOR PROJECT

Consultant

CDM Smith

CDM SMITH INDIA PVT LTD
(Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

Designed:	
Drawn:	
Checked:	
Approved:	

Scale

Not to Scale

Project

PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

Drawing Title

Avenue Tree Plantation
Mohanur (Km0+000) to Namakkal (Km 13+300)
Section of Road No. 5

Date.	Project No.	Drawing No.	Sheet No.	Rev.
	1314044		12 of 12	

4.4 TREE PLANTATION LOCATIONS IDENITIED IN THE GOVERNMENT PERMISIS ALONG THE PROJECT AREA

Land available for plantation in the government lands where schools, hospitals, BSNL, Electrical department, Police Station, etc are located is mapped. The chainage wise location and number of trees that can be planted is presented in Table 2.0. A total of 484 trees can be planted in these identified premises.

Table 2. Chainage Wise Government Lands Proposed for Compensatory Plantation along the project area.

S. NO.	DESCRIPTION	QUANTITY	BOQ ITEM NO.
1. Govt. Girls Higher Secondary School, Mohanur, KM 1+600, RHS			
1	Nettilingam tree	80	13.6.2.1
2	Fruit yielding tree	13	
3	Flowering tree	14	
4	Ornamental tree	14	
5	Moderate crown species	14	
6	Broader crown species	180	
7	Iron tree fence	315	
2. Primary School, Ariyar, KM 5+200, LHS			
1	Nettilingam tree	8	13.6.2.2
2	Fruit yielding tree	3	
3	Flowering tree	4	
4	Ornamental tree	4	
5	Moderate crown species	4	
6	Broader crown species	0	
7	Iron tree fence	23	
3. Telephone Exchange, BSNL, Laddivadi, KM 13+300, LHS			
1	Nettilingam tree	20	13.6.2.3
2	Fruit yielding tree	3	
3	Flowering tree	3	
4	Ornamental tree	3	
5	Moderate crown species	4	
6	Broader crown species	0	
7	Iron tree fence	33	
4. Thru.N.S. Arumuga Udaiyan, Govt. HSS, KM 9+900, RHS			
1	Nettilingam tree	50	13.6.2.4
2	Fruit yielding tree	6	
3	Flowering tree	6	
4	Ornamental tree	7	
5	Moderate crown species	6	
6	Broader crown species	38	
7	Iron tree fence	113	

4.5 TREE PLANTATION LOCATIONS IDENITIED IN THE CULTURAL PROPERTY PREMISE ALONG THE PROJECT AREA

Land available for plantation in cultural property location such as religious places etc is identified for tree plantation. The chainage wise location and number of trees is presented in Table 3. A total of 186 plants will be planted in these identified premises.

Table 3. Chainage Wise Cultural Property Lands Proposed for Compensatory Plantation along the project area.

S. NO.	DESCRIPTION	QUANTITY	BOQ ITEM NO.
1. Kanoppanna Swami Kovil, Kuthangalmedu, KM 2+900, LHS			
1	Nettilingam tree	34	13.6.1.1
2	Fruit yielding tree	0	
3	Flowering tree	0	
4	Ornamental tree	0	
5	Moderate crown species	0	
6	Broader crown species	0	
7	Iron tree fence	34	
8	Sitting Benches	2	
2. Arasaiyamman Kovil,Neikasanpath, KM 6+900, RHS			
1	Nettilingam tree	35	13.6.1.2
2	Fruit yielding tree	2	
3	Flowering tree	4	
4	Ornamental tree	2	
5	Moderate crown species	2	
6	Broader crown species	6	
7	Iron tree fence	51	
8	Sitting Benches	2	
3. Madhusaiveesan Kovil, Nallai Koundan pundar, KM 12+700, LHS			
1	Nettilingam tree	13	13.6.1.3
2	Fruit yielding tree	0	
3	Flowering tree	0	
4	Ornamental tree	0	
5	Moderate crown species	0	
6	Broader crown species	0	
7	Iron tree fence	13	
4. Sree Mariysmmsn Kovil – Kongalathur, Anyapuram, KM10+800, RHS			
1	Nettilingam tree	18	13.6.1.4
2	Fruit yielding tree	10	
3	Flowering tree	50	
4	Ornamental tree	10	
5	Moderate crown species	0	
6	Broader crown species	0	
7	Iron tree fence	88	
8	Landscaping	1800	
9	Sitting Benches	4	

4.6 THE IDENTIFIED ADDITIONAL TREE PLANTING AREAS ALONG PROJECT INFLUENCE AREA.

Puramboke land: As the number of trees to be planted in the compensatory plantation adhering to Honourable Madras High court's orders is worked out to be 8580. The available land along the road, in government and cultural property premise is sufficient for compensatory plantation.. The excess trees from other corridors can be planted in the additional land available in corridor 5 The Puramboke lands along the project area can be identified for compensatory plantation after the construction is complete. In this area more trees can be planted. It is estimated that considerable area will be available along the road. Though, it will be available only in patches. The EO will be responsible for this work. This cannot be identified at this juncture because of the non-availability of legal Right of Way and the Contractors final choice of

alignment based on the practical difficulties in running the equipment and machineries.

4.5 SELECTION OF TREE SPECIES FOR PLANTING

Selection of species for plantation is a complex and sometimes contentious .The avenue trees are generally categorised into fruit bearing, shade giving, and flowering trees. Each of them has their own advantage and disadvantage. The most suitable tree species are the native species which are traditionally adapted to the regions climatic conditions and can survive well in the region. These plants may not be aesthetically pleasing but are integrated in the local customs, tradition and ecology of the region. Neem, and Tamrind are good examples. It is not a coincidence that a large number or trees listed in the tree inventory in the current corridor are these two trees. One major drawback of planting native verities is their slow growth. The more appealing exotics grow fast and survive adverse weathers but their utility to the local community and fauna are limited. Eucalyptus and Acacia grow quickly but they are of least use to the community as well as local biodiversity, more over they are a threat during cyclones.

Planting fruit bearing trees are also not recommended as it may lead to unnecessary problem by the fruit harvesters and general public for the road traffic. Flower bearing and shade giving trees are ideal as they are aesthetically pleasing as well as help moderate the microclimate. The two species of Banyan trees i.e. the *Ficus religosa* and *Ficus bengalansis* are generally not recommended due to its irregular uncontrolled growth and also because of its religious association. Actually religious association is an environmental friendly positive aspect against tree cutting this aspect can be problem over a period of time if the road authority wanted to widen the road. Table 4.0 lists common trees recommended for plantation along the sides of the roads. The recommended species are mostly same as that of those occurring naturally in the region.

Table 4.0. List of Indigenous Trees Spices Suggested for Avenue Plantation

SL NO.	VERNACULAR NAME	BOTANICAL NAME	COMMON NAME
1	Konda vagei/ Selaunjal/ Velvagai	*Albizzia procera*	Safed Siris
2	Arappu thool	*Albizzia amara*	Cylone Siris
3	Mandari / Kalavilaichi	*Ambertia nobilis*	Tree of Heaven / Pride of Burma
4	Milachityan / Thondi	*Bischofia javanica*	Paniala / Pankain
5	Vaalulavai	*Colvelia recemosa*	Kilbili
6	Thothakathi	*Dalbergia latifolia*	Black shisham / Rosewood
7	Mayarum/ Mayirkonrai	*Delonx regia*	Gulmohar
8	Mamaram/ Manga	*Mengifera india*	Desi mango
9	Chambugam/Sempangan/Chembuga	*Michelia champaka*	Swarnachampa
10	Iyalvagi/ Iya vakai	*Peltophorum pherugenium*	Fellow Gulmohar
11	Nettilinkam/ Vansulam	*Polyalthia longifolia*	Ashok
12	Nungu	*Palms*	Palm
13	Asogam	*Saraca india*	Sita Ashok
14	Anukkam/ Asam/ Chandanam	*Santalum album*	White sandal
15	Veembu	*Azadirachta indica*	Neem
16	Amilam/ Puli	*Tamrindus India*	Imli

5. PLANTATION SPECIFICATIONS

Compensatory tree plantation is the responsibility of the contractor. He may outsource the entire procedure or raise nurseries and undertake plantation. It is suggested the contractor make arrangements for raising or locating nurseries closer to plantation site. There by ensuring supply of healthy and acclimatised seedlings on time. This will also help reduce the transportation time and associated shock to the plants.

5.1 NURSERY OPERATION

This includes the following operations. Preparation of nursery site by clearing and levelling the site for forming ten standard beds of 10m x 1m size, Formation of trenches of size 10m length 1m width and 0.30m/0.45m depth; burying mud pots in trenches and filling sand to a thickness of 0.75cm as bottom and top layers and between the pots, Watering the germination beds twice daily with rose can, Preparation of Soil Mixture (fertile earth & FYM) for Polythene container size of 35x50cm; Forming temporary shade pandals 10mx1m including collection of grasses; Watering the container plants (35x50 cm) twice daily with rose can; Flood watering in sunken beds of 10x1 m, Shifting the container plants, weeding, grading and replacement of casualties in the bags. The total number of plants should be raised in nursery is 8190 plants.

5.2 SEEDLING (IF PROCURED),

One meter tall seedlings should be used for avenue planting. It is suggested that one-and half year-old nursery seedlings raised in poly bags be used for the purpose. The total number of seedlings required for raising plants is 8190.

5.3 TRANSPORTATION , SITE PREPARATION AND PLANTING

The planting procedure includes Aligning and marking or stacking excluding costs of stacks; Digging 60 cm3 pits for avenue plantation, Loading and unloading Poly-bag container plants in private/Department vehicles up to a lead a 2 km; Transporting of Polythene container seedling by head loads in the places where approach roads are not available (1km); Distribution of polythene container seedlings from where seedlings are stacked to the planting spot, Planting the container plants by refilling pits of size 60 m; Scrap weeding for 1 m dia and soil working 15 cm depth around each plant and removing the grass roots away from the site or upturning the soil; Forming Semi circular bunds to the plants in the hillocks by collecting stones and earth from the area, forming revetment on the lower side of the stone and earth hyped and giving an inward slope; Forming catch water drains for each plant of 90x45x30 cm size; Removing / Scrapping vizal monsoon or bothai grass for one meter dia. around the plants. Total 8190 samplings should be transported, site prepared and planted in the project vicinity.

5.4 FENCING

Proper fencing should be provided for ensuring protection of plants from cattle and miscreants. Two types of fencing are proposed. Iron tree fence for all the trees planted in the government cultural property premises and tar drum fence for rest of the avenue trees. Fencing arrangements should be made for total 8190 trees.

5.5 MAINTENANCE FOR FIVE YEARS

The operations involve replacing the causalities, weeding as and when required, application of bio fertilizer and bio pesticides, repair of tree guards, watch and ward and other plant protection measures. 8190 trees should be maintained for five years.

5.6 FRUIT BEARING PLANTS

Fruit bearing plants are not recommended for planting as planting such trees result in social and traffic problems involvement in protecting them. If planted, local people will have full access to the use of fruits from these plants. However, some of the fruit trees like *Syzygium cuminii* and *Phylanthus emblica* which are medicinal in nature can be planted without such issues and some others like *Artocarpus heterophyllus* which provide valuable timber along with fruits are not suitable

for planting along road side.

6. TRANSPLANTING OF TREES WITH STEM GIRTH ABOVE 10CM BUT LESS THAN 30CM GBH

Transplanting is the process of bodily lifting of mature and large plants from their position to a new location. Those plants that have a stem girth above 10cm but less than 30cm were identified for transplantation. A total of 175 plants that can be transplanted are found within the formation width of the proposed widening scheme. These plants with greater than 10cm stem girth are to be transplanted using tree relocation machinery. The list of trees along with their chainage locations are presented in the below table

Table 5.0. Chaninge wise list of Trees for Transplantation

SL. NO	TREE NUMBER	CHAINAGE (KM)	COMMON NAME	VERNACULAR NAME	SCIENTIFIC NAME	GBH (CM)	HEIGHT (M)	DISTANCE FROM ECL (M)	REMARKS
LHS									
1	5	15+770	Neem	Vembu	Azadirachta indica	22	4	7.1	
2	6	15+075	Neem	Vembu	Azadirachta indica	23	5	7.1	
3	9	15+800	Singapore Cherry	Cherry maram	Muntingia calabura	17	3	8.7	
4	12	15+840	Pongamia	Pungai	Pongamia pinnata	23	4	8.7	
5	13	15+860	Pongamia	Pungai	Pongamia pinnata	12	3	8.5	
6	36	0+780	Neem	Vembu	Azadirachta indica	13	3	6.8	
7	42	1+025	Neem	Vembu	Azadirachta indica	23	4	8.9	Settlement Area
8	68	1+460	Golden shower tree	Konnai	Cassia fistula	25	4	9.6	Settlement Area
9	80	2+500	Neem	Vembu	Azadirachta indica	25	4	6.2	
10	81	2+505	Neem	Vembu	Azadirachta indica	27	4	6.2	
11	84	2+650	Neem	Vembu	Azadirachta indica	14	3	6.7	
12	85	2+675	Mahuva	Iluppei Maram	Madhuca longifolia	22	4	7.4	
13	86	2+685	Dyers's oleander	Palamaram	Wrightia tinctoria	16	3	7.8	
14	103	2+825	Dyers's oleander	Palamaram	Wrightia tinctoria	23	2	6.7	
15	107	2+850	Rain Tree	Mazhai-maram	Samanea saman	20	5	6.1	
16	108	2+850	Rain Tree	Mazhai-maram	Samanea saman	15	3	8.5	
17	133	5+030	Pongamia	Pungai	Pongamia pinnata	12	2	6.4	
18	134	5+030	Pongamia	Pungai	Pongamia pinnata	12	2	6.3	
19	157	5+710	Neem	Vembu	Azadirachta indica	25	3	8.2	
20	184	6+650	Neem	Vembu	Azadirachta indica	22	4	6.75	
21	186	6+655	Neem	Vembu	Azadirachta indica	20	5	8.3	
22	192	6+670	Dyers's oleander	Palamaram	Wrightia tinctoria	16	5	8.3	Realignment
23	193	6+670	Neem	Vembu	Azadirachta indica	12	3	8.34	Realignment
24	194	6+680	Neem	Vembu	*Azadirachta indica*	16	5	8.3	Realignment
25	197	6+710	Neem	Vembu	*Azadirachta indica*	12	5	8.7	Realignment
26	201	6+720	Neem	Vembu	*Azadirachta indica*	28	5	8.7	Realignment
27	202	6+720	Neem	Vembu	*Azadirachta indica*	27	5	8.7	Realignment
28	203	6+720	Neem	Vembu	*Azadirachta indica*	28	5	8.7	Realignment
29	204	6+720	Ber	llanthei	*Zizyphus jujube*	28	5	8.7	Realignment
30	205	6+730	Neem	Vembu	*Azadirachta indica*	29	5	7.2	Realignment
31	206	6+730	Neem	Vembu	*Azadirachta indica*	20	5	7	Realignment
32	211	6+980	Neem	Vembu	*Azadirachta indica*	18	3	6.25	
33	227	7+595	Rain Tree	Mazhai-maram	*Samanea saman*	26	4	9.3	
34	229	7+600	Neem	Vembu	*Azadirachta indica*	16	4	9.5	
35	230	7+600	Neem	Vembu	*Azadirachta indica*	18	5	7.7	

SL. NO	TREE NUMBER	CHAINAGE (KM)	COMMON NAME	VERNACULAR NAME	SCIENTIFIC NAME	GBH (CM)	HEIGHT (M)	DISTANCE FROM ECL (M)	REMARKS
36	231	7+610	White barked Acacia	velvelam	*Acacia leucophloea*	28	4	7.7	
37	233	7+610	Neem	Vembu	*Azadirachta indica*	12	2	9.5	
38	250	7+940	Indian Mulberry	Nona maram	*Morinda citrifolia*	28	3	7.7	
39	251	7+940	Indian Mulberry	Nona maram	*Morinda citrifolia*	15	3	7.7	
40	253	7+950	Neem	Vembu	*Azadirachta indica*	18	4	9.4	
41	256	7+990	Indian Mulberry	Nona maram	*Morinda citrifolia*	18	5	9.3	
42	258	8+000	Neem	Vembu	*Azadirachta indica*	20	3	10.2	
43	259	8+000	Ber	llanthei	*Zizyphus jujube*	15	3	10.2	
44	270	8+090	Neem	Vembu	*Azadirachta indica*	21	6	7	
45	271	8+100	Neem	Vembu	*Azadirachta indica*	25	4	6.3	
46	272	8+100	Neem	Vembu	*Azadirachta indica*	26	4	6.3	
47	296	8+910	Indian Mulberry	Nona maram	*Morinda citrifolia*	20	3	8.2	
48	303	8+970	Indian Mulberry	Nona maram	*Morinda citrifolia*	12	4	7.5	
49	320	9+225	Indian Mulberry	Nona maram	*Morinda citrifolia*	20	3	11.2	
50	321	9+230	Indian Mulberry	Nona maram	*Morinda citrifolia*	18	3	9.8	
51	322	9+230	Neem	Vembu	*Azadirachta indica*	18	3	6.8	
52	335	9+440	Neem	Vembu	*Azadirachta indica*	27	4	7.5	
53	336	9+440	Indian Mulberry	Nona maram	*Morinda citrifolia*	18	3	8.7	
54	337	9+445	Indian Mulberry	Nona maram	*Morinda citrifolia*	16	3	8.6	
55	348	9+510	Neem	Vembu	*Azadirachta indica*	18	3	7.1	
56	350	9+528	Neem	Vembu	*Azadirachta indica*	12	3	6.9	
57	351	9+530	Neem	Vembu	*Azadirachta indica*	13	3	6.9	
58	355	9+555	Indian Mulberry	Nona maram	*Morinda citrifolia*	12	3	8.2	
59	391	10+060	Indian Elm	Aya maram	*Holoptelea integrifolia*	18	6	7.3	
60	399	10+135	Indian Mulberry	Nona maram	*Morinda citrifolia*	20	5	8.3	
61	400	10+140	Neem	Vembu	*Azadirachta indica*	20	5	8.4	
62	401	10+145	Neem	Vembu	*Azadirachta indica*	25	5	8.4	
63	402	10+150	Neem	Vembu	*Azadirachta indica*	16	5	8.5	
64	409	10+350	Indian Mulberry	Nona maram	*Morinda citrifolia*	25	5	7	
65	412	10+380	Black Wattle	Oonzi	*Acacia mearnsii*	18	5	8.2	
66	413	10+395	Ber	llanthei	*Zizyphus jujube*	12	2	7.7	
67	415	10+495	Black Wattle	Oonzi	*Acacia mearnsii*	15	3	6.9	
68	416	10+495	Neem	Vembu	*Azadirachta indica*	15	3	6.9	
69	417	10+500	Neem	Vembu	*Azadirachta indica*	20	3	7	
70	420	10+760	Neem	Vembu	*Azadirachta indica*	10	5	7.6	
71	421	10+760	Neem	Vembu	*Azadirachta indica*	15	5	7.6	
72	422	10+760	Neem	Vembu	*Azadirachta indica*	10	5	7.6	
73	423	10+760	Indian Mulberry	Nona maram	*Morinda citrifolia*	20	5	7.6	

Sl. No	Tree Number	Chainage (km)	Common Name	Vernacular Name	Scientific Name	GBH (cm)	Height (m)	Distance from ECL (m)	Remarks
74	440	11+200	Neem	Vembu	*Azadirachta indica*	16	4	6.9	
75	441	11+210	Neem	Vembu	*Azadirachta indica*	12	2	7	
76	458	11+410	Black Wattle	Oonzi	*Acacia mearnsii*	20	4	7.1	
77	488	12+350	Tamrind	Puli	*Tamarindus indica*	19	2	9	
78	507	12+840	Neem	Vembu	*Azadirachta indica*	11	2	6.7	
79	509	12+930	wild almond tree	Pee maram	*Sterculia foetida*	10	3	10	
80	510	12+930	Neem	Vembu	*Azadirachta indica*	10	3	10	
RHS									
81		15+795	Neem	Vembu	*Azadirachta indica*	23	2	10	
82		15+795	Neem	Vembu	*Azadirachta indica*	20	2	10.5	
83		15+890	Pongamia	Pungai	*Pongamia pinnata*	10	2	10.2	
84		15+925	Pongamia	Pungai	*Pongamia pinnata*	15	1	10	
85		15+925	Pongamia	Pungai	*Pongamia pinnata*	15	1	10	
86		15+930	Pongamia	Pungai	*Pongamia pinnata*	20	1	10	
87		1+100	Copper pod	Perunkonrai	*Peltophorum pterocarpum*	25	3	14.6	
88		1+200	Other	Other	*Other*	10	3	8.7	
89		1+325	Pongamia	Pungai	*Pongamia pinnata*	26	3	7.4	
90		1+360	Neem	Vembu	*Azadirachta indica*	18	3	9.5	
91		1+670	Neem	Vembu	*Azadirachta indica*	14	2	11.2	
92		1+870	Drumstick Tree	Murungai	*Moringa oleifera*	25	3	6.7	
93		1+920	Singapore Cherry	Cherry maram	*Muntingia calabura*	10	1	6.2	
94		1+998	Dyers's oleander	Palamaram	*Wrightia tinctoria*	20	2	11	
95		2+080	Mahuva	Iluppei Maram	*Madhuca longifolia*	24	2	7.4	Realignment
96		2+080	Seema vathanamaram	Seema vathanamaram	*Seema vathanamaram*	13	4	13.1	Realignment
97		2+100	Tamarind	Puli	*Tamarindus indica*	22	2	7.5	Realignment
98		2+150	Neem	Vembu	*Azadirachta indica*	10	2	8.3	Realignment
99		2+150	Neem	Vembu	*Azadirachta indica*	10	2	7.4	Realignment
100		2+150	Neem	Vembu	*Azadirachta indica*	10	2	7.4	Realignment
101		2+155	Agri Tree	Agri Tree	*Agri Tree*	28	3	6.4	Realignment
102		2+350	Neem	Vembu	*Azadirachta indica*	18	2	7.1	Realignment
103		2+990	Palm	Panei	*Borassus flabellifer*	20	1	7.3	
104		2+990	Palm	Panei	*Borassus flabellifer*	20	1	7.3	
105		2+995	Palm	Panei	*Borassus flabellifer*	10	1	6	
106		3+000	Palm	Panei	*Borassus flabellifer*	10	1	5.3	
107		3+000	Palm	Panei	*Borassus flabellifer*	10	1	5	
108		3+000	Palm	Panei	*Borassus flabellifer*	10	1	5	
109		3+000	Palm	Panei	*Borassus flabellifer*	18	1	5.3	
110		3+000	Palm	Panei	*Borassus flabellifer*	10	1	5.3	

Sl. No	Tree Number	Chainage (km)	Common Name	Vernacular Name	Scientific Name	GBH (cm)	Height (m)	Distance from ECL (m)	Remarks
111		3+000	Palm	Panei	*Borassus flabellifer*	10	2	5.3	
112		3+000	Palm	Panei	*Borassus flabellifer*	10	1	5.3	
113		3+000	Palm	Panei	*Borassus flabellifer*	10	1	5.3	
114		4+120	White Gulmohar	Vadana	*Delonix elata*	24	5	5.92	
115		4+150	Pongamia	Pungai	*Pongamia pinnata*	15	3	6.47	
116		4+160	Pongamia	Pungai	*Pongamia pinnata*	14	3	6.47	
117		4+160	Palm	Panei	*Borassus flabellifer*	10	1	6	
118		4+970	Palm	Panei	*Borassus flabellifer*	10	1	5	
119		5+005	Pongamia	Pungai	*Pongamia pinnata*	27	3	7.7	
120		5+005	Pongamia	Pungai	*Pongamia pinnata*	29	3	7.7	
121		5+020	Pongamia	Pungai	*Pongamia pinnata*	20	2	8.4	
122		5+025	Dyers's oleander	Palamaram	*Wrightia tinctoria*	14	2	8.4	
123		5+050	Pongamia	Pungai	*Pongamia pinnata*	13	2	8.8	
124		5+420	Neem	Vembu	*Azadirachta indica*	28	3	6.45	
125		5+790	Palm	Panei	*Borassus flabellifer*	10	1	7.55	
126		5+860	Neem	Vembu	*Azadirachta indica*	27	4	6.7	
127		5+950	Neem	Vembu	*Azadirachta indica*	17	3	7.7	
128		6+040	Neem	Vembu	*Azadirachta indica*	17	2	8.5	
129		6+043	Palm	Panei	*Borassus flabellifer*	10	1	7	
130		6+765	Neem	Vembu	*Azadirachta indica*	10	2	5	Realignment
131		6+786	Neem	Vembu	*Azadirachta indica*	23	2	7.51	Realignment
132		6+820	Neem	Vembu	*Azadirachta indica*	16	3	7.8	Realignment
133		8+660	Neem	Vembu	*Azadirachta indica*	19	3	7.7	
134		8+660	Pongamia	Pungai	*Pongamia pinnata*	24	3	7.3	
135		8+660	Pongamia	Pungai	*Pongamia pinnata*	18	3	7.3	
136		9+155	Neem	Vembu	*Azadirachta indica*	23	3	9.37	
137		9+160	Neem	Vembu	*Azadirachta indica*	22	5	9.3	
138		9+160	Neem	Vembu	*Azadirachta indica*	20	4	9	
139		9+185	Indian Mulberry	Nona maram	*Morinda citrifolia*	21	3	7.3	
140		9+400	Pongamia	Pungai	*Pongamia pinnata*	15	2	7.5	
141		10+075	neem	Vembu	*Azadirachta indica*	20	3	7.1	
142		10+100	Indian Mulberry	Nona maram	*Morinda citrifolia*	18	2	6.9	
143		10+100	neem	Vembu	*Azadirachta indica*	19	2	6.9	
144		10+100	neem	Vembu	*Azadirachta indica*	19	2	6.9	
145		10+110	neem	Vembu	*Azadirachta indica*	25	2	7	
146		10+228	White Gulmohar	Vadana	*Delonix elata*	20	2	7.2	
147		10+400	neem	Vembu	*Azadirachta indica*	17	3	7.6	
148		10+400	Copper pod	Perunkonrai	*Peltophorum pterocarpum*	22	4	7.6	

SL. NO	TREE NUMBER	CHAINAGE (KM)	COMMON NAME	VERNACULAR NAME	SCIENTIFIC NAME	GBH (CM)	HEIGHT (M)	DISTANCE FROM ECL (M)	REMARKS
149		10+400	Copper pod	Perunkonrai	*Peltophorum pterocarpum*	18	4	7.6	
150		10+410	Copper pod	Perunkonrai	*Peltophorum pterocarpum*	10	2	7	
151		10+450	Dyers's oleander	Palamaram	*Wrightia tinctoria*	22	3	8.5	
152		10+500	neem	Vembu	*Azadirachta indica*	16	2	7	
153		10+500	neem	Vembu	*Azadirachta indica*	14	2	7	
154		10+530	neem	Vembu	*Azadirachta indica*	14	3	6	
155		10+590	neem	Vembu	*Azadirachta indica*	13	3	6.8	
156		10+595	neem	Vembu	*Azadirachta indica*	20	2	7	
157		10+595	neem	Vembu	*Azadirachta indica*	18	2	7	
158		10+605	neem	Vembu	*Azadirachta indica*	20	2	6.9	
159		11+140	Custard Apple	Seetha pazham	*Annona squamosa*	15	2	6.2	
160		11+180	neem	Vembu	*Azadirachta indica*	25	1	5.8	
161		11+290	neem	Vembu	*Azadirachta indica*	10	2	5.8	
162		11+290	neem	Vembu	*Azadirachta indica*	10	2	5.8	
163		11+600	neem	Vembu	*Azadirachta indica*	28	3	7.5	
164		11+820	Black Wattle	Oonzi	*Acacia mearnsii*	22	4	8.6	
165		11+850	neem	Vembu	*Azadirachta indica*	25	5	13	
166		12+010	Indian Elm	Aya maram	*Holoptelea integrifolia*	22	2	9.7	
167		12+090	Gulmohar	Vadanaranyana	*Delonix regia*	20	2	7.3	
168		12+090	Gulmohar	Vadanaranyana	*Delonix regia*	10	2	7.3	
169		12+180	Indian Elm	Aya maram	*Holoptelea integrifolia*	10	2	8.2	
170		12+730	Pongamia	Pungai	*Pongamia pinnata*	25	4	5.1	
171		13+000	Dyers's oleander	Palamaram	*Wrightia tinctoria*	20	1	6.2	
172		13+000	Black Wattle	Oonzi	*Acacia mearnsii*	25	3	7.5	
173		13+005	Dyers's oleander	Palamaram	*Wrightia tinctoria*	25	2	6.5	
174		13+040	Dyers's oleander	Palamaram	*Wrightia tinctoria*	18	2	6.2	
175		13+210	neem	Vembu	*Azadirachta indica*	25	3	7.2	

7. MONITORING FORMATS

Monitoring of both planted and transplanted plants may be done on a monthly basis using the format given in Table 5.0.

Table 6.0. MONITORING FORMAT

LOCATION	N	NO. OF PLANTS PLANTED	NO. OF PLANTS SURVIVING AND PERCENTAGE	AVERAGE HEIGHT	REMARK ON GENERAL HEALTH OF PLANTS

8. BIO MANURE

Bio manures like compost, neem cake, Azatobactor are recommended instead of chemical fertilizers to make the scheme more eco-friendly. About 10 gm Azatobactor together with 250 gram of neem cake or compost shall be used at the time of planting and for five years maintenance period. Neem cake will also function as bio pesticide. Compost can be made from green leaves, coconut husk or urban waste materials. Care should be taken while using urban waste for composting. The compost should be screened for heavy metal contamination. Normally the tree species suggested do not suffer from attack of pests and application of neem cake can be very effective prophylactic treatment.

9. MULCHING AND PRUNING

Mulching at the end of monsoon shall be done with coconut husk, grass or green leaves after under taking a soil working around the plant in order to conserve moisture. Frequent watering of trees shall also be carried out to protect them from severe summer. Pruning of branches during maintenance period shall be carried out to ensure proper stem formation and to ensure that the branches will not obstruct the traffic on the road.

10. PAYMENT SCHEDULE

The major portion of the expenditure is at the pre planting and planting stages. Plantation will be carried out by the project contractor with first year maintenance and cost for the same is considered in BOQ. Second and third year maintenance will be carried out by contractor appointed by TNRSP.

11. NOISE BARRIER

Although dissipation of complete noise is expensive and difficult to implement, some cost effective methods can be employed to reduce the noise level considerably. In order to create a healthy noise barrier the following considerations would help.

The species selection should be very careful. The selected species should have small but presence of innumerable green leaves each small leaf acting as noise attenuator. The space available between the school or silence zone and the road corridor could be the deciding factor.

The number of rows required creates an effective noise shield for the given circumstances. This

actually depend on the space available between the road corridor and the building

The design provided is an ideal situation especially with regard to the location of school gate, assembly area, and tree planting area (one rows of trees completely sealing the entry of direct noise).

The school activity area (ground for daily assembly, prayer meetings etc) should be planned away from the main high traffic road. This is applicable as guideline to new schools.

The School gate should be away from the main traffic road. If the situation does not permit the gate should be in any corner in such a way that the noise effect from the main road is minimum.

The planting within the ROW is not shown in the design layout. If situation permits this will add to the noise barrier and in fact effect increase to many fold because of noise first striking the trees (ROW) and Wall) and then before sound waves reach the tree barrier it has to pass through an open air area. The noise effect will be like that shown in the design from the road towards the building.

The species recommended for the tree planting is *Saraca asoca* (Asoka tree). However depending on the situation any trees with numerous relatively small leaves will be ideal.

The detailed design for the noise barrier is provided in the design drawings. Refer Annexure no 3.59.

12. ROAD SPECIFIC ACTION PLAN FOR TREE PLANTING

12.1 TREE PLANTING AWARENESS CAMPAIGN

An Environmental Monitoring Unit (EMU) under the Project Management Team (PIU) will take up this activity coordinating with local Engineers of each affected district for Panchayat level awareness meetings. The Environmental Officer will be solely responsible for the various activities. The EO needs to identify and invite the local people to participate in the programme.

The parties to be invited include

1) Representatives of parents, Students and teachers of the Schools and other educational institutions bordering the Project road
2) Forest officials
3) Project Management Team (PIU) members
4) PWD local Staff
5) NGOs in the region as listed in the Project documents. If the local NGOs are not suited, the EO can select the most appropriate NGOs as the credibility of all NGOs can only be evaluated by their past activities.
6) Private Nursery owners
7) Panchayat representatives

Frequency of meetings There should be at least four meetings at local Panchayat levels per year to evaluate the programme after planting of the trees. The meeting shall be attended by representative of school children's and teachers at all levels of education in addition to Panchayat Authorities. The PIU should organize mass media contact programmes in the local language.

Sources of Funding Tree plantation cost is already included in the contractor cost which is part

of bid document, which also includes the planting for noise barriers. Contractor will carry out planting trees along the corridor as and when the road construction is complete. This way, survival rate of trees can be ensured. The rest of the funds has to be raised locally. The panchayat authorities can provide local funding for organizing these meetings and action plans. The project provision for noise barriers also provides funding for schools and hospitals.

13. CONCLUSION & POLICY RECOMMENDATIONS

13.1 CONCLUSIONS

The project is committed to plant a minimum of 8820 trees as against the removal of 886 trees in the priority corridor 5. Apart from the design alteration to save trees where ever possible efforts will also be made to relocate 292 trees from within the formation width to safer locations. Ultimately, its contractors responsibility to plant the trees and maintain it for 5 years defect liability period. Contractor should ensure the survival rate of this plantation.

13.2 RECOMMENDATIONS

After the construction of the road, there should be a determined effort to persuade the landowners on both sides to plant shade trees along safe sections and to discourage at unsafe sections. This activity shall be at micro level i.e. at the Panchayat or village level with people's involvement. The household should know why these activities are required. Efforts should be made to involve local schools, hospitals, Panchayat Municipal and Police authorities towards this. The strategy discussed is a general approach, depending upon the local situation; there can be variations.

Tree planting however should be considered in all 'Puramboke land' outside the required corridor so as not to interfere with the smooth and safe flow of traffic.

In case of Tamil Nadu Road Sector Project (TNRSP) the main areas for tree planting are the so as the Puramboke land. This land will be mostly utilized during the proposed improvement works. The plantation sites shall be leased to NGOs preferably woman NGOs or to families in the immediate vicinity. This can be an income generating activity for BPL[5] families.

Where ever tree relocation is needed the contractor should ensure that the transplantations are done as close as possible to the original habitat of the plant. The transplantation should be preferable in the nearest available RoW or Puramboke land.

PIU will have to develop a monitoring mechanism for the lands during operational stage. Monitoring is essential as it helps in identifying the progress, decision making and also in taking corrective steps. PIU should consider the employment of local people for planting.

ANNEXURE 3. 57. AUTO-JEEP-TAXI STANDS – EXISTING AND PROPOSED

No Auto-Jeep-Taxi stands are proposed in the corridor.

ANNEXURE 3. 58. LISTED NGOs IN THE REGION

S.No	Name	Registration	Contact Person	Address	Activity
NAMAKKAL DISTRICT					
1	WOMENS ORGANISATION IN RURAL DEVELOPMENT	41/1988(30-08-1988)	Mrs M Renida Sarala	186/1, Kavin Harsha Complex, Nethaji Nagar II Street, Trichy Road	Agriculture, Children, Education & Literacy, Health & Family Welfare, HIV/AIDS, Human Rights, Legal Awareness & Aid, Micro Finance (SHGs), Nutrition, Rural Development & Poverty Alleviation, Vocational Training, Women's Development & Empowerment, Youth Affairs
2	TAMILNADU TECHNICAL EDUCATIONAL TRUST	169/1996 (11-06-1996)	Muthukumar p	Mig-95, housing unit anna nagar Kadachanalur (po) Namakkal dist	Agriculture, Children, Education & Literacy, Food Processing, Health & Family Welfare, Labour & Employment, Rural Development & Poverty Alleviation, Vocational Training, Women's Development & Empowerment, Youth Affairs
3	SHERDP	217/1996 (30-10-1996)	R Muniyandi	Society for Health Environmental and Rural Development Project (SHERDP), 5-B, VELUR MAIN ROAD, Paramathi Post, Paramathi Velur Taluk, Namakkal District, Tamil Nadu, South India	Agriculture, Children, Drinking Water, Education & Literacy, Environment & Forests, Health & Family Welfare, HIV/AIDS, Human Rights, Legal Awareness & Aid, Micro Finance (SHGs), Nutrition, Panchayati Raj, Rural Development & Poverty Alleviation, Tribal Affairs, Vocational Training, Water Resources, Women's Development & Empowerment, Youth Affairs
4	WOMENS ORGANIZATION FOR RURAL DEVELOPMENT	39/1991(16-05-1991)	R Sivakamavalli	WOMEN'S ORGANISATION FOR RURAL DEVELOPMENT (WORD) P.O.Box.No.1 50/102-C, Big Bazaar St., Pandamangalam Post, Paramathi Velur Taluk, Namakkal District, Tamil Nadu, South India. PIN: 637 208	Aged/Elderly, Agriculture, Children, Civic Issues, Dalit Upliftment, Drinking Water, Education & Literacy, Environment & Forests, Health & Family Welfare, HIV/AIDS, Legal Awareness & Aid, Land Resources, Micro Finance (SHGs), New & Renewable Energy, Nutrition, Panchayati Raj, Rural Development & Poverty Alleviation, Tribal Affairs, Vocational Training, Water Resources, Women's Development & Empowerment
5	LEADERSHIP THROUGH EDUCATION AND ACTION FOUNDATION	85/2004(08-10-2004)	Sathiya Nesan S L	10/134, Trichy Main Road, Periya veppanatham Village, Vasanthapuram Post, Namakkal District, Tamil Nadu. Pin-637001	Agriculture, Children, Disaster Management, Education & Literacy, Health & Family Welfare, Micro Finance (SHGs), Rural Development & Poverty Alleviation
6	ALL INDIA DR AMBETHKAR TRUST	34/94(16-09-1994)	Smt Sellam Masilamani	All india dr.ambethkar trust, ho.94.Dr.Ambedkar nagar,	Rural Development & Poverty Alleviation

S.No	Name	Registration	Contact Person	Address	Activity
				erumapatty.po. Namakkal.tkl&dt, Tamil Nadu, India, pin.637013.	
7	HEALDS	Old: 140/96, New: 66/2006(26-11-1996)	Satish Babu	HEALDS Opposite to sugar Mills Mohanur - 637015 Namakkal District. Tamilnadu	Agriculture, Children, Dalit Upliftment, Education & Literacy, HIV/AIDS, Human Rights, Information & Communication Technology, Micro Finance (SHGs), Micro Small & Medium Enterprises, Panchayati Raj, Vocational Training, Women's Development & Empowerment
8	SOCIO ECONOMIC EDUCATIONAL DEVELOPMENT ORGANISATIO	1430(14-07-2004)	Prabhakaran	V.p.prabhakaran managing trustee seedo p.Pudupatti Kovilangulam post Usilampatti taluk Madurai district 625514	Agriculture, Children, Dalit Upliftment, Education & Literacy, Environment & Forests, Health & Family Welfare, Rural Development & Poverty Alleviation, Vocational Training
9	GEO RESOURCE CENTRE	84-2003(21-04-2003)	Dr D Dhanapal	Geo Resource Centre Dr.D.Dhanapal 3 Arasamara Street, Gandhi Nagar, Mohanur Road, NAMAKKAL 637001. Tamil Nadu	Animal Husbandry, Dairying & Fisheries, Agriculture, Biotechnology, Children, Differently Abled, Disaster Management, Dalit Upliftment, Drinking Water, Education & Literacy, Environment & Forests, Food Processing, Health & Family Welfare, HIV/AIDS, Human Rights, Information & Communication Technology, Land Resources, Micro Finance (SHGs), New & Renewable Energy, Nutrition, Panchayati Raj, Rural Development & Poverty Alleviation, Tribal Affairs, Water Resources, Youth Affairs, Any Other

ANNEXURE 3. 59. ENVIRONMENTAL ENHANCEMENT DRAWINGS

The Environmental enhancement drawings attached as per table 1 present site specific conceptual drawings for enhancement measures proposed at cultural properties and government premises. Typical design drawings have also been prepared for specific cases for soak pits at hand pumps/wells, rainwater harvesting pits and bus lay bye and bus shelters. These drawings clearly provide concept for the preparation of other design drawings. The PIU and Environmental Management Unit (EMU) should review the improvement plans, case-to-case based on the Local, Regional and State interests. These drawings also include the concept of Typical Noise barriers developed by the project for consideration at the identified Silence zones. The details of these drawings are given below.

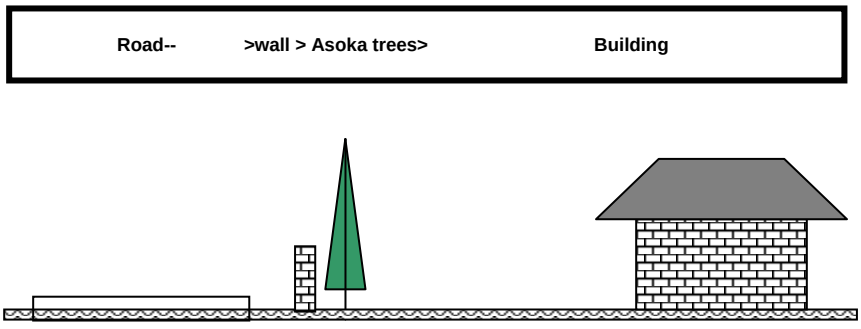
TABLE 1.0 Environmental Enhancement Drawings

SL NO	DRAWING NUMBER	LOCATION IF ANY	DETAILS OF THE DRAWING	REMARKS
1	Dwg. No. Vol.12/Part IV/TNRSP II/COR5/CP/01	2+900 LHS	CONCEPUALT PLAN OF ENHANCEMENT MEASURES FOR TEMPLE	-
2	Dwg. No. Vol.12/Part IV/TNRSP II/COR5/CP/02	6+900 RHS	CONCEPUALT PLAN OF ENHANCEMENT MEASURES FOR TEMPLE	-
3	Dwg. No. Vol.12/Part IV/TNRSP II/COR5/CP/03	12+700 LHS	CONCEPUALT PLAN OF ENHANCEMENT MEASURES FOR TEMPLE	-
4	Dwg. No. Vol.12/Part IV/TNRSP II/COR5/CP/04	10+800 RHS	CONCEPUALT PLAN OF ENHANCEMENT MEASURES FOR TEMPLE	-
5	Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GP/05	1+600 RHS	CONCEPUALT PLAN OF ENHANCEMENT MEASURES FOR SCHOOL	-
6	Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GP/06	5+200 LHS	CONCEPUALT PLAN OF ENHANCEMENT MEASURES FOR PRIMARY SCHOOL	-
7	Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GP/07	13+300 LHS	CONCEPUALT PLAN OF ENHANCEMENT MEASURES FOR TELEPHONE EXCHANGE	-
8	Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GP/08	9+900 RHS	CONCEPUALT PLAN OF ENHANCEMENT MEASURES FOR Govt. HIGHER SECONDAY SCHOOL	-
9	Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GENERAL/09		TYPICAL DESIGN FOR SOAK PITS FOR HAND PUMPS/ WELLS	-
10	Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GENERAL/10		TYPICAL DESIGN FOR RAIN WATER HARVESTING PITS FOR RURAL AREAS	-
11	Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GENERAL/11		TYPICAL LAYOUT OF PARTIAL BUS BAY IN URBAN AREA	-
12	Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GENERAL/12		TYPICAL DESIGN FOR BUS WAITING SHED WITH KIOSK	-
13	Dwg. No. Vol.12/Part		TYPICAL LAYOUT OF NOISE BARRIER	

SL NO	DRAWING NUMBER	LOCATION IF ANY	DETAILS OF THE DRAWING	REMARKS
	IV/TNRSP II/COR5/GENERAL/13		& ACCESS FACILITEIS TO SCHOOL	
14	Dwg. No. Vol.12/Part IV/TNRSP II/COR5/GENERAL/14		TYPICAL DESING FOR SLOPE PROECTION MEASURES	

The concept of Noise barrier design: The design drawing is an ideal condition, which rarely meets in its perfection in the location. The detailed guidelines are given in the Annexure 3.8. The concept of Noise barriers is as follows:

1) The design provided is an ideal situation especially with regard to the location of school gate, assembly area, and tree planting area (one row of trees completely sealing the entry of direct noise.
2) The school activity area (ground for daily assembly, prayer meetings etc) should be planned away from the main road.
3) The Schools gate should be away from the main traffic road. If the situation dose not permits the gate should be in any corner in such a way that the noise effect from the main road is minimum
4) The planting within the ROW is not shown in the design layout. If situation permits this will add to the noise barrier and in fact the noise attenuation effect increase to many fold because of noise waves (energy waves) first striking the trees within the ROW and then the Wall and later sound waves reach the tree barrier. In the whole situation noise has to pass through a column of air also. The effect of noise will be like that shown in the sketch below from the road towards the building.
5) The species recommended for the tree planting is given in **Table 3.0** in **Annexure 3.56**. *Polyalthia* longifolia Var *Pendula* (Asok tree) is ideal for noise barrier. However depending on the situation any trees with numerous relatively small leaves could be ideal.



ANNEXURE 3. 60. SPOIL AND SCARIFIED MATERIAL DISPOSAL PLAN FOR MOHANUR – NAMAKKAL SECTION OF ROAD NO 5 (SH 95)

The following specific scenario is worked out to deal with the scarified material collection and disposal assuming that the entire length of SH95road as overlay considered

SL. NO	DETAILS	VALUES I
1	Length of road scarification(M)	13350
2	Average width of scarification(M)	7
3	Average thickness of scarification(M)	0.09
4	**TOTAL SCARIFIED MATERIAL AVAILABL(CU. M)**	**8410.5**

The entire material will be used for base filling of the corridor and low lying areas. The topsoil in all cases is about 50 cm. This will be removed and heaped to use for productive purposes.

The mass balance would be achieved by filling along new alignments and also along the construction alignments for access roads etc. The total material required will be almost the same as that of the material available. The detailed plan should be in conformity with the Construction scheduling prepared by the PIU. The Contractor will have to obtain approval from the Engineer regarding Contractors plan to use the material.

Excess spoils, debris and over burden shall be dumped on approved municipality waste disposal site near the project site or at the abandoned Magnetite mining area situate towards north-eastern side of Salem. To dump these waste materials, necessary permission from concerned authorities shall be obtained by the contractor.

ANNEXURE 3. 61. CULTURAL PROPERTIES REHABILITATION MEASURES

The project needs to develop measures for the rehabilitation of cultural properties that will be affected by the road improvement programme. This could be made a part of the broad R&R Principle and Policy Framework. The Environmental Budget with in the EMP will undertake the environmental enhancement and landscaping where as any land acquisition and rehabilitation will be part of the Resettlement Action Plan. The TNRSP has been guided by the Bank's Draft Operational Policy 4.11, which exclusively deals with the cultural properties, in its handling of the affected cultural properties due to the project. Further, as desired by the Bank, this section of the EMP and RAP has been prepared as a separate safeguard measures exclusively for the Tamil Nadu Road Sector Project.

What Does Cultural Property Mean?
The United Nations term "Cultural Property" includes sites having archaeological (prehistoric), palaeontological, historical, religious, and unique natural values. Cultural Property, therefore, encompasses both remains left by previous inhabitants, for example, middens, shrines, and battlegrounds) and unique natural environmental features such as canyons and waterfalls. The rapid loss of cultural property in many countries is irreversible and often unnecessary. Detailed background information on all aspects of this note are contained in the technical paper of the same title, available from the office of Environmental and Scientific Affairs, Project Policy Department of UN, which is ready to provide assistance on request.
Source: World bank Draft OP 4.11

1. TYPES OF RELIGIOUS PROPERTIES IDENTIFIED IN THE PROJECT LOCATION

Shrines are usually small structures, located in the vicinity of the main religious structure associated with all the three major religions of the State. The shrines usually serve the purpose of helping the road users obtain a quicker religious service, besides indicating the larger presence of the religious community in the locality.

The shrines are a most important part of any place of worship. Normally a small shrine develops to a bigger place of worship with earlier shrine remaining as the most important part of the property.

Temples are Hindu places of worship**.** There are private as well as community temples. Most of the temples are different from one another by way of age and idols (Shiva, Vishnu, Krishna etc). In a majority of the cases, the location has specific significance. Because of the same reason temples are usually located away from the Roads.

Churches are Christian places of worship. There are no private Churches. The churches usually belong to different groups within Christianity Except few cases the location has no specific significance for a church.

Tree shrines are usually associated with the Hindus. There are a few tree shrines located along the project roads. People worship the idols installed at the base of the trees as well as the trees. These trees have a special significance to the local community, which will usually oppose the removal of such tree shrines. The landscaping would be ideal. This will require extensive community consultation.

Sacred groves are also usually associated with the Hindus. Even today, the some local community in Tamil Nadu worship snakes and other demigods. For this purpose they preserve a small forest, known as sacred groves. This represents the close association of man with nature. Usually, landscaping would be ideal for the sacred groves.

2.TYPES OF IMPACTS TO CULTURAL PROPERTIES

Direct Impacts: The direct impacts to the cultural properties are of the following category.
1. Only Compound wall affected
2. Compound wall and part of the compound affected
3. Part of structure affected
4. Sanctum sanatorium affected – can be categorised as the complete structure affected
5. Only land affected
6. Complete cultural property affected
7. Loss of access/entrance, if the existing access is from the project roadside.

Project Approach : At the design stage as a result of vigorous field survey and interaction between various teams involved in the project most of the structures are excluded due to design changes. In cases where structures are affected, the mitigation actions are framed unique to that particular situation with respect to the available space, the unique characteristics of the religious structure affected, local public and religious judgment. In other words, the project policy is unique to consider the widely varying situations for each cultural property.

Impact Mitigation: The loss of land and assets of the cultural properties will be treated on par with the loss of other land and assets for the purpose of compensation and assistance. However, the project will, in addition, strive to enhance benefits to the affected cultural properties in consultation with their respective management/ Owners.

The Project has a clear strategy to take people and affected parties in to confidence before taking any decision on shifting of structures especially religious structures. In general there would not be any involuntary shifting or relocation especially in the case of cultural properties. An outline benefits enhancement for the cultural properties is shown in the following Table 1.0.

Table 1.0. STRATEGY FOR RESTORATION, RELOCATION OR RECONSTRUCTION OF CULTURAL PROPERTIES

SL NO.	EXTENT OF IMPACT ON CULTURAL PROPERTIES	RESTORATION AND RELOCATION MEASURE	BENEFIT ENHANCEMENT
1	Only Compound wall and land beneath affected	Reconstruction of wall parallel to the present compound wall. Loss of land compensated	Access/entrance provided through one of the sides
2	Compound wall and part of compound affected	Reconstruction of wall parallel to the existing wall. Loss of land compensated. If land is available adjacent to the property, will be purchased.	Access/entrance provided through one of the sides
3	Structure affected	Alternate structure constructed and all pre-status restored	Access/entrance provided through one of the sides
4	Sanctum sanctorum affected	Complete structure reconstructed and all prestatus	Access/entrance provided

		restored	through one of the sides
5	Only land affected	Alternate land provided, preferably, if available, adjacent to the existing location.	Access/entrance provided through one of the sides
6	Complete cultural property affected	Relocation of site identified by the cultural property authorities and rebuilding of the property.	Access/entrance provided through one of the sides

3. OTHER IMPACTS TO CULTURAL PROPERTIES INCLUDE:

Indirect/Induced impacts: The construction of road or realignments or bypasses sometime will result in induced impacts obstructing the cultural properties in various ways. In the instances of such events the highway authority will assist through consultation and other means (Highway Protection Act, 2000) restoring the importance of the shrine. This will be mostly applicable along the new alignments.

4. CULTURAL PROPERTY REHABILITATION ACTION PLAN

The Rehabilitation Action Plan include environmental enhancement, design changes to save the structure from being affected. This section will be updated after finalisation of SIA & RAP reports

5. CULTURAL PROPERTY IMPACT ASSESSMENT, MITIGATION AND ENHANCEMENT PLAN

The cultural properties that will be affected by Corridor 5 (SH95) improvements are shown below in Table 2.0.

TABLE 2.0. CULTURAL PROPERTY IMPACT ASSESSMENT, MITIGATION AND ENHANCEMENT PLAN

EXISTING CHAINAGE	TYPE	NAME OF THE CP	SIDE	DISTANCE FROM CL	IMPACT	MITIGATION / ENHANCEMENT MEASURES
1+220	Temple	Kuruvukkara Swami Kovil	LHS	25	No direct Impact	No Space available for proposing enhancement measure
1+370	Temple	Shiva Temple	LHS	10	No direct Impact	No Space available for proposing enhancement measure
1+580	Temple	Ganapathi Kovil	LHS	14	No direct Impact	No Space available for proposing enhancement measure
1+590	Temple	Baladhandayudha Kovil	RHS	8	No direct Impact	No Space available for proposing enhancement measure
1+610	Temple	Bhagavathi Temple	LHS	15	No direct Impact	No Space available for proposing enhancement measure
2+900	Temple	Karuppu Swami Kovil	LHS	15	No direct Impact	Tree Plantation, Providing Sitting Benches, Construction of Compound Wall are proposed as enhancement measures.
6+900	Temple	Arasaiyamman Kovil,Neikasanpath	RHS	20	No direct Impact	Tree Plantation, Providing Sitting Benches, Construction of Compound Wall are proposed as enhancement measures.
7+380	Temple	Atha Mariyamma Kovil, Pandiyar Nagar, Neikkaraupatty	RHS	15	No direct Impact	Tree Plantation, Providing Sitting Benches, Construction of Compound Wall are proposed as enhancement measures.
8+420	Temple	Ganapathi Kovil	LHS	12	No direct Impact	
10+800	Temple	Sree Mariyamman Kovil – Kongalathur, Anyapuram	LHS	50	No direct Impact	Tree Plantation, Benches, Construction of Compound Wall are proposed as enhancement measures
12+700	Temple	Madhusaiveesan Kovil, Nallai Koundan pundar	LHS	15	No direct Impact	No Space available for proposing enhancement measure
13+000	Graveyard	Graveyard	RHS	15	No direct Impact	No Space available for proposing enhancement measure
13+050	Temple	Amman Kovil	LHS	15	No direct Impact	No Space available for proposing enhancement measure
13+100	Temple	Temple	LHS	20	No direct Impact	No Space available for proposing enhancement measure

The team found out three distinct cases for impact mitigation. These are

Design changes made to save cultural properties Accordingly most of the cultural properties have been saved.

Relocation where ever necessary In few cases some land acquisition will also be necessary.

Environmental Enhancement and landscaping. Landscaping and plantations are proposed in those cultural properties that are not directly impacted by the current project as a good will gesture as well as to meet compensatory plantation obligation. Detailed conceptual plans were prepared for each property. Table No 3 showing the enhancement measures proposed such as tree planting, landscaping, providing benches for the benefit of users is presented in Annexure 3.56.

ANNEXURE 3. 62. ENVIRONMENTAL STANDARDS

"[SCHEDULE VII]

[See rule 3(3B)]

NATIONAL AMBIENT AIR QUALITY STANDARDS

S.No	Pollutants	Time-weighted average	Concentration in ambient air		Method of measurement
			Industrial Residential, Rural & other Areas	Ecologically Sensitive Area (Notified by Central Government)	
1	Sulphur Dioxide (SO2) µg/m3	Annual*	50	20	-Improved West and Geake
		24 hours**	80	80	-Ultraviolet fluorescence
2	Nitrogen Dioxide (NO2) µg/m3	Annual*	40	30	-Modified Jacob & Hochheiser
		24 hours**	80	80	(Na-Arsenite) - Chemiluminescence
3	Particulate Matter (Size less than 10 µm)	Annual*	60	60	-Gravimetric -TOEM
	or PM10 µg/m3	24 hours**	100	100	-Beta attenuation
4	Particulate Matter (Size less than 2.5 µm) or PM2.5 µg/m3	Annual*	40	40	-Gravimetric -TOEM
		24 hours**	60	60	-Beta attenuation
5	Carbon Monoxide (CO) mg/m3	8 hours**	02	02	- Non Dispersive Infra Red (NDIR)
		1 hour**	04	04	Spectroscopy

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

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

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

NATIONAL AMBIENT AIR QUALITY STANDARDS FOR NOISE BY CPCB

Sl. No.	**Area**	**Leq dB (A)**	
		Day Time*	**Night Time****
1	Industrial Area	75	70
2	Commercial Area	65	55
3	Residential Area	55	45
4	Silent Zone***	50	40

Notes :

* Day Time -- 0600 hour to 2200 hour (16 hours)

** Night time --2200 hour to 0600 hour (08 hours)

*** Areas upto 100 metres around certain premises like hospitals, educational institutions and courts may be declared as silence zones by the competent authority ;

NATIONAL STANDARDS FOR DRINKING WATER (IS:10500)

Sl. No	Substance or Characteristic	Requirement (Desirable Limit)	Permissible Limit in the absence of Alternate source
Essential characteristics			
1	Colour, (Hazen units, Max)	5	25
2	Odour	Unobjectonable	Unobjectionable
3	Taste	Agreeable	Agreeable
4	Turbidity (NTU, Max)	5	10
5	pH Value	6.5 to 8.5	No Relaxation
6	Total Hardness (as CaCo3) mg/lit., Max	300	600
7	Iron (as Fe) mg/lit, Max	0.3	1
8	Chlorides (as Cl) mg/lit, Max.	250	1000
9	Residual free chlorine, mg/lit, Min	0.2	--
Desirable Characteristics			
10	Dissolved solids mg/lit, Max	500	2000
11	Calcium (as Ca) mg/lit, Max	75	200
12	Copper (as Cu) mg/lit, Max	0.05	1.5
13	Manganese (as Mn)mg/lit, Max	0.1	0.3
14	Sulfate (as SO4) mg/lit, Max	200	400
15	Nitrate (as NO3) mg/lit, Max	45	100
16	Fluoride (as F) mg/lit, Max	1.9	1.5
17	Phenolic Compounds (as C 6 H5OH) mg/lit, Max.	0.001	0.002
18	Mercury (as Hg)mg/lit, Max	0.001	No relaxation
19	Cadmium (as Cd)mg/lit, Max	0.01	No relaxation
20	Selenium (as Se)mg/lit, Max	0.01	No relaxation
21	Arsenic (as As) mg/lit, Max	0.05	No relaxation
22	Cyanide (as CN) mg/lit, Max	0.05	No relaxation
23	Lead (as Pb) mg/lit, Max	0.05	No relaxation
24	Zinc (as Zn) mg/lit, Max	5	15
25	Anionic detergents (as MBAS) mg/lit, Max	0.2	1
26	Chromium (as Cr6+) mg/lit, Max	0.05	No relaxation
27	Polynuclear aromatic hydro carbons (as PAH) g/lit, Max	--	--
28	Mineral Oil mg/lit, Max	0.01	0.03
29	Pesticides mg/l, Max	Absent	0.001
30	Radioactive Materials		
	i. Alpha emitters Bq/l, Max	--	0.1
	ii. Beta emitters pci/l, Max	--	1
31	Alkalinity mg/lit, Max	200	600
32	Aluminium (as Al) mg/l, Max	0.03	0.2
33	Boron mg/lit, Max	1	5
Bacteriological Parameters			

a) For water entering a distribution system
Coliform count in any sample of 100 ml should be zero(0).
b) For water in a distribution system
(i) E Coli count in 100 ml of any sample must be zero (0).
(ii) Coliform organisms should not be more than 10 per 100 ml in any sample.
(iii) Coliform organisms should not be present in 100 ml of any two consecutive samples or more than 5% of the samples collected for the year.

NATIONAL STANDARDS FOR INLAND SURFACE WATERS SUBJECT TO POLLUTION (IS:2296)

Class C – Drinking water with conventional treatment followed by disinfection.

Sl No.	Parameter and Unit	Class C
1	Taste	--
2	Odour	--
3	Colour (True) (Hazen unit), Max	300
4	pH (Min and Max)	6.5 - 8.5
5	Conductivity (25oC) µS/cm, Max	--
6	DO (mg/L), Min	4
7	BOD (3 Days 27oC) (mg/L), Max	3
8	Total Coliforms (MPN/100 mL), Max	5000
9	TDS (mg/L), Max	1500
10	Oil and Grease (mg/L), Max	0.1
11	Mineral oil (mg/L), Max	--
12	Total Hardness as CaCO3 (mg/L), Max	--
13	Chlorides as Cl (mg/L), Max	600
14	Sulfates as SO4 (mg/L), Max	400
15	Nitrates as NO3 (mg/L), Max	50
16	Free CO2 (mg/L), Max	--
17	Free NH3 as N (mg/L), Max	--
18	Fluorides as F (mg/L), Max	1.5
19	Calcium as Ca (mg/L), Max	--
20	Magnesium as Mg (mg/L), Max	--
21	Copper as Cu (mg/L), Max	1.5
22	Iron as Fe(mg/L), Max	50
23	Manganese as Mn (mg/L), Max	--
24	Zinc as Zn (mg/L), Max	15
25	Boron as B (mg/L), Max	--
26	Barium as Ba (mg/L), Max	--
27	Silver as Ag (mg/L), Max	--
28	Arsenic as As (mg/L), Max	0.2
29	Mercury as Hg (mg/L), Max	--
30	Lead as Pb (mg/L), Max	0.1
31	Cadmium as Cd (mg/L), Max	0.01
32	Chromium as Cr6+ (mg/L), Max	0.05
33	Selenium as Se (mg/L), Max	0.05
34	Cyanide as CN (mg/L), Max	0.05
35	Phenols as C2H5OH (mg/L), Max	0.005
36	Anionic detergents as MBAS (mg/L), Max	1
37	PAH (mg/L), Max	--
38	Pesticides (µg/L), Max	--
39	Insecticides (µg/L), Max	0
40	Alpha emitters (µC/mL), Max	10-9

Sl No.	Parameter and Unit	Class C
41	Beta emitters (µC/mL), Max	10-8
42	Percent Sodium (%),Max	--
43	Sodium Absorption Ratio, Max	--

NATIONAL STANDARDS FOR DISCHARGE OF EFFLUENTS

S. No.	Parameter	Inland surface water	Public sewers	Land for irrigation	Marine/ coastal areas
.	2		3	.	.
.	.	(a)	(b)	(c)	(d)
1	Colour and odour	All efforts should be made to remove colour and unpleasant odour as far as practicable		All efforts should be made to remove colour and unpleasant odour as far as practicable	All efforts should be made to remove colour and unpleasant odour as far as practicable
2	Suspended solids mg/l, max.	100	600	200	(a) For process waste water (b) For cooling water effluent 10 per cent above total suspended matter of influent.
3	Particle size of suspended solids	shall pass 850 micron IS Sieve	-	-	(a) Floatable solids, solidsmax. 3 mm (b) Settleable solids, max 856 microns
4	pH value	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0	5.5 to 9.0
5	Temperature	shall not exceed 5oC above the receiving water temperature			shall not exceed 5oC above the receiving water temperature
6	Oil and grease, mg/l max,	10	20	10	20
7	Total residual chlorine, mg/l max	1.0	-	-	1.0
8	Ammonical nitrogen (as N),mg/l, max.	50	50	-	50
9	Total kjeldahl nitrogen (as N);mg/l, max. mg/l, max.	100	-	-	100
10	Free ammonia (as	5.0	-	-	5.0

S. No.	Parameter	Inland surface water	Public sewers	Land for irrigation	Marine/ coastal areas
.	2		3	.	.
.	.	(a)	(b)	(c)	(d)
	NH3), mg/l,max.				
11	Biochemical oxygen demand (3 days at 27oC), mg/l, max.	30	350	100	100
12	Chemical oxygen demand, mg/l, max.	250	-	-	250
13	Arsenic(as As).	0.2	0.2	0.2	0.2
14	Mercury (As Hg), mg/l, max.	0.01	0.01	-	0.01
15	Lead (as Pb) mg/l, max	0.1	1.0	-	2.0
16	Cadmium (as Cd) mg/l, max	2.0	1.0	-	2.0
17	Hexavalent chro-mium (as Cr + 6),mg/l, max.	0.1	2.0	-	1.0
18	Total chromium (as Cr) mg/l, max.	2.0	2.0	-	2.0
19	Copper (as Cu)mg/l, max.	3.0	3.0	-	3.0
20	Zinc (as Zn) mg/l, max.	5.0	15	-	15
21	Selenium (as Se)	0.05	0.05	-	0.05
22	Nickel (as Ni) mg/l, max.	3.0	3.0	-	5.0
23	Cyanide (as CN) mg/l, max.	0.2	2.0	0.2	0.2
24	Fluoride (as F) mg/l, max.	2.0	15	-	15
25	Dissolved phos-phates (as P),mg/l, max.	5.0	-	-	-
26	Sulphide (as S) mg/l, max.	2.0	-	-	5.0
27	Phenolic compounds (as C6H50H)mg/l, max.	1.0	5.0	-	5.0
28	Radioactive materials: (a) Alpha emitters micro curie mg/l,	10-7	10-7	10-8	10-7

S. No.	Parameter	Inland surface water	Public sewers	Land for irrigation	Marine/ coastal areas
.	2		3	.	.
.	.	(a)	(b)	(c)	(d)
	max. (b)Beta emitters micro curie mg/l	10-6	10-6	10-7	10-6
29	Bio-assay test	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent
30	Manganese	2 mg/l	2 mg/l	-	2 mg/l
31	Iron (as Fe)	3mg/l	3mg/l	-	3mg/l
32	Vanadium (as V)	0.2mg/l	0.2mg/l	-	0.2mg/l
33	Nitrate Nitrogen	10 mg/l	-	-	20 mg/l

* These standards shall be applicable for industries, operations or processes other than those industries, operations or process for which standards have been specified in Schedule of the Environment Protection Rules, 1989.

ANNEXURE 3. 63. EMP DRAWINGS

Note :- Trees shown in Plan are tentitative . Exact numbers are given in Annexure 3.56

Legend :-

- Nettilingam Tree
- Moderate Crown Tree
- Broader Crown Tree
- Landscaping
- Benches
- Existing Features

NOTE:-

Client: TAMILNADU ROAD SECTOR PROJECT (TNRSP)

Consultant: **CDM SMITH INDIA PVT LTD** (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

Designed: | Drawn: | Checked: | Approved:

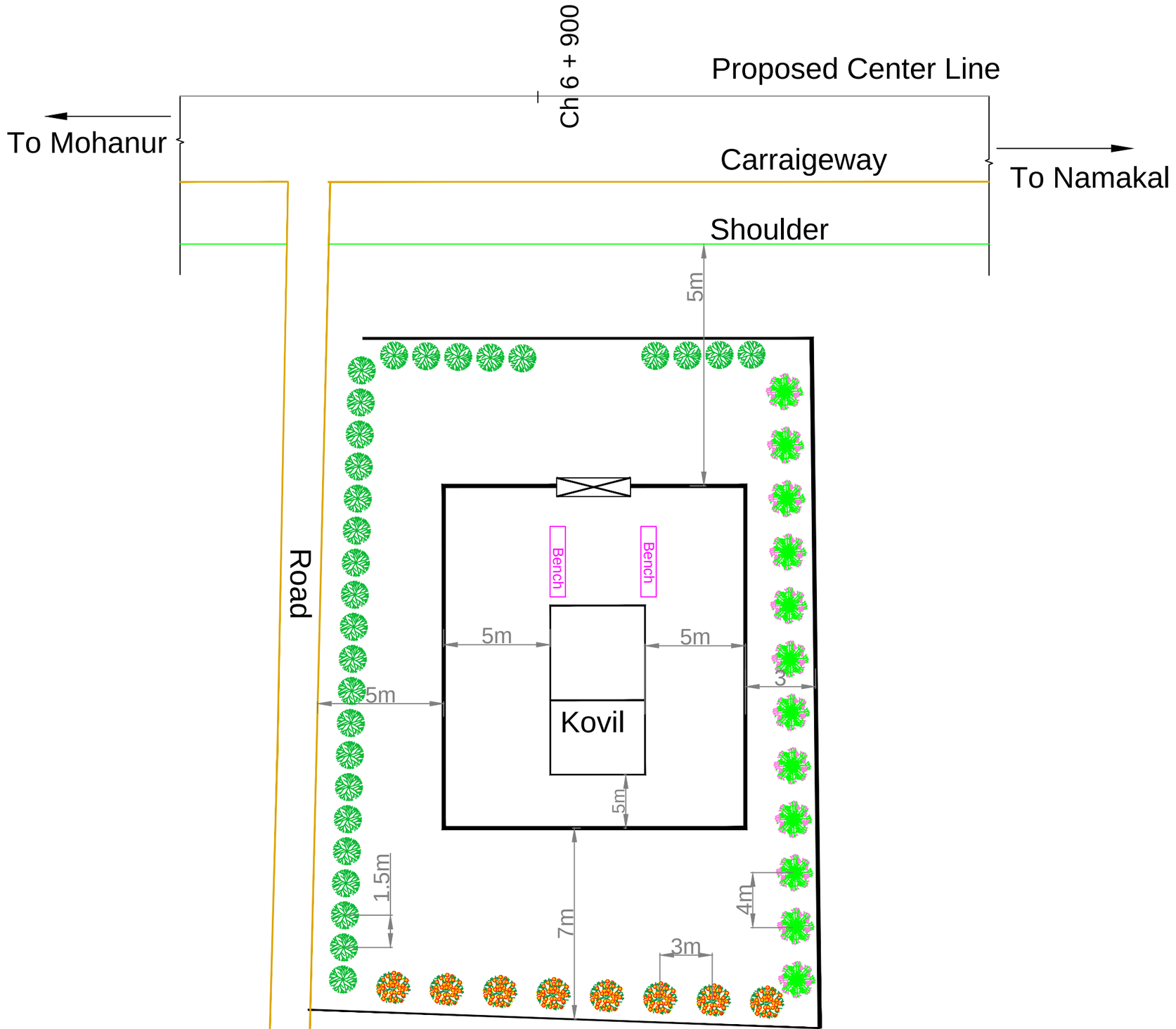
Scale: Not to Scale

Project: **PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03**

Drawing Title: Mohanur (Km0+000) to Namakkal (Km 13+300) Section of Road No. 5 Conceptual Plan for Enhancement Measure at **Temple at Km 2+900 on LHS**

Date.	Project No.	Drawing No.	Sheet No.	Rev.
	1314044	Vol.12/Part IV/TNRSP II/CORS/CP/01	1 of 8	

\\server\EPMD01 Current Projects\1314044 - TNRSP II\Drawings\02 DWG Files\Tree Plantation Drawings\Corridor 5\Corridor 5 tree Plantation-A3.dwg Jul 22,2014



Note :- Trees shown in Plan are tentitative . Exact numbers are given in Annexure 3.56

Legend :-

- Nettilingam Tree
- Moderate Crown Tree
- Broader Crown Tree
- Landscaping
- Benches
- Existing Features

NOTE:-

Client: TAMILNADU ROAD SECTOR PROJECT (TNRSP)

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

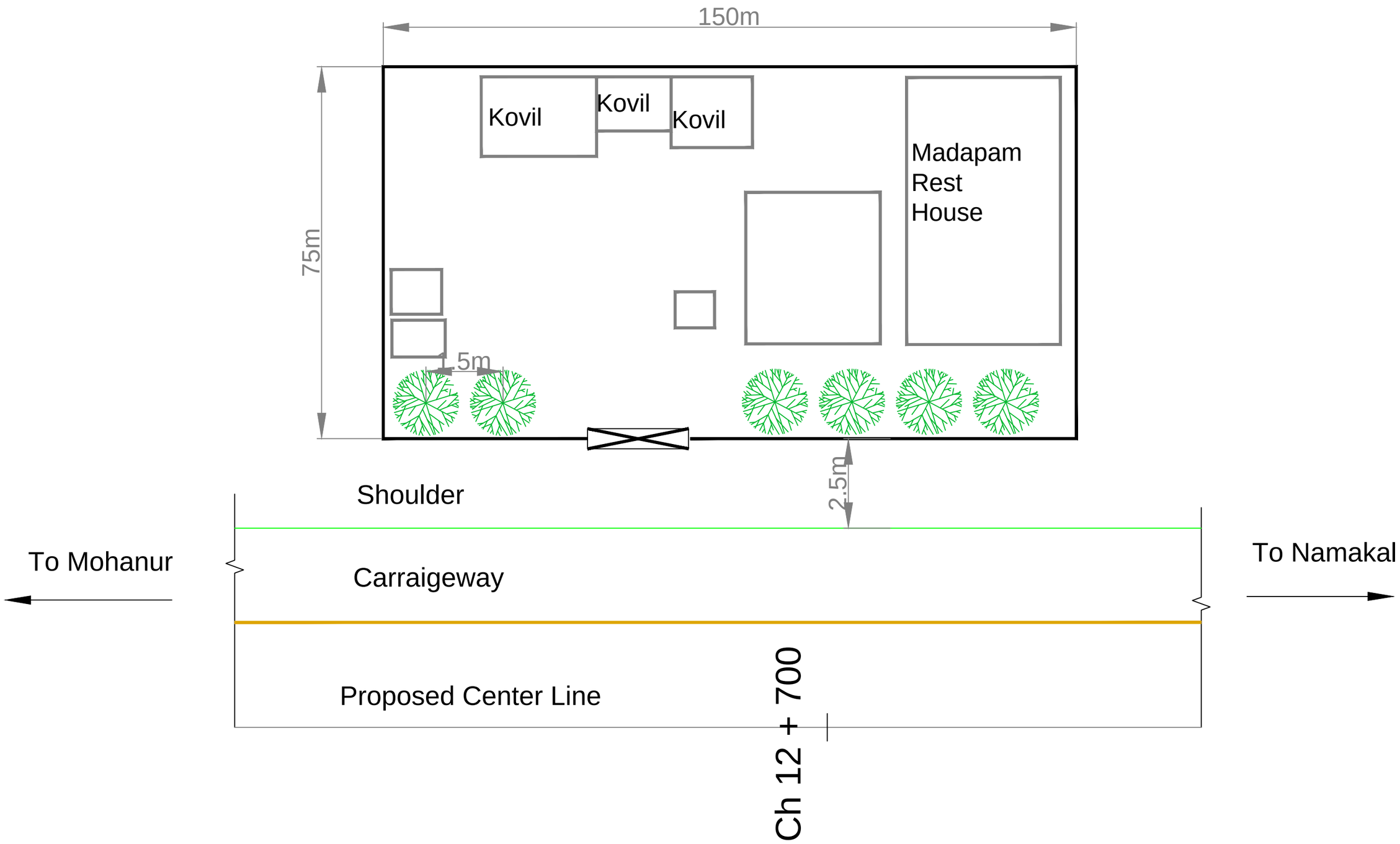
Designed: | Drawn: | Checked: | Approved:

Scale: Not to Scale

Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

Drawing Title: Mohanur (Km0+000) to Namakkal (Km 13+300) Section of Road No. 5 Conceptual Plan for Enhancement Measure at **Temple at Km 6+900 on RHS**

Date,	Project No.	Drawing No.	Sheet No.	Rev.
	1314044	Vol.12/Part IV/TNRSP II/CORS/CP/02	2 of 8	



Note :- Trees shown in Plan are tentitative . Exact numbers are given in Annexure 3.56

Legend :-

- Nettilingam Tree
- Moderate Crown Tree
- Broader Crown Tree
- Landscaping
- Benches
- Existing Features

NOTE:-

Client: TAMILNADU ROAD SECTOR PROJECT (TNRSP)

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

Designed: | Drawn: | Checked: | Approved:

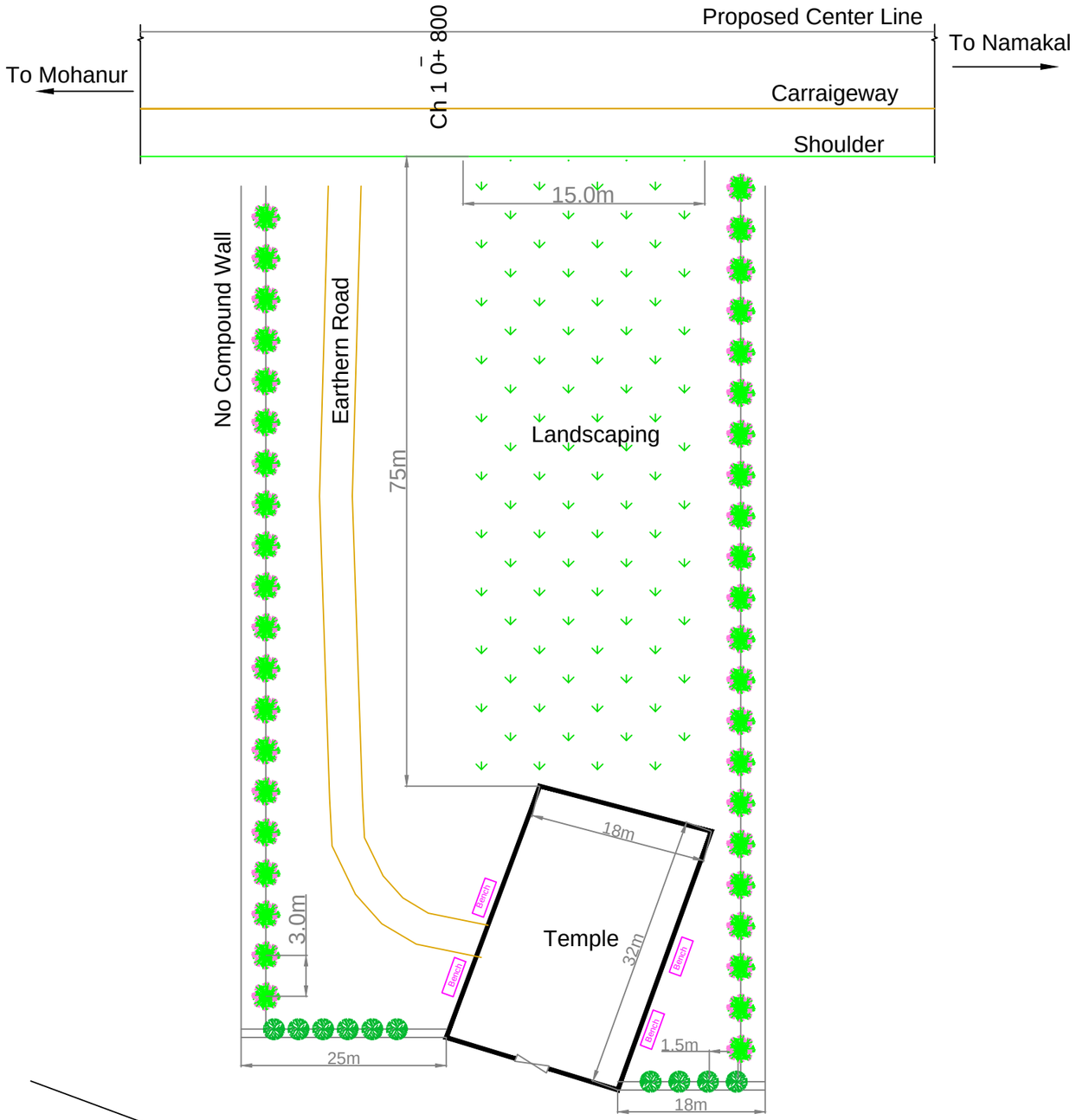
Scale: Not to Scale

Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

Drawing Title: Mohanur (Km0+000) to Namakkal (Km 13+300) Section of Road No. 5 Conceptual Plan for Enhancement Measure at **Temple at Km 12+700 on LHS**

Date,	Project No.	Drawing No.	Sheet No.	Rev.
	1314044	Vol.12/Part IV/TNRSP II/CORS/CPI/03	3 of 8	

\\server\EPMD\01 Current Projects\1314044 - TNRSP II\Drawings\02 DWG Files\Tree Plantation Drawings\Corridor 5\Corridor 5 tree Plantation-A3.dwg Jul 22,2014



Note :- Trees shown in Plan are tentitative . Exact numbers are given in Annexure 3.56

Legend :-

- Nettilingam Tree
- Moderate Crown Tree
- Broader Crown Tree
- Landscaping
- Benches
- Existing Features

NOTE:-

Client: TAMILNADU ROAD SECTOR PROJECT (TNRSP)

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

	Date	Revision
Designed:		
Drawn:		
Checked:		
Approved:		

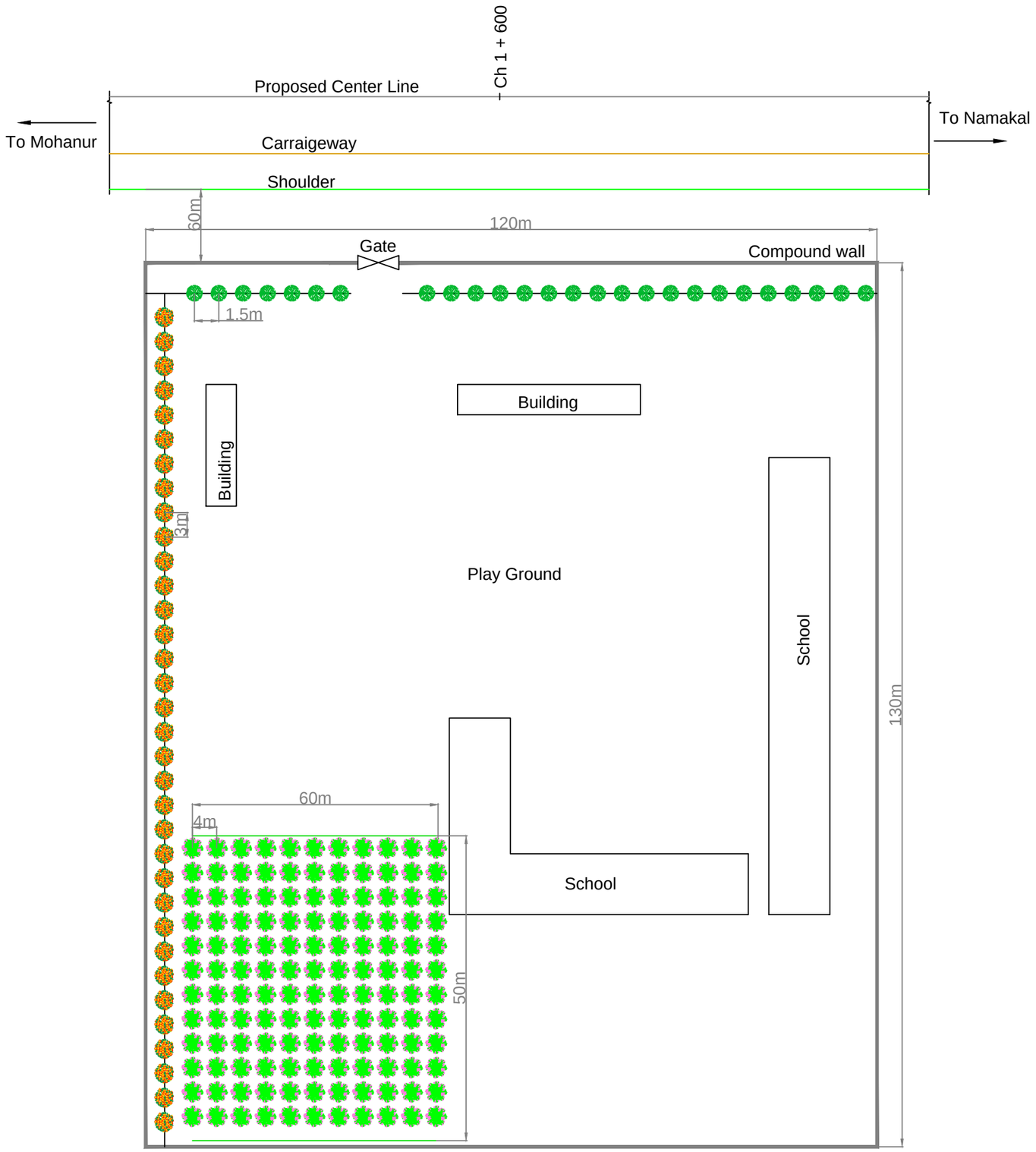
Scale: Not to Scale

Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

Drawing Title: Mohanur (Km0+000) to Namakkal (Km 13+300) Section of Road No. 5 Conceptual Plan for Enhancement Measure at **Temple at Km 10+800 on RHS**

Date.	Project No.	Drawing No.	Sheet No.	Rev.
	1314044	Vol.12/Part IV/TNRSP II/CORS/CP/04	4 of 8	

\\server\EPMD\01 Current Projects\1314044 - TNRSP II\Drawings\02 DWG Files\Tree Plantation Drawings\Corridor 5\Corridor 5 tree Plantation-A3.dwg Jul 22,2014



Note :- Trees shown in Plan are tentitative . Exact numbers are given in Annexure 3.56

Legend :-

- Nettilingam Tree
- Moderate Crown Tree
- Broader Crown Tree
- Landscaping
- Benches
- Existing Features

NOTE:-

Client: TNRSP — TAMILNADU ROAD SECTOR PROJECT

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

Designed: | Drawn: | Checked: | Approved:

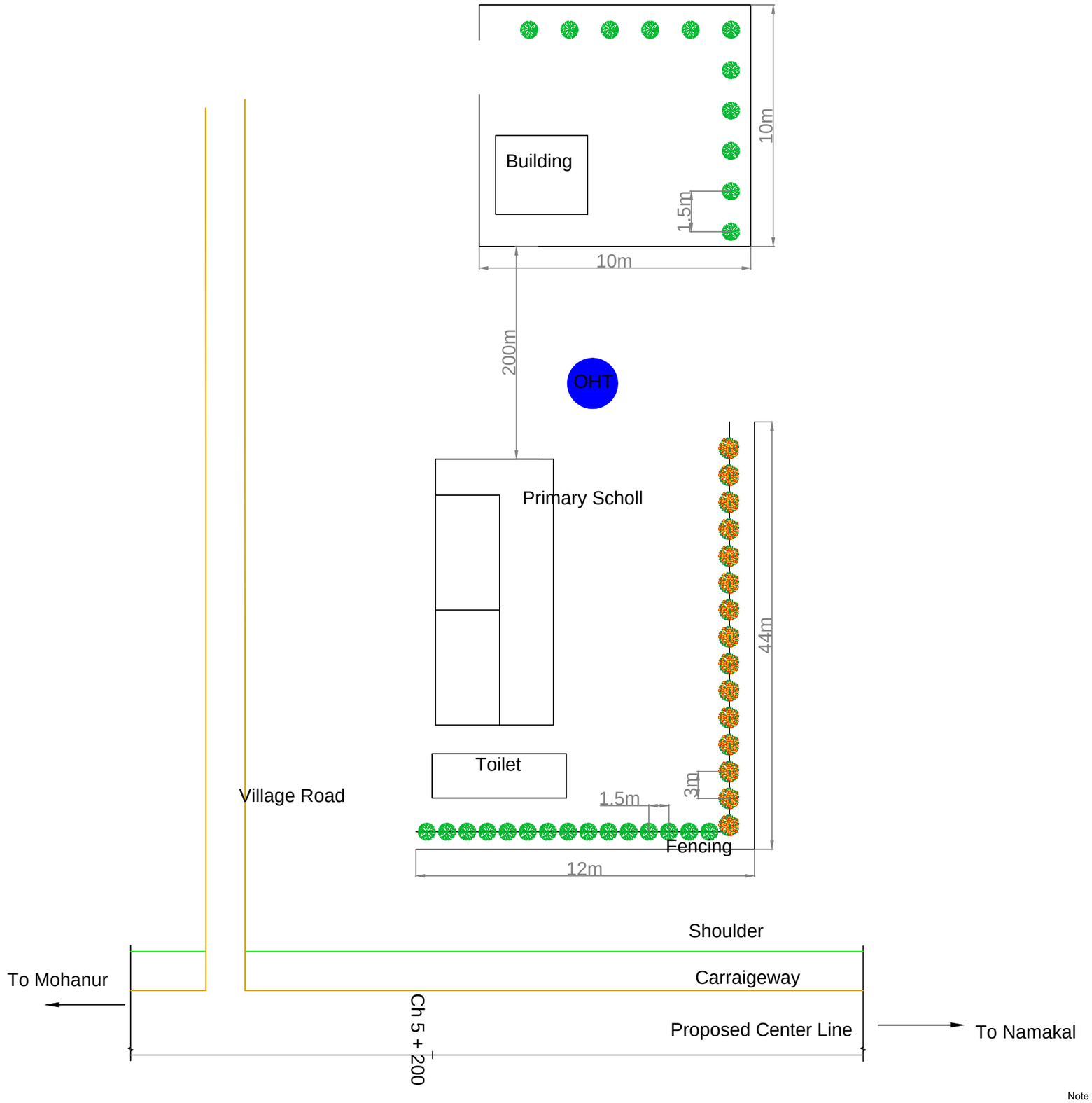
Scale: Not to Scale

Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

Drawing Title: Mohanur (Km0+000) to Namakkal (Km 13+300) Section of Road
No. 5 Conceptual Plan for Enhancement Measure at
School at Km 1+600 on RHS

Date,	Project No.	Drawing No.	Sheet No.	Rev.
	1314044	Vol.12/Part IV/TNRSP II/COR5/GP/05	5 of 8	

\\server\EPMD\01 Current Projects\1314044 - TNRSP II\Drawings\02 DWG Files\Tree Plantation Drawings\Corridor 5\Corridor 5 tree Plantation-A3.dwg Jul 22,2014



Note :- Trees shown in Plan are tentitative . Exact numbers are given in Annexure 3.56

Legend :-

- Nettilingam Tree
- Moderate Crown Tree
- Broader Crown Tree
- Landscaping
- Benches
- Existing Features

NOTE:-

Client: TAMILNADU ROAD SECTOR PROJECT (TNRSP)

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

	Date	Revision
Designed:		
Drawn:		
Checked:		
Approved:		

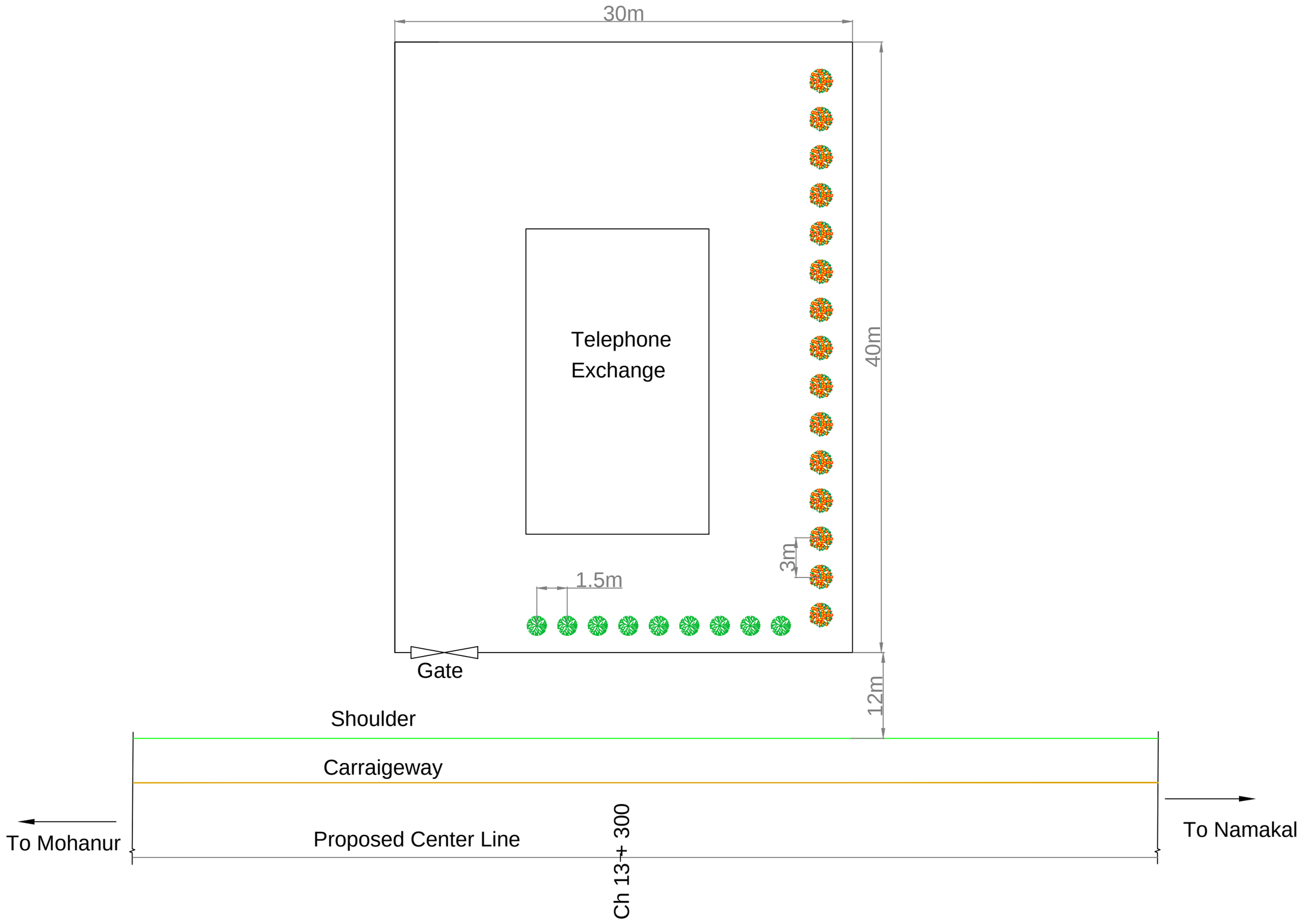
Scale: Not to Scale

Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

Drawing Title: Mohanur (Km0+000) to Namakkal (Km 13+300) Section of Road No. 5 Conceptual Plan for Enhancement Measure at **Primary School at Km 5+200 on LHS**

Date.	Project No.	Drawing No.	Sheet No.	Rev.
	1314044	Vol.12/Part IV/TNRSP II/CORS/GP/06	6 of 8	

\\server\EPMD\01 Current Projects\1314044 - TNRSP II\Drawings\02 DWG Files\Tree Plantation Drawings\Corridor 5\Corridor 5 tree Plantation-A3.dwg Jul 22,2014



Note :- Trees shown in Plan are tentitative . Exact numbers are given in Annexure 3.56

Legend :-

- Nettilingam Tree
- Moderate Crown Tree
- Broader Crown Tree
- Landscaping
- Benches
- Existing Features

NOTE:-

Client: TAMILNADU ROAD SECTOR PROJECT (TNRSP)

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

Designed:	
Drawn:	
Checked:	
Approved:	

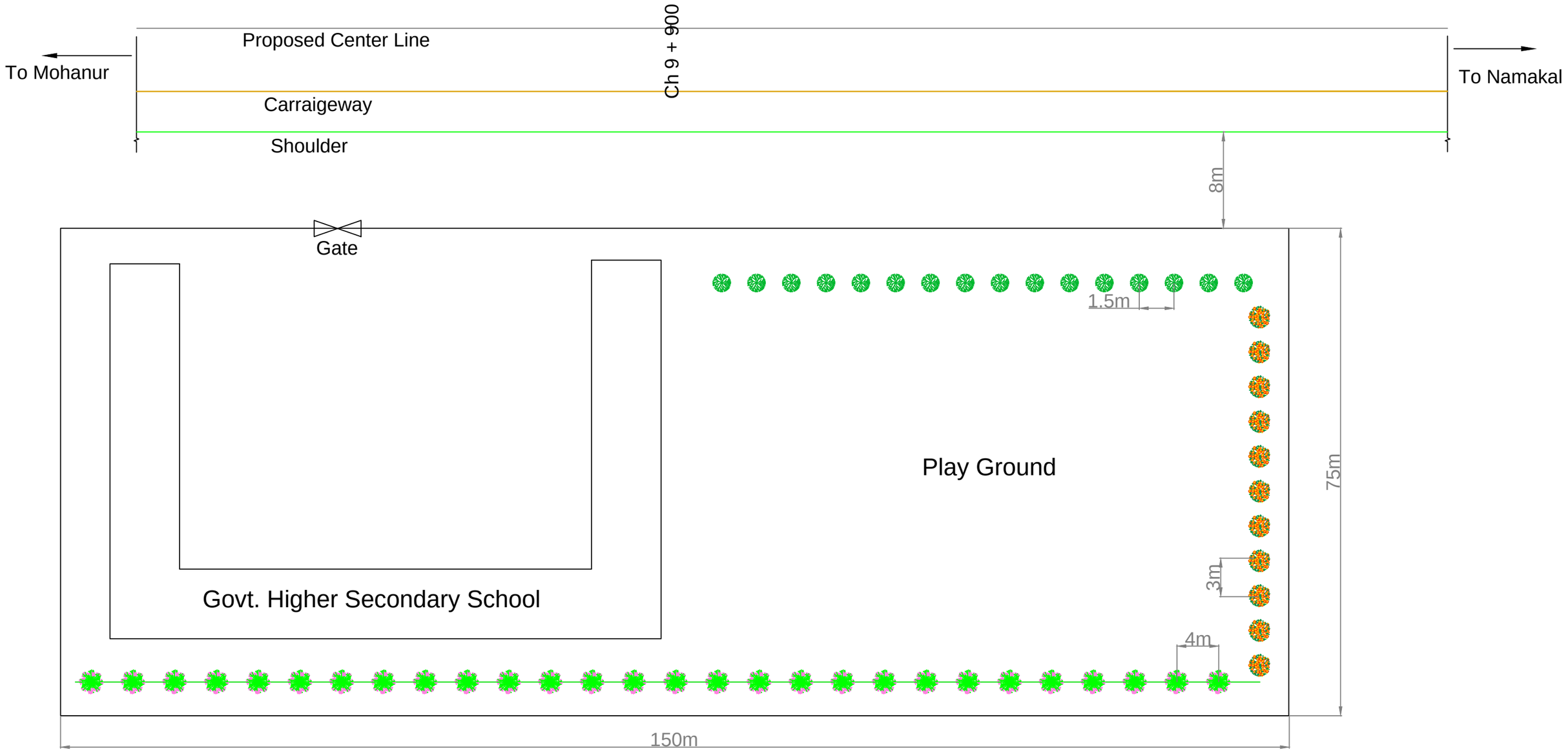
Scale: Not to Scale

Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

Drawing Title: Mohanur (Km0+000) to Namakkal (Km 13+300) Section of Road No. 5 Conceptual Plan for Enhancement Measure at **Telephone Exchange at Km 13+300 on LHS**

Date.	Project No.	Drawing No.	Sheet No.	Rev.
	1314044	Vol.12/Part IV/TNRSP II/COR5/GP/07	7 of 8	

\\server\EPMD01 Current Projects\1314044 - TNRSP II\Drawings\02 DWG Files\Tree Plantation Drawings\Corridor 5\Corridor 5 tree Plantation-A3.dwg Jul 22,2014



Note :- Trees shown in Plan are tentitative . Exact numbers are given in Annexure 3.56

Legend :-

- Nettilingam Tree
- Moderate Crown Tree
- Broader Crown Tree
- Landscaping
- Benches
- Existing Features

NOTE:-

Client: TAMILNADU ROAD SECTOR PROJECT (TNRSP)

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

Designed: | Drawn: | Checked: | Approved:

Scale: Not to Scale

Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

Drawing Title: Mohanur (Km0+000) to Namakkal (Km 13+300) Section of Road No. 5 Conceptual Plan for Enhancement Measure at **Govt. Higher Secondary School at Km 9+900 on RHS**

Date.	Project No.	Drawing No.	Sheet No.	Rev.
	1314044	Vol.12/Part IV/TNRSP II/CORS/GP/08	8 of 8	

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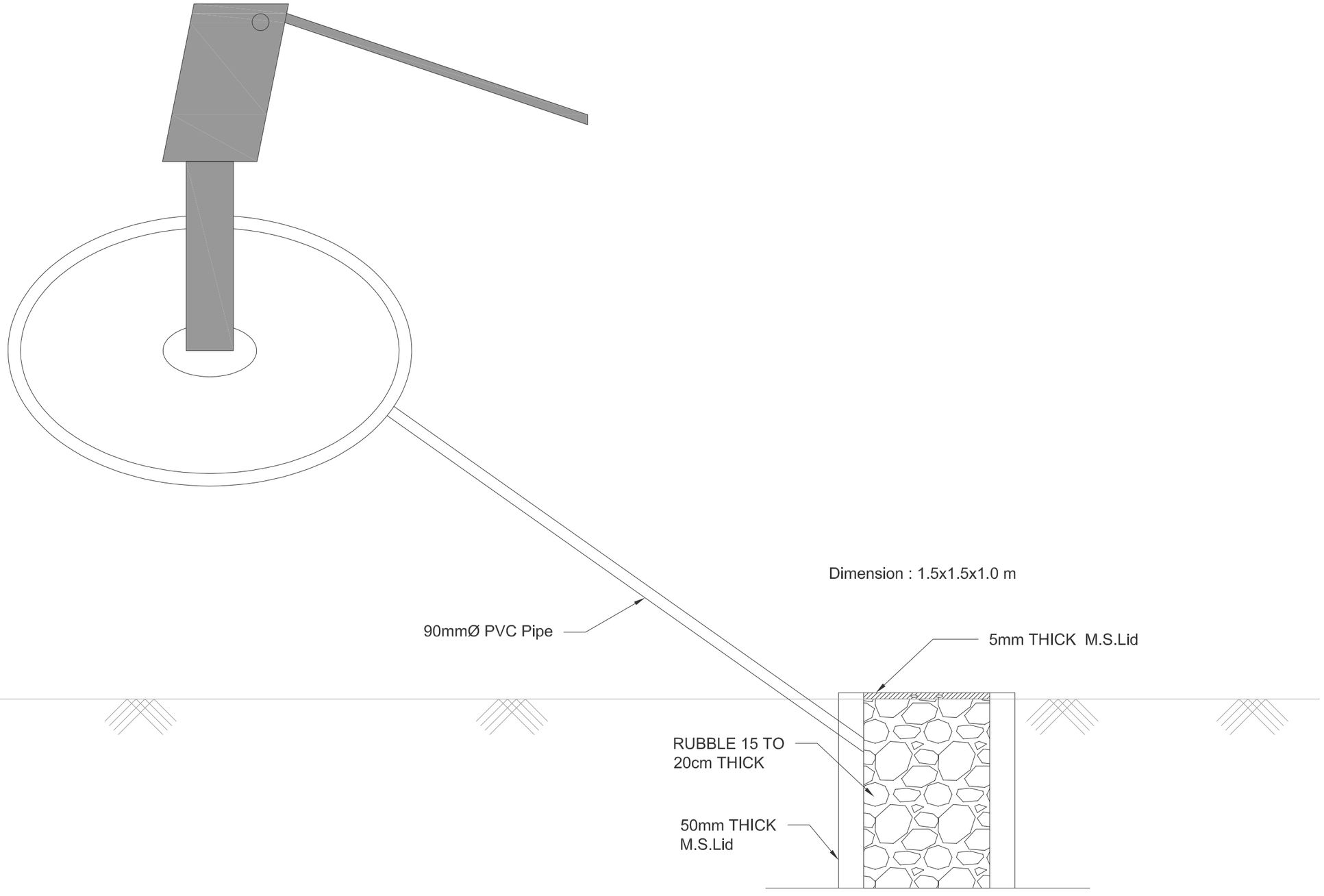


TYPICAL DESIGN FOR SOAKPITS FOR PUMPS/WELLS

NOTE:-

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

Client: TAMILNADU ROAD SECTOR PROJECT (TNRSP)

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

Designed: | Drawn: | Checked: | Approved:

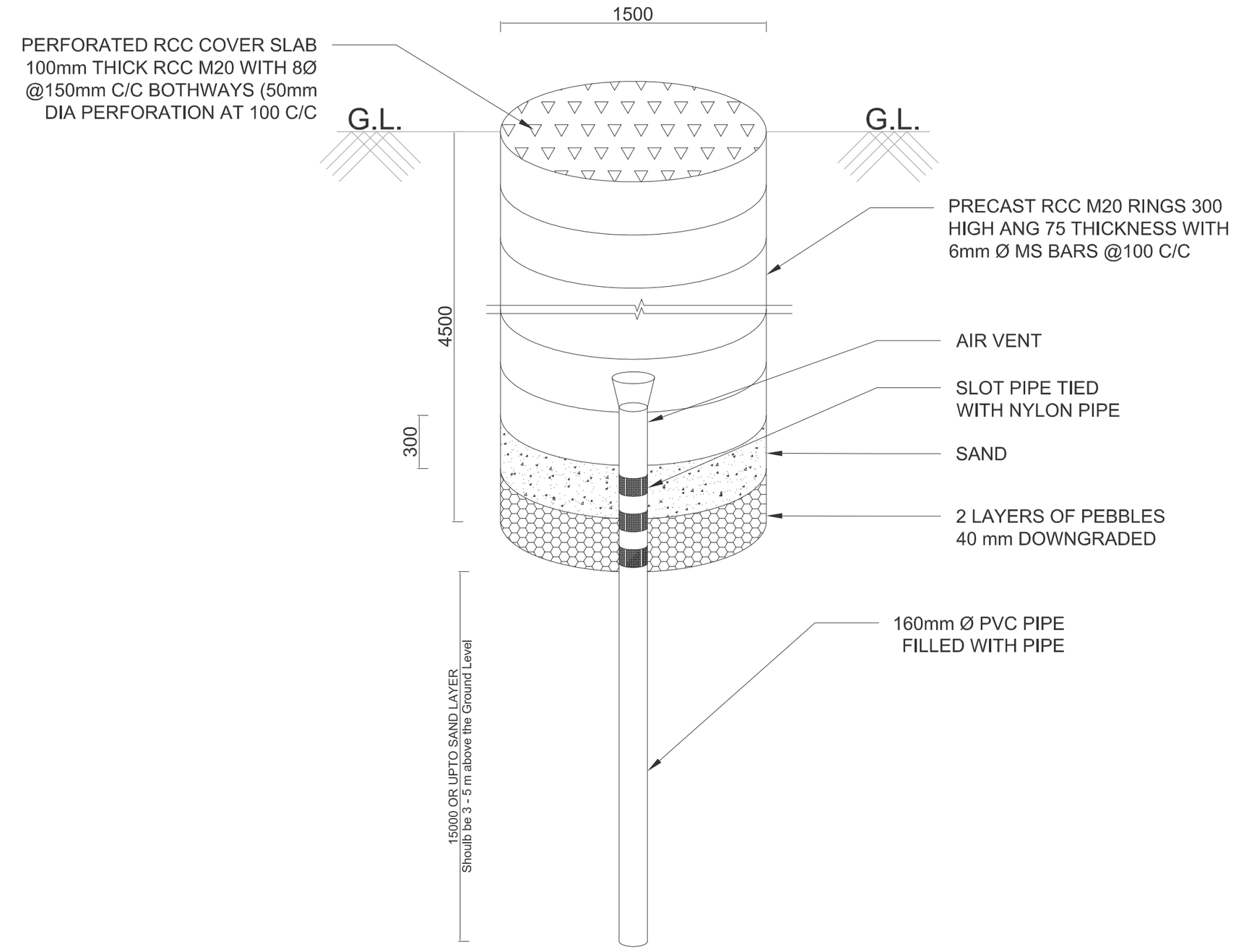
Not to Scale

Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

Drawing Title: Mohanur (Km 0+000) to Namakkal (Km 13+300)
Section of Road No.5
Typical Design for Soakpits for Pumos/Wells

Date.	Project No.	Drawing No.	Sheet No.	Rev.
	1314044	Vol.12/Part IV/TNRSP II/COR 5/GENERAL/9	9 OF 14	

P:\1314044 TNRSP-II\40 Working Document\P05, Mohanur - Rasipuram Road (SH95)\01, Drawings\40, Environmental\ENVIRONMENTAL_SH 95 (0+000 TO 13+385) .dwg Sep 11,2014



PERCOLATION WELL CUM BORE PIT FOR RAIN WATER HARVESTING

NOTE:-

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

Client: TAMILNADU ROAD SECTOR PROJECT (TNRSP)

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

Designed: | Drawn: | Checked: | Approved:

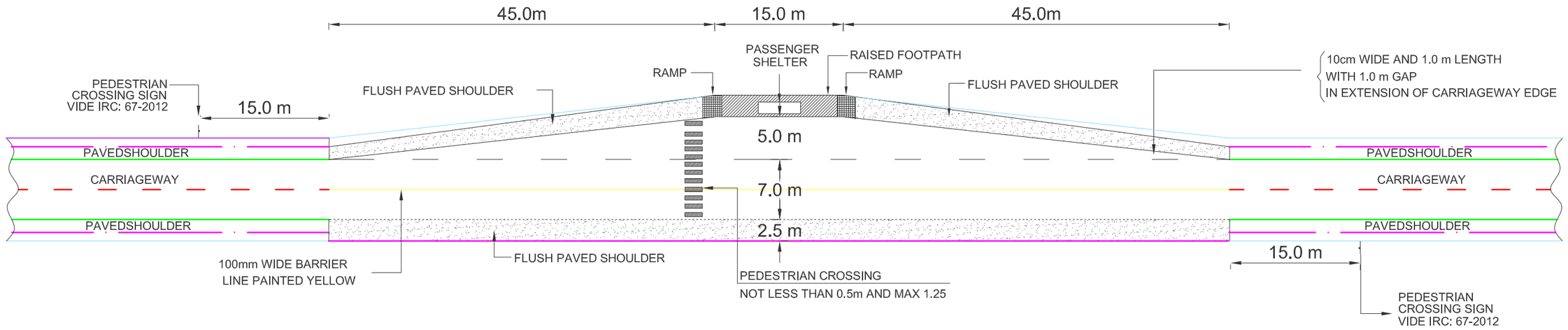
Not to Scale

Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

Drawing Title: Mohanur (Km 0+000) to Namakkal (Km 13+300)
Section of Road No.5
Percolation Well Cum Bore Pit for Rain Water Harvesting

Date.	Project No.	Drawing No.	Sheet No.	Rev.
	1314044	Vol.12/Part IV/TNRSP II/COR 5/GENERAL/10	10 OF 14	

P:\1314044 TNRSP\40 Working Document\P05. Mohanur - Rasipuram Road (SH85)\01. Drawings\40. Environmental\ENVIRONMENTAL_SH 95 (0+000 TO 13+385).dwg Sep 11,2014



TYPICAL BUS BAY

NOTE:-

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

Client: TAMILNADU ROAD SECTOR PROJECT (TNRSP)

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

Designed:
Drawn:
Checked:
Approved:

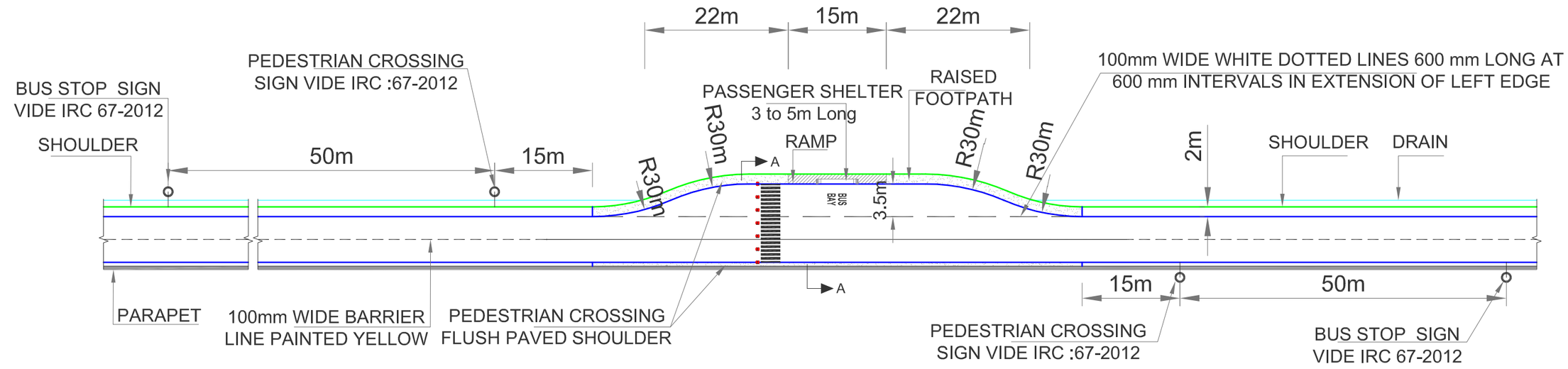
Not to Scale

Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

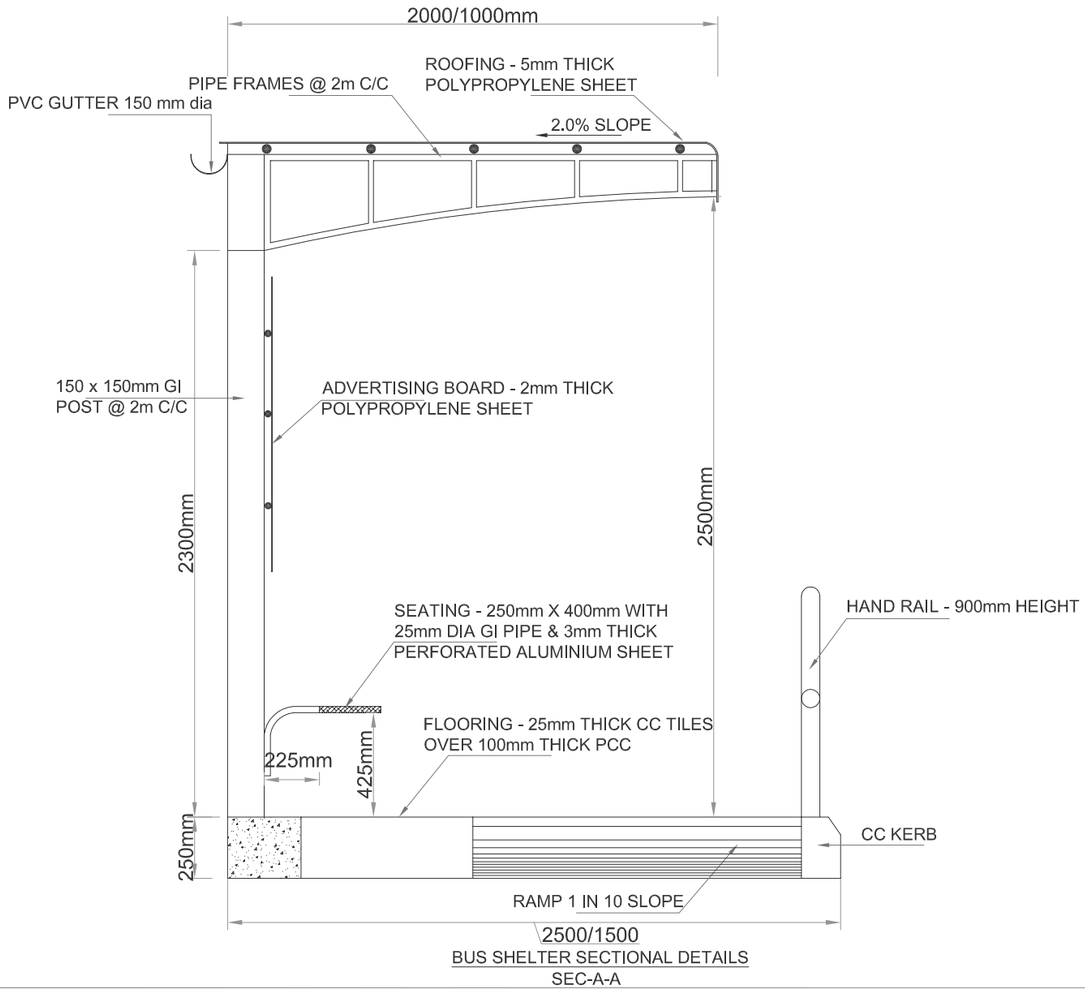
Drawing Title: Mohanur (Km 0+000) to Namakkal (Km 13+300)
Section of Road No.5
Typical Layout of Partial Busbay in Urban Area

Date.	Project No.	Drawing No.	Sheet No.	Rev.
	1314044	Vol.12/Part IV/TNRSP II/COR.5/GENERAL/11	11 OF 14	

P:\1314044 TNRSP\40 Working Document\P05, Mohanur - Rasipuram Road (SH95)\01. Drawings\40. Environmental\ENVIRONMENTAL_Sht 95 (0+000 TO 13+385) .dwg Sep 11,2014



TYPICAL LAYOUT FOR PICK-UP BUS STOP



BUS SHELTER SECTIONAL DETAILS
SEC-A-A

NOTE:-

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

Client: TAMILNADU ROAD SECTOR PROJECT (TNRSP)

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

Designed:
Drawn:
Checked:
Approved:

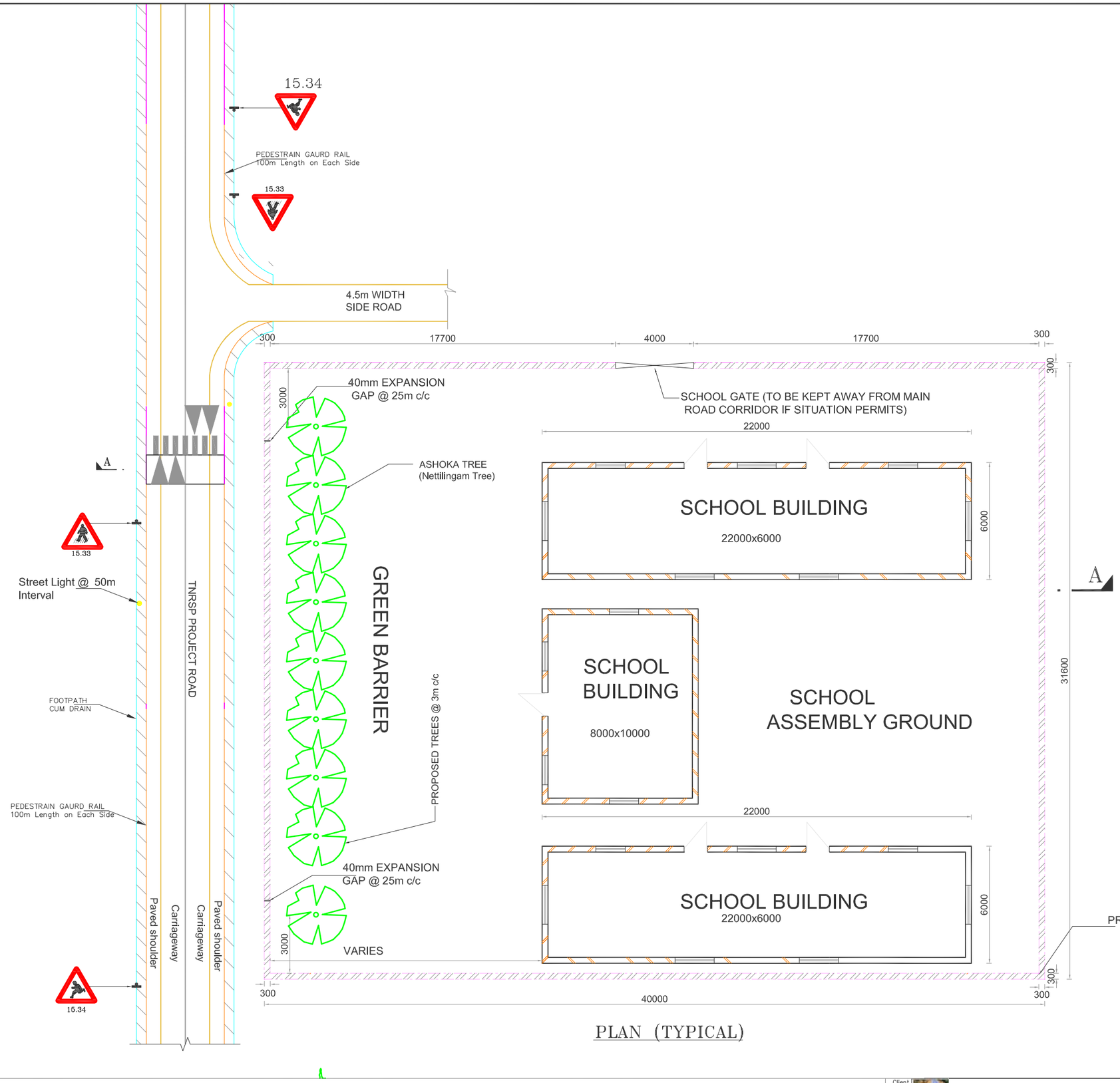
Not to Scale

Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

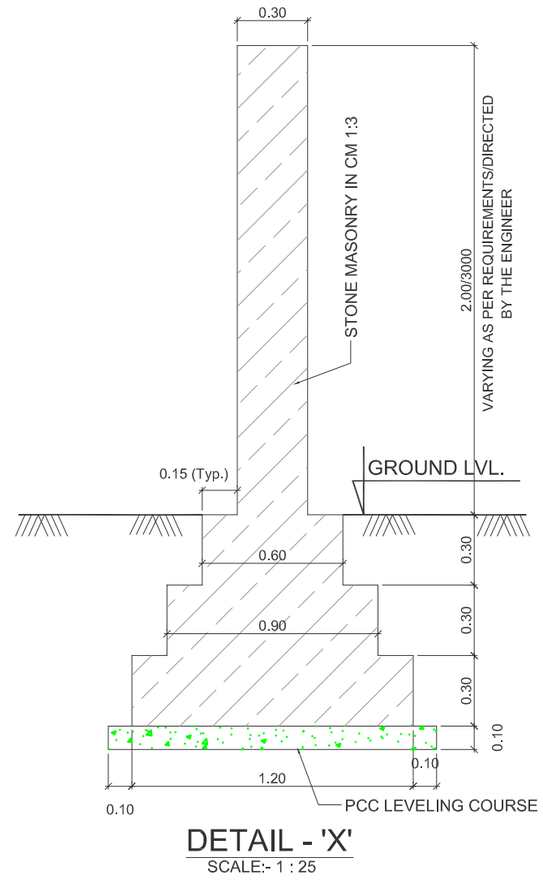
Drawing Title: Mohanur (Km 0+000) to Namakkal (Km 13+300)
Section of Road No.5
Typical Design For Bus Waiting Shed With Kiosk

Date.	Project No.	Drawing No.	Sheet No.	Rev.
	1314044	Vol.12/PartIV/TNRSP II/COR 5/GENERAL/12	12 OF 14	

P:\1314044 TNRSP\40 Working Document\P05, Mohanur - Rasipuram Road (SH95)\01, Drawings\40, Environmental\ENVIRONMENTAL_SH 95 (0+000 TO 13+385) .dwg Sep 11,2014



PLAN (TYPICAL)



DETAIL - 'X'

SCALE:- 1 : 25

NOTE:-

1. ALL DIMENSION IN MM.
2. NUMBER OF ROWS IN THE GREEN BARRIER VARIES WITH THE DISTANCE BETWEEN WALL AND SCHOOL BUILDING.
3. TREES CANOPY HEIGHT SHOULD OVERLAP WITH THE TOP OF THE WALL
4. PROVIDE ROAD SIGNS AS PER : IRC 67

NOTE:-

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

Client: TAMILNADU ROAD SECTOR PROJECT (TNRSP)

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

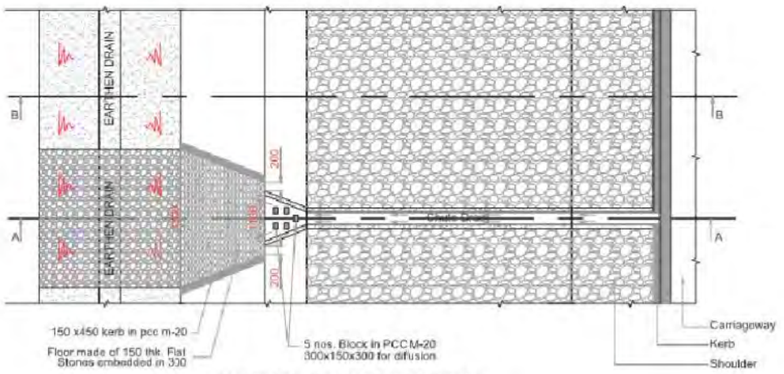
Date	Revision
Designed:	
Drawn:	
Checked:	
Approved:	

Not to Scale

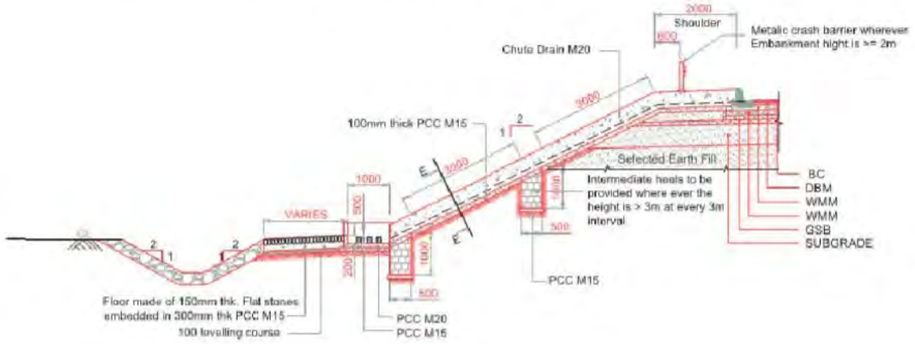
Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

Drawing Title: Mohanur (Km 0+000) to Namakkal (Km 13+300)
Section of Road No.5
Typical Layout for Noise Barriers and Access Facilities at School Locations

Date	Project No.	Drawing No.	Sheet No.	Rev.
	1314044	Vol.12/Part IV/TNRSP II/CORS/GENERAL/13	13 OF 14	

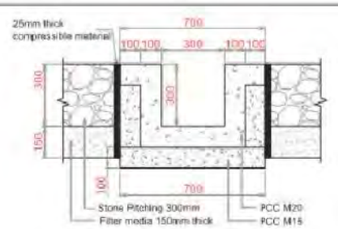


EMBANKMENT WITH STONE PITCHING
SCALE 1 : 50

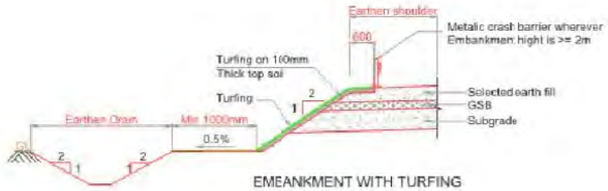


SECTION "A-A"
SCALE 1 : 50

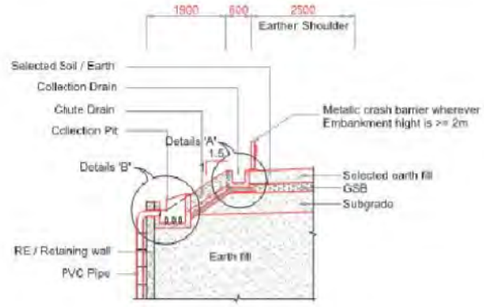
SECTION "B-B"
SCALE 1 : 50



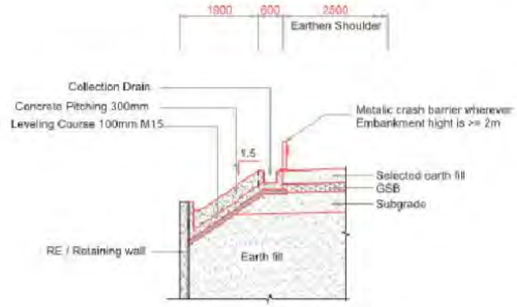
SECTION E-E
CROSS SECTION OF CHUTE
Scale 1 : 10



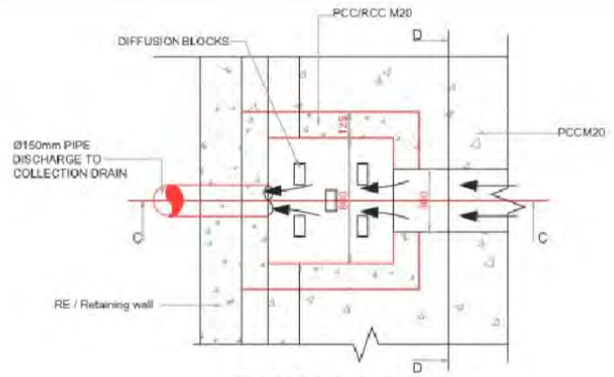
EMEANKMENT WITH TURFING



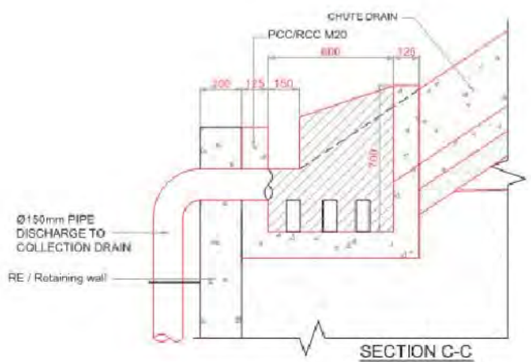
EMBANKMENT WITH CHUTE DRAIN AND COLLECTION PIT ARRANGEMENT @ UNDERPASS LOCATIONS



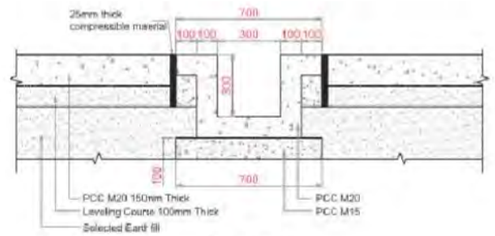
EMBANKMENT WITH CHUTE DRAIN AND COLLECTION PIT ARRANGEMENT @ UNDERPASS LOCATIONS



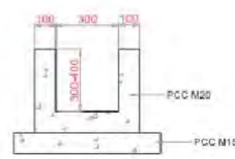
PLAN OF COLLECTION PIT



SECTION C-C
COLLECTION PIT
DETAIL-'B'
Scale 1 : 10



SECTION D-D
CROSS SECTION OF CHUTE
Scale 1 : 10



DETAIL 'A'
CROSS SECTION OF COLLECTION DRAIN
Scale 1 : 10

NOTE:-

1. ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SPECIFIED.

Client: TNRSP — TAMILNADU ROAD SECTOR PROJECT

Consultant: CDM SMITH INDIA PVT LTD (Formerly Wilbur Smith Associates Pvt Ltd.)

Date	Revision

Designed: | Drawn: | Checked: | Approved: | Not to Scale

Project: PROJECT PREPARATION CONSULTANCY SERVICES FOR PREPARING DETAILED PROJECT REPORT (DPR) FOR TNRSP II - PPC03

Drawing Title: Mohanur (Km 0+000) to Namakkal (Km 13+300) Section of Road No.5 Typical Eambankment Protection Details

Date.	Project No.	Drawing No.	Sheet No.	Rev.
	1314044	Vol.12/Part IV/TNRSP II/COR 5/GENERAL/14	14 OF 14	

P:\1314044 TNRSP\40 Working Document\P05. Mohanur - Rasipuram Road (SH85)\01. Drawings\40. Environmental\ENVIRONMENTAL_SH 85 (0+000 TO 13+385) .dwg Sep 11,2014