NATIONAL HIGHWAYS AUTHORITY OF INDIA

(Ministry of Shipping, Road Transport & Highways)

ENVIRONMENTAL IMPACT ASSESSMENT REPORT- PHASE I

Consultancy Services for Preparation of Feasibility-cum- Preliminary Design Report for Bangalore-Chennai Expressway under NHDP Phase-VI



September 2020

Submitted by:

egis bceom International

in association with

SECON

TOR Compliances

The following are the compliances for the ToR issued by MOEF vide letter NO.F.No. 10-15/2018-IA.III dated 14th May 2018 for the Bangalore-Chennai Expressway Phase-I.

Sr. No.	TOR Points & Conditions	Compliances
A	**Project Specific Conditions**	
i	Quantity and Source of water utilization and its permission	Section 4.2.3.3 of Chapter-4
ii	Traffic density study to be carried out.	Section 2.7.3 of Chapter-2
iii	Cumulative impact assessment study to be carried out along proposed alignment including other packages.	Refer Section 4.5 of Chapter 4
iv	Detailed Impact assessment study to be carried out with mitigation measures for protection of reservoirs, water bodies and rivers if any	Chapter-4 and Chapter-9
v	Composite plan to compensate the loss of tree cover though massive tree plantation programme with time schedule and financial outlay	Annexure-9.1 of Chapter-9
B	**General Conditions**	
i	A brief description of the project, project name, nature, size, its importance to the region/state and the country shall be submitted	Chapter-1 & Chapter-2
ii	In case the project involves diversion of forests land, guidelines under OM dated 20.03.2013 shall be followed and necessary action be taken accordingly	No forest Land diversion
iii	Details of any litigation(s) pending against the project and/or any directions or orders passed by any court of law/any statutory authority against the project to be detailed out.	No litigations are pending against the project road
iv	Detailed alignment plan, with details such as nature of terrain (plain, rolling, hilly), land use pattern, habitation, cropping pattern, forest area, environmentally sensitive areas, mangroves, notified industrial areas, sand dunes, sea, rivers, lakes, details of villages, teshils, districts and states, latitude and longitude for important locations falling on the alignment by employing remote sensing techniques followed by "ground truthing" and also through secondary data sources shall be submitted	Chapter-3
v	Describe various alternatives considered, procedures and criteria adopted for selection of the final alternative with reasons	The Analysis of Alternatives are given in Chapter-5
vi	Land use map of the study area to a scale of 1: 25,000 based on recent satellite imagery delineating the crop lands (both single and double crop), agricultural plantations, fallow lands, waste lands, water bodies, built-up areas, forest area and other surface features such as railway tracks, ports, airports, roads, and major industries etc. along with detailed ground survey map on 1:2000 scale showing the existing features falling within the right of way namely trees, structures including	The Land Use Map of the proposed project based on recent satellite imagery is given as Annexure-3.5 and details in section 3.1.4 of Chapter-3

	archaeological & religious, monuments etc. if any, shall be submitted	
vii	If the proposed route is passing through any hilly area, the measures for ensuring stability of slopes and proposed measures to control soil erosion from embankment shall be examined and submitted	The proposed route is not passing through hilly area
viii	If the proposed route involves tunneling, the details of the tunnel and locations of tunneling with geological structural fraction should be provided. In case the road passes through a flood plain of a river, the details of micro-drainage, flood passages and information on flood periodicity at least of the last 50 years in the area shall be examined and submitted	The proposed route does not involve Tunneling
ix	If the project is passing through/located within the notified ecologically sensitive zone (ESZ) around a notified National Park/Wildlife Sanctuary or in the absence of notified ESZ, within 10 km from the boundary of notified National Park/Wildlife Sanctuary, the project proponent may simultaneously apply for the clearance for the standing committee of NBWL. The EC for such project would be subject to obtaining the clearance from the standing committee of NBWL.	The project is not passing through/located within the ESZ
x	Study regarding the animal bypasses/underpasses etc. across the habitation areas shall be carried out. Adequate cattle pass for the movement of agriculture material shall be provided at the stretches passing through habitation areas. Underpasses shall be provided for the movement of Wild animals.	Adequate cattle underpasses for the movement of agriculture material and cattle have been provided at the stretches passing near the habitation areas and the list of cattle underpasses (LVUP) is given in section 2.7.6 of Chapter-2. There is no wild life area near the Project road.
xi	Study regarding in line with the recent guidelines prepared by Wildlife Institute of India for linear infrastructure with strong emphasis on animal movement and identifying crossing areas and mitigation measures to avoid wildlife mortality	There is not any wild life movement near by the project road.
xii	The information shall be provided about the details of the trees to be cut including their species and whether it also involves any protected or endangered species. Measures taken to reduce the number of the trees to be removed should be explained in detail. The details of compensatory plantation shall be submitted. The possibilities of relocating the existing trees shall be explored	The information about the details of the trees to be cut including their species is given in Section 3.2 and Annexure-3.3 of Chapter-3. The details of plantations are given in the Tree Plantation Strategy in point PC.1.2, C.5.1 of Table 9.2, Annexure-9.1 of Chapter-9 and mitigation measures in Section 4.1.8 of Chapter-4
xiii	Necessary green belt shall be provided on both sides of the highway with proper central verge and cost provision should be made for regular	The condition shall be complied with and details are given in Annexure-9.1 of Chapter-9.

	maintenance.	
xiv	If the proposed route is passing through a city or town, with houses and human habitation on either side of the road, the necessity for provision of bypasses/diversions/under passes shall be examined and submitted. The proposal should also indicate the location of wayside amenities, which should include petrol stations/service centres, rest areas including public conveyance, etc.	No. This is a green field project. The required number of underpasses have been provided and given in section 2.7.6 of Chapter-2. Wayside amenities having the Rest Areas including public conveyance have been given in section 2.7.14 of Chapter-2.
xv	Details about measures taken for the pedestrian safety and construction of underpasses and foot-over bridges along with flyovers and interchanges shall be submitted.	This is a green field project. Wherever road crossings exist, the required number of underpasses have been provided and given in section 2.7.6 of Chapter-2.
xvi	The possibility that the proposed project will adversely affect road traffic in the surrounding areas (e.g. by causing increases in traffic congestion and traffic accidents) shall be addressed	This is a green field project and there will no impact on existing road traffic in the surrounding areas. The separate Traffic Safety Plan is given in Annexure 9.8 of Chapter-9.
xvii	The details of use of fly ash in the road construction, if the project road is located within the 100 km from the Thermal Power Plant shall be examined and submitted	The details of use of fly ash in the road construction, for the project road located within the 300 km from the Thermal Power Plant, are given in Annexure 9.7 of Chapter-9.
xviii	The possibilities of utilizing debris/waste materials available in and around the project area shall be explored.	The condition shall be complied with
xix	The details on compliance with respect to Research Track Notification of Ministry of Road, Transport and Highways shall be submitted	Conditions in the notification will be complied during construction of the project
xx	The details of sand quarry and borrow area as per OM No.2-30/2012-IA-111 dated 18.12.2012 on 'Rationalization of procedure for Environmental Clearance for Highway Projects involving borrow areas for soil and earth" as modified vide OM of even No. dated March 19, 2013, shall be examined and submitted	The details have been given in Chapter-9 on Environmental Management of Borrow Area.
xxi	Climate and meteorology (max and min temperature, relative humidity, rainfall, frequency of tropical cyclones and snow fall); the nearest IMD meteorological station from which climatological data have been obtained to be indicated.	Climate and meteorology have been given in section 3.1.5 of Chapter-3.
xxii	The air quality monitoring shall be carried out as per the notification issued on 16th November, 2009. Input data used for Noise and Air quality modeling shall be clearly delineated	The air quality monitoring was carried out as per the notification issued on 16th November, 2009 and details are given in section 3.1.8 of Chapter-3. Air quality modeling has been done and given in section 4.3.2 and

		Annexure 4.5 of Chapter-4.
xxiii	The project activities during construction and operation phases, which will affect the noise levels and the potential for increased noise resulting from this project, shall be identified. Discuss the effect of noise levels on nearby habitations during the construction and operational phases of the proposed highway. Identify noise reduction measures and traffic management strategies to be deployed for reducing the negative impact if any. Prediction of noise levels shall be done by using mathematical modeling at different representative locations	Impact of noise levels and its mitigation measures discussed in details in section 4.2.6, 4.3.3, of Chapter-4, Section C-4, O-4, O-6 of Table 9.2 of Chapter-9 and Noise level monitoring during construction and operation stage will be carried out as mentioned in Table 6.1 of Chapter-6. Noise modeling has been done and is given in 4.3.3 of Chapter-4
xxiv	The impact during construction activities due to generation of fugitive dust from crusher units, air emissions from hot mix plants and vehicles used for transportation of materials and prediction of impact on ambient air quality using appropriate mathematical model, description of model, input requirement and reference of derivation, distribution of major pollutants and presentation in tabular form for easy interpretation shall be examined and carried out	The impact during construction activities due to generation of fugitive dust from crusher units, air emissions from hot mix plants and vehicles used for transportation of materials have been given in Section 4.2.5. Air quality modeling has been given in section 4.3.2. and Annexure 4.5 of Chapter-4.
xxv	The details about the protection to existing habitations from dust, noise, odour etc. during construction stage shall be examined and submitted	Section 4.2.5, Section 4.2.6 of Chapter-4 and Point C.3, Point C.4 of Table 9.2 of Chapter-9.
xxvi	If the proposed route involves cutting of earth, the details of area to be cut, depth of cut, locations, soil type, volume and quantity of earth and other materials to be removed with location of disposal dump sites along with necessary permission	All the cutting of earth will be used for filling. The details are given in Section 4.2.1 of Chapter-4.
xxvii	If the proposed route is passing through low lying areas, details of filling materials and initial and final levels after filling above MSL, shall be examined and submitted	The project does not encounter low lying area
xxviii	The water bodies including the seasonal ones within the corridor of impacts along with their status, volumetric capacity, quality and likely impacts on them due to the project along with the mitigation measures, shall be examined and submitted	Section 3.1.6 of Chapter-3, Section 4.2.3, 4.2.4 and Annexure 4.2 of Chapter-4.
xxix	The details of water quantity required and source of water including water requirement during the construction stage with supporting data and also classification of ground water based on the CGWA classification, shall be examined and submitted	Section 4.2.3.3 of Chapter-4.
xxx	The details of measures taken during constructions of bridges across rivers/ canals/major or minor drains keeping in view the flooding of the rivers and the life span of the existing bridges shall be examined and submitted. Provision of speed breakers, safety signals, service lanes and foot paths shall be examined at appropriate locations throughout the proposed road to avoid accidents.	BCE Phase-I is a green field project, so there is not any existing bridge. Since this is an access controlled Expressway, person cannot enter the expressway. However in order to avoid accidents and for smooth commuting of man, machine and material, pedestrian/cattle

		underpasses (Light Vehicular Underpasses) have been provided and given in Section 2.7.6 of Chapter-2.
xxxi	If there will be any change in the drainage pattern after the proposed activity, details of changes shall be examined and submitted	There will be no change in the drainage pattern due to the proposed project. Cross drainage structures like Major Bridges, Minor Bridges, Underpasses and Culverts have been provided to ensure uninterrupted movement of water. Details of the structures are given in section 2.7.8 and section 2.7.10 of Chapter-2.
xxxii	Rain water harvesting pit shall be at least 3 - 5 m above the highest ground water table. Provisions shall be made for oil and grease removal from surface runoff	For Rain Water Harvesting-Point C.2.2 of Table 9.2 and Annexure 9.5 of Chapter-9. For Oil & Grease removal- Point C.2.2 of Table 9.2 and Annexure 9.6 of Chapter-9
xxxiii	If there is a possibility that the construction/widening of road may cause an impact such as destruction of forest, poaching or reduction in wetland areas, examine the impact and submit details	There is not any possibility that the construction of the road may cause an impact such as destruction of forest, poaching or reduction in wetland areas. The same will be taken care of.
xxxiv	The details of road safety, signage, service roads, vehicular under passes, accident prone zones and the mitigation measures, shall be submitted	Annexure 9.8 of Chapter-9
xxxv	IRC guidelines shall be followed for widening & up gradation of roads	It is a green field expressway. This is not widening project.IRC guidelines shall be followed for the proposed project.
xxxvi	The details of social impact assessment due to the proposed construction of the road, shall be submitted	The details of social impact assessment due to the proposed construction is given in chapter-9
xxxvii	Examine the road design standards, safety equipment specifications and Management System training to ensure that design details take account of safety concerns and submit the traffic management plan	Traffic Safety Plan is given in Annexure 9.8 of Chapter-9.
xxxviii	Accident data and geographic distribution shall be reviewed and analyzed to predict and identify trends - in case of expansion of the existing highway and provide Post accident emergency assistance and medical care to accident victims	This is a greenfield project. There is not any requirement to review the accident data of existing highways.
xxxix	If the proposed project involves any land reclamation, details shall be provided of the activity for which land is to be reclaimed and the area of land to be reclaimed	The project does not involve any land reclamation.
xl	Details of the properties, houses, business activities etc. likely to be effected by land acquisition and an estimation of their financial losses, shall be submitted	Details of the properties, houses, business activities etc. likely to be affected by land acquisition and an estimation of their financial

		losses are given in Chapter-7
xli	Detailed R&R plan with data on the existing socio-economic status of the population in the study area and broad plan for resettlement of the displaced population, site for the resettlement colony, alternative livelihood concerns/employment and rehabilitation of the displaced people, civil and housing amenities being offered, etc and the schedule of the implementation of the specific project, shall be submitted	Detailed R & R Plan with data on the existing socio-economic status of the population in the study area is give in Chapter-7
xlii	The environment management and monitoring plan for construction and operation phases of the project shall be submitted. A copy of your corporate policy on environment management and sustainable development shall also be submitted.	The Environmental Management Plan is given in Chapter-9 and Monitoring Plan is given in Chapter-6.
xliii	Estimated cost of the project including that of environment management plan (both capital and recurring) and source of funding. Also, the mode of execution of the project, viz, EPC, BOT, etc, shall be submitted.	Estimated construction cost of the Project is 2676.85 crores and Cost of EMP is 52.284 Crores and source of funding is Hybrid Annuity Mode (HAM)
xliv	Fund allocation for Corporate Environment Responsibility (CER) shall be made as per Ministry's O.M. No. 22-65/2017-1A.11I dated 1st May, 2018 for various activities therein. The details of fund allocation and activities for CER shall be incorporated in EIAIEMP report	Fund allocation for Corporate Environment Responsibility (CER) has been made as per Ministry's O.M. No. 22-65/2017-1A.11I dated 1st May, 2018 for various activities therein. A fund allocation of Rs 13.38 Crores has been allocated for CER activities. (Section 9.6 of Chapter-9)
xlv	Details of blasting if any, methodology/technique adopted, applicable regulations/permissions, timing of blasting, mitigation measures proposed keeping in view mating season of wildlife	There will be no blasting .If during construction hard rock encounters, controlled blasting will be done.
xlvi	In case of river/ creek crossing, details of the proposed bridges connecting on either banks, the design and traffic circulation at this junction with simulation studies	The proposed project is passing through the Palar river. The details of the proposed structure design section are given in 2.7.8 of Chapter-2
xlvii	Details to ensure free flow of water in case the alignment passes through water bodies/river/streams etc.	Cross drainage structures like Major Bridges, Minor Bridges and Culverts have been provided to ensure free flow of water. Details of the structures are given in section 2.7.8 and section 2.7.10 of Chapter-2.
xlviii	In case of bye passes, the details of access control from the nearby habitation/habitation which may come up after the establishment of road.	There is not any bypass in the proposed project. This is a green field project with access control.
xlix	Bridge design in eco sensitive area /mountains be examined keeping in view the rock classification hydrology etc.	There is not any Eco Sensitive Area /Mountain within the RoW.
l	Details of litigation pending against the project, if any, with direction/order passed by any Court of Law against the Project should be given	No litigation is pending against the project road

Ii	The cost of the Project (capital cost and recurring cost) as well as the cost towards implementation of EMP should be clearly spelt out.	The Cost of the Project is 2676.85 Crores. The cost towards implementation of EMP is 52.284 Crores and it is given in section 9.8 of Chapter-9.
Iii	In case of alignment passing through coastal zones	The alignment is not passing through coastal areas.
Iiii	Any further clarification on carrying out the above studies including anticipated impacts due to the project and mitigative measure	No

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1 INTRODUCTION

1.1 Purpose of the Report

The Government of India has decided to take up through National Highways Authority of India (NHAI) about 1000 Kms of expressways under Phase VI of the National Highways Development Project (NHDP).

In pursuance of the above program, NHAI is undertaking the Bangalore-Chennai Expressway project to facilitate high speed travel connectivity between the cities of Bangalore (Karnataka) and Chennai (Tamil Nadu). The proposed project starts from Bangarpet Taluka, Kolar District, Karnataka and ends at Sriperumbudur Taluq, Kanchipuram District in Tamil Nadu. The project road is entirely a new Greenfield highway covering a length of approx. 262 Km in three states viz. Karnataka, Andhra Pradesh and Tamil Nadu.

The Bangalore-Chennai expressway is proposed to be taken up in 3 phases for the purpose of convenient construction and better management of the project. The details of the phases are given in **Table 1.1**

Table 1.1: Phase wise details of Project Corridor BCE

Phases	Description (Design km)	Length (km)	District	State
Phase-I	**Ch. 0.000 to Ch. 71.00** *(incl. a Spur Alignment of 2.05 km)*	**73.050**	**Bangalore Rural** **Kolar**	**Karnataka**
Phase-II	Ch. 71.00 to Ch. 156.000	85.000	Kolar Chittoor	Karnataka & Andhra Pradesh
Phase-III	Ch. 156.000 to Ch. 262.569	106.569	Chittoor Kanchipuram	Andhra Pradesh & Tamil Nadu

This report is for Phase-I of the Bangalore Chennai Expressway starting from Ch. 0.00 to Ch. 71.00. The total length of this package is 73.050 Km.

The development of the project is to improve the performance of the State's road transport network and make it a part of the ongoing NHDP by improving road conditions and capacity, as well to avoid traffic congestion of parallel running existing NH-4 in terms of heavy vehicles, which is among the highest traffic carrying corridors in India.

1.2 Identification of Project and Project Proponent

Ministry of Road Transport & Highways (MoRT&H), Government of India through National Highways Authority of India (NHAI) is implementing the NHDP Phase-IV for the development of about 1000 Kms of expressways. These Expressways will be executed by the through National Highways Authority of India. The NHAI as project proponent has decided to take up the Bangalore-Chennai Expressway project to facilitate high speed travel in this corridor.

NHAI is an autonomous agency of GoI setup by an act of Parliament, the National Highways Authority of India Act, 1988 for the development, maintenance and management of national

highways and for matter connected therewith or incidental thereto. The Project Proponent has appointed *M/s Egis India Consulting Engineers Pvt. Ltd.* as their technical consultant for establishing the technical, economic and financial viability of the project and prepare a Detailed Project Report including Environmental Impact Assessment for the development of Bangalore-Chennai Expressway including spur.

The Registered office of NHAI is:

National Highway Authority of India (NHAI)
G 5&6, Sector-10, Dwarka,
New Delhi - 110 075
Phone: 91-011-25074100 & 25074200
Fax : 91-011-25093507, 25093514
Website: www.nhai.gov.in

The project is being administered by NHAI's Project Implementation Unit (PIU) Bangalore, Karnataka.

1.3 Project Location

The phase-I of proposed 8 lane Bangalore Chennai Expressway (BCE) starts from east of Bangalore at Km 301.200 of NH-4 and ends at Km 71.000 near N.G.Hulkur Village, Bangarpet Taluka, Kolar District, Karnataka. The length falling under Phase-I is 73.050 Km including one Spur alignment of 2.5Km for expressway connectivity to the industrial town of Kolar Gold Fields (KGF). Spur Alignment is also a new alignment and starts from Km 52.085 of main alignment of BCE and continues upto Kolar Goldfields on SH-95 about a length of 2.050 Km. The geographical extension of the project road section is between 13°5'3.38" and 13°00'28.49" of North Latitude and 77°49'20.59" and 78°25'34.00" of the Eastern Longitude between Bangalore and Chennai. Details of the proposed project road are given in Table 1.2.

Table 1.2: Details of the Phase-I of BCE (Project Road)

Sl. No	Section	Design Chainage (Km)		Length (km)
		From	To	
1	BCE Main Alignment-Phase-I (Eight Lanes)	Km 0.000	Km 71.000	71.000
2	Spur Alignment (Four Lanes)	Km 52.085	Kolar Gold Fields on SH-95	2.050
Total				73.050

There are two districts falling under proposed project road in Phase-I in the state of Karnataka namely Bangalore Rural and Kolar as described in **Table 1.3**

Table 1.3: District-wise Length of BCE Phase-I

Sl. No	District	Chainage (Km)		Length (km)
		From	To	
KARNATAKA				
1	Bangalore Rural	Km 0.000	Km 11.682	11.682
2	Kolar			
	(i) Main Alignment	Km 11.682	Km 71.000	59.318
	(ii) Spur Alignment	Km 52.085 of BCE	Kolar Gold Fields on SH-95	2.050

Sl. No	District	Chainage (Km)		Length (km)
		From	To	
Total				73.050

1.4 Salient Features of the Project:

- The proposed project is a new Expressway connecting Bangalore to Chennai. The proposed Phase-I of Bangalore Chennai Expressway starts from east of Bangalore at Km 301.200 of NH-4 and ends at Km 71.000 near N.G.Hulkur Village, Bangarpet Taluka, Kolar District, Karnataka. The total length of proposed Bangalore Chennai Expressway (Phase-I) is 73.050 Km including spur alignment of length Km 2.05. The project stretch falls in the state of Karnataka.
- The proposed spur starts from km 52.080 of Bangalore Chennai Expressway (BCE) and ends at Major District Road which is connecting SH-95 and KGF. The length of spur is 2.05 Km. So the total project length including spur will be 73.050 Kms. The proposed ROW for the spur is 45m.
- The proposed road passes through 2 districts viz. Bangalore Rural and Kolar districts in the state of Karnataka. The project also includes proposal of Spur Alignment for connectivity from the industrial town of Kolar Gold Fields (KGF)/ Robertson pet to Bangalore Chennai Expressway.
- The Proposed Right of Way is 90m keeping in view the fully access controlled expressway with 8-lane dual carriageway configuration to meet the IRC specification.
- For facilitating the construction, the 8-laning will be carried out in phased manner. In first phase construction of 4-lane dual carriageway configuration with 21m depressed median will be taken up. It will facilitate future expansion on median side. This intern requires no additional land on later date. Hence the proposal of 90m ROW has been undertaken. As per the traffic projection, the expressway will be requiring 6-lanes in the years 2030 to 2035 and require 8-lanes configuration in the years 2041 to 2045.
- The Proposed road will have 15 nos. of Major bridges (13 nos. in Main Expressway and 2 nos. in the Interchange), 44 Nos. (41 Nos. along Main Alignment & 3 Nos. along Interchange), 123 Nos. (98 Nos. along Main Alignment & 23 Nos. along Interchange), 1 nos. of ROBs, 35 Nos. of Vehicular Underpass (33 Nos. along Main Alignment & 2 Nos. along Interchange), 19 nos. Light Vehicular Underpasses, 06 nos. of Vehicular Overpasses, 1 nos. of toll plaza, 4 no's interchange with toll plaza.
- There is provision of 2 nos. Truck lay byes, 2 nos. of Rest areas. High mast lights have been proposed along the project Expressway locations like Interchange locations, Rest Area, Toll Plaza Locations and Check Post locations.
- The project alignment passes through 72 village areas, the major settlements along the alignment are Hoskote, Bangarpet, Kolar. All the settlement areas have been avoided by careful selection of alignment in order to avoid mass displacement.
- The land use pattern on 10 Km either side of the project road is predominantly agriculture followed by habitation area.
- The proposed alignment does not pass through any forest area or any ecologically protected areas, such as National Parks, Wildlife Sanctuary, Tiger Reserve of any other notified eco-sensitive areas neither fall in 10 Km radius of such features.

- The project alignment (ROW) involves acquisition of 764.08 Ha of land which includes 717.35 Ha of private land and 46.73 Ha Government land.
- A total number of 344 structures belonging to private person and 1 temple will be affected due to proposed Road. The NHAI shall compensate all the affected title holder as per NHAI Act, 1956 and Right to fair compensation and transparency in land acquisition, rehabilitation and Resettlement Act, 2013.
- Safety measures will be provided as per NHAI Safety Manual and IRC: SP 88 and Expressway Manual IRC: SP 99). Safety Measures, as provided in NHAI Safety Manual i.e. Unit-3 (pertaining to Traffic Safety , such as traffic control zone , advance warning zones, traffic control devices, regulatory & warning signs cylindrical cones, drums, flagman, Barricades , Pedestrian Safety , speed control etc.) and other safety guidelines & measures suggested in Unit-4 (Construction Zone Safety), Unit 5 (Temporary Structures Safety), Unit-6 (Workers & Work Zone Safety), Unit-7 (Electrical & Mechanical Safety) will be strictly implemented. All required illustrative plans for safety at construction sites keeping in view all situations highlighted IRC: SP: 55 and in NHAI Safety Manual will be prepared and strictly implemented.
- The proposed alignment passes through a number of plantation areas where farmers carry out commercial cultivation of Eucalyptus and Mango plants. About one lac such trees will be affected, out which more than 95 percent are Eucalyptus trees. During estimation of compensation of land acquisition, the affected trees have already been considered and according compensation has been paid to the affected farmers.
- Avenue plantation shall be carried out as per IRC SP: 21:2009 on available ROW apart from statutory requirements. The enumerations (tree inventories) of total trees and trees to be affected has been carried out with their local & scientific names and girth range specific manner.
- Materials requirements are aggregate (22,17,500 cum), Bitumen (45,600 MT), Soil (1,95,07,688 cum), Sand (5,01,300 cum), Steel (65287 MT), Cement (4,28,000 MT), Brick (2,47,55,000 Pieces).
- The total requirement of water for construction is estimated to 15000 KL/day. To meet the water requirement for construction.
- The total estimated Project Civil Cost is approximately Rs. 2676.85 Crores.
- The project is proposed to be developed in Hybrid Annuity Mode (HAM) with time period of 30 months. The schedule of construction for each of the activities of the project will be prepared by contractor and submit to authority for approval before start of the project execution.

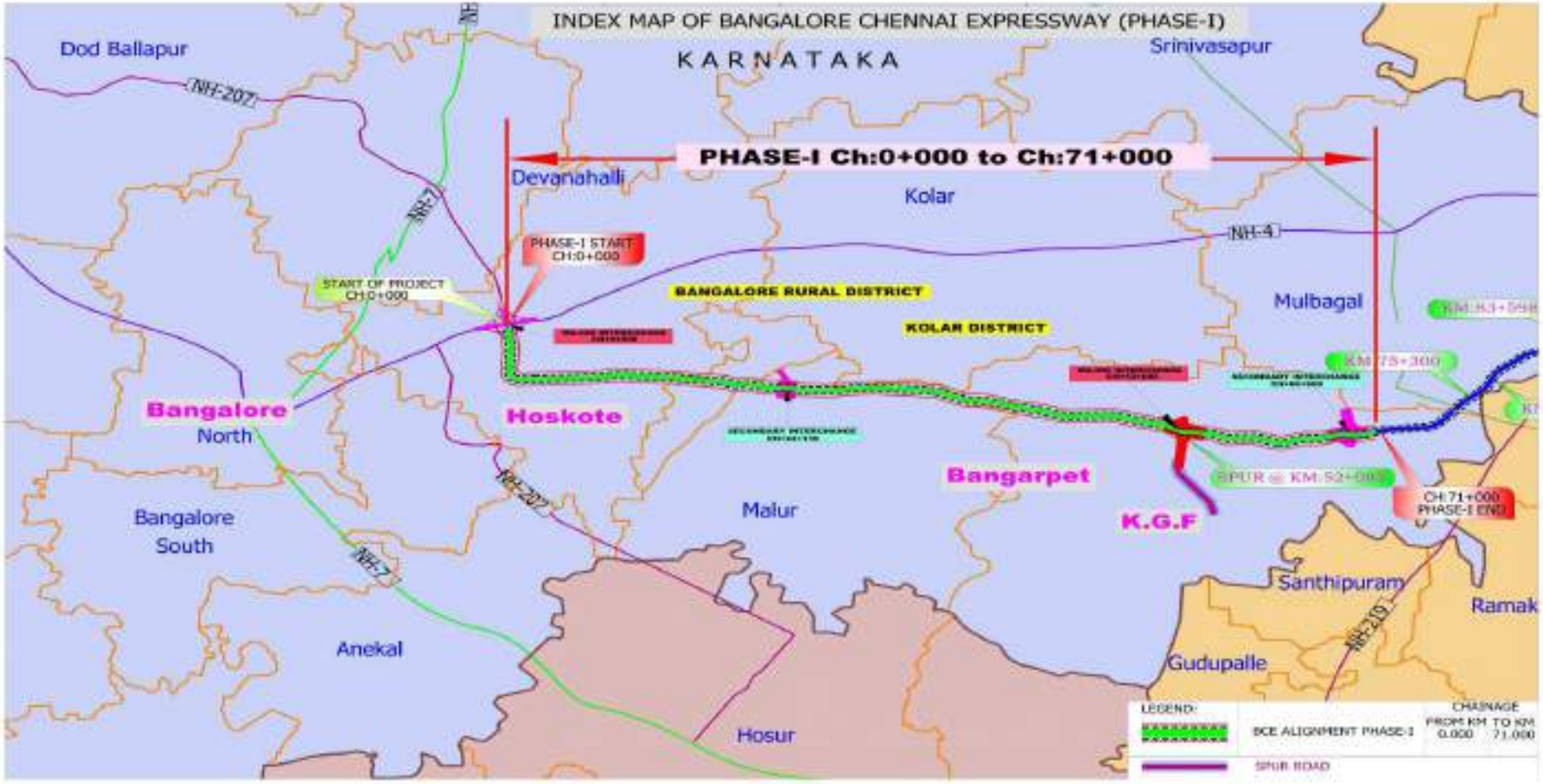


Figure 1.1: Key Plan of Bangalore-Chennai Expressway-Phase-I

1.5 Objectives of the Study

The major objective of this study is to establish present environmental condition along the project corridor through available data / information supported by field studies to evaluate the impacts on relevant environmental attributes due to the construction & operation of the proposed project; to recommend adequate mitigation measures to minimize / reduce adverse impacts and to prepare an Environmental Management Plan (EMP) for timely implementation of the mitigation measures to make the project environmentally sound and sustainable. An Environmental Impact Assessment (EIA) study basically includes:

- Establishment of the present environmental scenario
- Study of the specific activities related to the project
- Evaluation of the probable environmental impacts
- Recommendations of necessary environmental control measures.
- Preparation of Environmental Management Plan

1.6 Scope of the Study

Environmental Impact assessment is a detailed process, which starts from the conception of the project and continues till the operation phase. The steps for environmental assessment are therefore different at different phases. The present report details the environmental setting of the project zone, collects the baseline data and then identifies the anticipated environmental impact and finally suggests appropriate mitigation measures and mechanism for ensuring effective implementation of the environmental safeguard measures at different stages of the project. The detailed EIA study for the present project has been carried out in accordance with the standard TOR and conditions stipulated under the approved TOR.

The NHAI approached the MoEFCC for approval of Terms of Reference for the proposed project. Accordingly, after recommendations of Expert Appraisal Committee (EAC), the MoEFCC issues ToR for EIA study for the above project vide their letter NO. F.No. *10-15/2018-IA.III dated 14th May 2018.*

The compliance matrix to the approved TOR conditions has been provided in the Tabular Form separately

1.7 Environmental Policies and Legislation

Table 1.4 presents Environmental regulations and legislations relevant to this project, which are the responsibility of a number of government agencies.

Table 1.4: Summary of Relevant Environmental Legislations

Act/Rule/Notification/ Policy	Year	Objectives	Responsible Agency
Constitution of India, Article 48, 51-A	1950	Article 48A of the Directive Principles of State Policy provides for the State's commitment to protecting the environment and Article 51A(g) states that to protect and improve the natural environment shall be the fundamental duty of the citizen of India.	MoEF&CC, Government of India

Act/Rule/Notification/ Policy	Year	Objectives	Responsible Agency
The Environment (Protection) Act The Environment (Protection) Rules	1986 1986	To protect and improve the overall environment by ensuring that appropriate measures taken to conserve and protect the environment before commencement of operations.	MoEF&CC; GoI; Department of Forest, GoUP; KSPCB
Environment Impact Assessment Notification and its amendments made thereafter.	2006	Identifies highways/expressways among other project that needs environmental clearance from the Central Government in the form of an approved environmental impact assessment (EIA) report and EMP.	MoEF&CC; GoI; KSPCB
Indian Forest Act Forest (Conservation) Act Forest (Conservation) Rules Forest Conservation Rules (Notification)	1927 1980 1981 2003 2014 2017	To consolidate the laws related to forest, the transit of forest produce and the duty livable on timber and other forest produce. Conservation of Forests, Judicious use of forestland for non-forestry purposes; and to replenish the loss of forest cover by Compensatory Afforestation on degraded forestland and non-forest land. Procedure for submission of the proposals seeking approval for Central Government for diversion of forestland to non-forest purposes.	MoEF&CC; Department of Forest, State Govt (SFD).
Wild Life (Protection) Act The Wild Life (Protection) Amendment Act	1972 2002	To protect wildlife in general and National Parks and Sanctuaries in particulars. To protect wild animals, birds and plants with a view to ensure the ecological and environmental security of the country.	Chief Conservator of Wildlife, Wildlife Wing, Forest Department, State Govt. National/State Board for Wildlife
The Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forest Rights) Act	2006	Grants legal recognition to the rights of traditional forest dwelling communities, partially correcting the injustice caused by the forest laws. Makes a beginning towards giving communities and the public a voice in forest and wildlife conservation	Ministry of Tribal Affaires, GOI and Department of Tribal Welfare, GoK
National Forest Policy National Forest Policy (Revised)	1952 1988	To maintain ecological stability through preservation and restoration of biological diversity	Forest Department, GoI and State Govt.
The Water (Prevention and Control of Pollution) Act Water (Prevention and Control of Pollution) Cess Act	1974 1977	To control water pollution by controlling discharge of pollutants as per prescribed standards Provides for a levy and collection of a cess on water consumed by industries and local authorities	CPCB; KSPCB
The Air (Prevention and Control of Pollution) Act	1981	To control air pollution by controlling emission of air pollutants as per prescribed standards	CPCB; KSPCB & Transport Department; State Govt.
Noise Pollution (Regulation and Control) Rules The Noise Pollution (Regulation and Control) Amendment Rules	2000 2006	To regulate and control noise producing and generating sources with the objective of maintaining the ambient air quality standards in respect of noise.	CPCB; KSPCB, Transport Department; State Govt.
Solid Waste Management Rules (SWM)	2016	For Management and handling of solid waste during construction	KSPCB

Act/Rule/Notification/ Policy	Year	Objectives	Responsible Agency
Hazardous and Other Wastes (Management & Trans boundary Movement) Rules	2016	Protection to the general public against improper handling and disposal of hazardous wastes	KSPCB
Construction and Demolition Waste Management Rules	2016	To provide responsibility of the waste generators for the collection, segregation and other activities involved with the debris management generated during construction	KSPCB
Batteries (Management & Handling) Amendment Rules	2010	Management and handling of used lead batteries i.e. safe disposal of batteries used during construction	KSPCB
E-Waste (Management) Rules	2016	Effective mechanism to regulate generation, collection, storage, transport, import, export, recycling, treatment and disposal of e-wastes	KSPCB
Biodiversity Act	2002	To provide for conservation of biodiversity, sustainable use of resources fair and equitable sharing of the benefits from use of resources	National Biodiversity Authority/State Authorities
Fly Ash Notification	2011 2016	Mandate use of fly ash in road construction within a radius of 300km. For highways project, flyash to be made available by the TPP at filling site free of cost up to 100km and on cost sharing basis up to 300km.	MoEF&CC
National Environmental Tribunal	1995	To provide for strict liability for damages arising out of any accident occurring while handling any hazardous substance	National Environmental Tribunal
The Motor Vehicle Act Central Motor Vehicle Rules and The Motor Vehicles (Amendment) Act	1988 1989 2019	To consolidate and amend the laws related to motor vehicles. Licensing of driving of motor vehicles, registration of motor vehicles, with emphasis on road safety standards and pollution control measures, standards for transportation of hazardous and explosive materials To check vehicular air and noise pollution.	RTO Office, GoUP, Govt. of Karnataka
The Ancient Monuments and Archaeological Sites and Remain Act	1958 2010	To provide for the preservation of ancient and historical monuments and archeological sites and remains of national importance and protection sculptures, carvings and other like objects.	Archaeological Department (ASI), GoI; Indian Heritage Society and Indian National Trust for Art and Culture Heritage (INTACH),
National Policy of Resettlement and Rehabilitation	2007	For payment of compensation and assistance, different entitlements payment of compensation and assistance, resettlement and rehabilitation of project affected population due to acquisition of lands and structures.	PIU NHAI, Competent Authority (Revenue Department)
Right to fair compensation and transparency in land acquisition,	2013	Fair compensation for acquisition of immovable assets; Resettlement of displaced population	Revenue Department. Govt. of Karnataka

Act/Rule/Notification/ Policy	Year	Objectives	Responsible Agency
rehabilitation and Resettlement Act		due to LA and economic rehabilitation of all those who are affected due to land acquisition.	
National Environment Tribunal Act	1995	To provide for strict liability for damages arising out of any accident occurring while handling any hazardous substance.	National Environmental Tribunal
State Acts			
The Karnataka Ancient and Historical Monuments and Archaeological sites and Remains Act	1961	These Acts are applicable in case any development activity is undertaken in close vicinity of any archaeological site or any are discovered during the construction stage. The Act requires prior authorization of the Archaeological Survey of India (ASI) for development within 300 m of a Protected Property	Archaeological Dept., GoK and GoI; Indian Heritage Society and Indian National Trust for Art and Culture Heritage (INTACH)
The Karnataka Forest Act, The Karnataka Forest Rules	1963 1969	The rules provide for constitution, conservation and protection of reserved forests, village forests and district forests, control of timber and other forest produce in transit, provisions relating to sandalwood, forest development tax, penalties and procedures relating to forest offence cases, etc. The Karnataka Forest Rules were formulated during 1969 for carrying out the provisions of Karnataka Forest Act, 1963	Department of Forests, Government of Karnataka
The Mysore Highways Act, Mysore Highways Rules,	1964 1965	These enactments provide, among other things, for the restriction of ribbon development and removal of encroachments. They are applicable to highways of the State, but not to the National Highways. These have also provisions for enforcing restrictions on building activity along highways and control of access to their land.	Department Country and Town Planning, GOK
The Karnataka Preservation of Trees Act, The Karnataka Preservation of Trees Rules	1976 1977	To regulate the felling of the trees and for the planting of adequate number of trees to restore ecological balance and for matters connected therewith. The Act also stipulates constitution of a Tree Authority in different areas. The Act also elaborates the restriction on felling of trees and liability for preservation of trees. Section 8(2) of the Act specifies that "Any person desiring to fell a tree shall apply in writing to the concerned Tree Officer for permission in that behalf. The application shall be accompanied by a site plan or survey sketch specifying clearly the site or survey number, the number, kind and girth of tree sought to be cut and the reasons therefore along with the consent of the owner or occupant".	Department of Forests, Department of Social Forestry, GoK

Brief description of relevant laws is given below:

Forest (Conservation) Act, 1980: The Forest (Conservation) Act, 1980 is of particular significance in case the project corridors require clearance for diversion of forest land for non-forest purpose inside the Right of Way (RoW) of the road corridors for the development of Kanpur Lucknow Expressway.

The proposals involving upto forty hectares of forest land and all proposals involving diversion of forest land for linear projects such as roads, railway lines, transmission lines, pipelines etc., irrespective of area of forest land involved, are sent to the concerned Regional Office (in project

case, RO-Lucknow) of the Ministry of Environment, Forest and Climate Change (MoEF&CC). As per the FC Rules, prior approval of central government under the FC Act is given in two stages commonly referred to as Stage-I (In Principle agreement) and Stage-II (Formal approval) under the FC Act respectively.

Wild Life Protection Act, 1972: It has allowed the government to establish a number of National Parks and Sanctuaries over the past 25 years, to protect and conserve the flora and fauna of the State.

The Water (Prevention and Control of Pollution) Act, 1974: It resulted in the establishment of the Central and State Level Pollution Control Boards whose responsibilities include managing water quality and effluent standards, as well as monitoring water quality, prosecuting offenders and issuing licenses for construction and operation of any facility. This will include generation of liquid effluent during construction of road from Civil Engineering activities or from domestic activities in worker's colony. There are specific penalties for violation, which include imprisonment for responsible officials.

The Air (Prevention and Control of Pollution) Act, 1981: The Act empowers Central and State Pollution Control Boards for managing air quality and emission standards, as well as monitoring air quality, prosecuting offenders and issuing licenses for construction and operation of any facility. There are specific penalties for violation, which include imprisonment for responsible officials. This Act has notified National Ambient Air Quality Standard for different regions e.g. Industrial, Residential and Sensitive. Air quality during construction and operation phases will be guided by this specific act.

Environment (Protection) Act, 1986: This Act was passed as an overall comprehensive act "for protection and improvement of environment". According to this Act, the Central Government has the power to take all such measures as it deems necessary or expedient for the purpose of protecting and improving the quality of environment and preventing, controlling and abating environmental pollution. Under this act rules have been specified for discharge/emission of effluents and different standards for environmental quality. These include Ambient Noise Standard, Emission from Motor Vehicles, Mass Emission Standard for Petrol Driven Vehicles, General Effluent Standards etc. especially important for road project.

EIA Notification, 2006: The Environment Impact Assessment (EIA) notification 2006, Ministry of Environment, Forests & Climate Change, Government of India, came into effect from 14th September 2006. The EIA Notification, 2006 specifies the various development projects requiring prior clearance from Ministry of Environment, Forests & Climate Change (MoEF&CC). As per Schedule of the Notification; the Highway project falls under Physical Infrastructure including Environmental Services and have been listed under item no. 7(f), including new highways or expansion of existing highways (highways include Expressways). The projects and activities under the Notification have been classified into two categories- Category A and Category B, based on the spatial extent of potential impacts on human health and natural and manmade resources. The highway projects have also been classified into two categories- Category A and Category B based on the following conditions:

Category A: New National Highways and expansion of existing National Highway greater than 100 Km, involving additional RoW or land acquisition greater than 40 m on existing alignment and 60 m on re-alignment or bypass.

Category B: All State Highway projects and State Highway expansion projects in hilly terrain (above 1000 m AMSL) and or ecologically sensitive areas.

Moreover, any project or activity specified in Category B will be treated as Category A if located in whole or in part with in 5 km from the boundary of:

i. Protected areas notified under the Wild Life (Protection) Act, 1972,
ii. Critically Polluted areas as notified by Central Pollution Control Board from time to time,
iii. Eco sensitive areas as notified under section 3 of Environment Protection Act, 1986 such as Mahabaleshwar, Panchangi, Matheran, Pachmarhi, Dahanu, Doon Valley, and
iv. Inter State boundaries and international boundaries.

Provided that the requirement regarding distance of 10 km of the inter-state boundaries can be reduced or completely done away with by an agreement between the respective States or U.Ts sharing the common boundary in the case the activity does not fall within 10 kilometres of the areas mentioned at item (i), (ii) and (iii) above.

In the present case, the proposed expressway is a new National Expressway contained in Uttar Pradesh only Hence, as per EIA notification 2006, the proposed project falls under Category-A and attracts the conditions of obtaining prior Environmental Clearance from MoEFCC.

Fly Ash Notification, 2016

According to the Notification No. S.O. 763 (E), dated 14.09.1999 and its amendment thereafter on 27.08.2003 and notification S.O. 2804(E) dated 3rd November 2009, S.O. 254 (E)dated 25.01.2016 by MoEF&CC, it is mandatory to use fly ash within a radius of 300 kilometers of Thermal Power Plant. No agency, person or organization shall within a radius of 300 kilometer of Thermal Power Plant undertake construction or approve design for construction of roads of flyover embankments in contravention of the guidelines/ specification issued by the Indian Road Congress (IRC) as contained in IRC specification No. SP: 58 of 2001. Any deviation from this direction can only be agreed to a technical reason if the same is approved by Chief Engineer (Design) or Engineer-in-chief of the concerned agency or organization or on production of certificate of "Pond ash not available" from the Thermal Power Plant(s) located within 300 kilometers of the site construction. This certificate shall be provided by TPP within two working days from the date of making request for fly ash.

1.8 Summary of Statutory Clearance Requirement

The project requires a number of statutory clearances under different Acts and Rules at different stage of the project. These are listed in **Table 1.5.**

Table 1.5: Summary of Statutory Clearance Requirement of the Project

Sl. No.	Name of Clearance/Permission	Authority to Accord Clearance	Responsibility
1	Environmental clearance for New Alignment	Ministry of Environment and Forests (MoEF) on the recommendations of an Expert Appraisal Committee (EAC) to be constituted by the Central Government.	NHAI

Sl. No.	Name of Clearance/Permission	Authority to Accord Clearance	Responsibility
3	NOC, Consent to establish and Consent operate construction camps, crushers, hot mix plants, etc.	Karnataka State Pollution Control Board	Contractor
4	Permission to withdraw ground water for construction from new sources	Central Ground Water Board.	Contractor
5	License to store HSD and Explosives at Construction camp by the contractors from Chief Controller of Explosives under Petroleum Acts and Rules	Office of the Controller of Explosives, Mangalore (Karnataka)	Contractor
6	Permission to Establish Construction camps	District Magistrates of respective districts.	Contractor
7	Permission to cut the trees in the RoW in private land	District Magistrates of respective districts.	Contractor
8	Permission to withdraw water for construction from surface water sources such as rivers	Water Resources Department, Karnataka	Contractor
9	Licenses and permissions under Factories Act and Labour Law during phase by the contractors	Directorate of Factories and Boilers and Department of Labour, Bangalore (Karnataka).	Contractor

NOC for Crossing the Irrigation Water Tanks

The project alignment passes through 14 numbers of irrigation tanks which is owned and managed by the Irrigation Department, Government of Karnataka. The NHAI has obtained NOC from the line department for constructing the road across these waterbodies with adequate protection measures. The copy of NOCs issues by the line department is enclosed as **Annexure 1.1.**

Compensation of Land & Properties

As standard practice, the NHAI appointed Competent Authority for estimation of compensation for the losses of land and properties and disbursement of compensation to the bonafide affected person as per the prevailing rules and rates. The Competent Authority of the SLO, District Revenue Department. The competent Authority for Land Acquisition (CALA) has already estimated the compensation cost after joint measurement of each land and properties. As per estimation the cost of compensation for land and properties is INR 21,25,84,90,825/- out of which almost 98% of the amount has been disbursed to the affected persons.

1.9 Structure of the Report

The present Environmental Impact Assessment Report is structured as follows:

Chapter 1.0 Introduction: The chapter provides the introduction to the present project, identification of the project proponent, need of the project and its interventions with statutory requirements.

Chapter 2.0 Project Description: It provides the details of salient features of the existing project road, details of the proposed developments – widening proposal, service roads, details of bridges, culverts, flyover, vehicular/ pedestrian underpasses, bus bays, truck lay byes, entry and exit locations, rest areas and toll plaza etc.

Chapter 3.0 Description of the Environment: The chapter describes Baseline Environmental features within the project area in details. It includes detailing of physical environmental resources viz. (Physiography, Geology and Soils, Quarry Site and Borrow Area, Climatology details), Ecological and social & cultural resources along the project road corridor and its area of influence. The data presented in the chapter is collected from primary and secondary sources.

Chapter 4.0 Anticipated Environmental Impacts & Mitigation Measures: It deals with details of anticipated environmental impacts (both positive as well as negative) due to the proposed project and provides mitigation measures for all the identified adverse impacts during design and construction phase and operation stage of the project.

Chapter 5.0 Analysis of Alternatives: This chapter provides detailed analysis of alternatives that has been carried out for the finalization of alignment.

Chapter 6.0 Environmental Monitoring Programme: The chapter provides the details about the Environmental Monitoring Plan in Construction Stage and in Operation Stage. The monitoring plans details out the performance indicators, monitoring parameters, standards, frequency, duration, implementation and responsibilities required for monitoring and the cost of monitoring the parameters.

Chapter 7.0 Additional Studies: The chapter is divided into two parts. The first part provides the information of the socio-economic condition of the Project Affected Persons (PAPs), impact on the land and properties, compensation, Institutional arrangement, Monitoring and evaluation. The second part provides the information of Public Hearing conducted in project districts as per EIA Notification 2006. It contains proceedings of public hearing forwarded by State Pollution Control Board to MoEF&CC, attendance sheets and photographs.

Chapter 8.0 Project Benefits: This chapter describes Project Benefits from proposed project and includes local benefits and the wider regional or national level benefits.

Chapter 9.0 Environmental Management Plan (EMP): This chapter comprises a set of environmental safeguard measures for identifies adverse impacts during different stage of the project and activities with an objective to offset or reduce adverse environmental impacts to acceptable levels. The EMP provides action plan of implementation of mitigation measures at different locations, time frame with responsibility assignments for implementing appropriate measures at appropriate time for ensuring effectiveness of the proposed safeguard measures. Adequate budgetary provisions have also been made for implementation and monitoring of the effectiveness of the suggested measures.

Chapter 10.0: Summary and Conclusion: The Chapter provides overall summary of the project features and summary of EIA study.

Chapter 11.0: Disclosure of Consultants Engaged: The Chapter provides information of the Consultants and experts who were involved in the EIA study of the project.

2 PROJECT DESCRIPTION

2.1 INTRODUCTION

Government of India has decided to take up through National Highways Authority of India (NHAI) about 1000Kms of expressways under Phase VI of the National Highways Development Project (NHDP). The Bangalore-Chennai Expressway project has been considered under NHDP Phase-VI to facilitate high speed travel in this corridor. The existing National Highway–4 which is running parallel to the proposed expressway carries one of the highest traffic carrying corridors in India. The proposed expressway facility is proposed to be developed as a fully access controlled facility on a new alignment.

The National Highways Authority of India (NHAI) has appointed M/s Egis-BCEOM International S.A. in association with M/s SECON Pvt. Ltd. as consultants to carryout Consultancy Services for Feasibility Study cum Preliminary Design Report for the Bangalore-Chennai Expressway under NHDP Phase-VI. The proposed eight lane expressway would be a fully access controlled high speed facility. Therefore, all the entry, exits and crossings have to be planned suitably as grade separated facilities. Safety in design, construction, and operation is of paramount importance for the facility and needs to be integrated at the planning stage itself.

The Feasibility cum Preliminary Design Report thus prepared containing inter-alia, the scheme and layout of the expressway and the project facility, preliminary design and costing. Costing will be on HAM pattern, wherein the concessionaire shall, in accordance with the model concession agreement approved by the Government, take full responsibility to carry out the detailed design, construction, maintenance and operation of the project expressway and the project facilities confirming to the standards specified in the concession agreement. Concessionaire will obtain all the finances required for the project, and eventually transfer the project to NHAI after expiry of the concession period in a state as specified in the concession agreement.

2.2 NEED FOR THE PROJECT

Road projects are generally undertaken to improve the economic and social welfare of those using the road or served by it. Increased road connectivity can facilitate the fast and smooth movement of traffic thereby reducing travel times and lower the costs of vehicle use. Benefits include increased access to markets, jobs, education and health services, and reduced transport costs for both freight and passengers, reduce fuel consumption and exhaust emissions from the vehicle plying on the road.

2.3 PROJECT OBJECTIVE

The main objective of the consultancy work is to establish the feasibility of an expressway corridor between Bangalore and Chennai on the basis of technical, economic and financial viability of the project in the first stage and thereafter prepare the feasibility cum preliminary design report for the construction of the expressway along the selected alignment by the NHAI. Based on the feasibility cum preliminary design report, bidding documents will be prepared for

award of BOT concession on DBFO Pattern for the construction, operation and maintenance of the expressway.

The expressway is planned to be developed as a fully access controlled facility. Appropriate measures for mitigating the effects of property and community severance and circulation of the local and access traffic are to be suggested. Drainage pattern needs to be undisturbed. Natural environment, human habitation and heritage sites have to be fully protected.

Safety is of paramount importance for the project and needs to be incorporated at the planning stage itself. Infrastructure for user facilities, operation and maintenance, incident management and user information system will be an integral part of the study. Modern automatic toll collection systems with state of the art technologies will be proposed for the project.

2.4 PROJECT APPROACH FOR ENVIRONMENTAL STUDIES

The basic approach adopted for conducting the environmental study for the project will strongly pursue the prevailing institutional and legislative setup of the Government of India (GoI) and in conformity with NHAI policy on this subject. The main approaches are:

- Identification of potential environmental and social impacts of the project.
- Integration of environmental and social issues in alignment selection and the project design for avoiding and offsetting the environmental and social impacts.
- Identification of unavoidable or irreversible impacts;
- Explanation of the impacts quantitatively,
- Characterization of the extent and quality of available data;
- Exploration towards the opportunities for environmental enhancement; and
- Identification of feasible and cost effective mitigation measures to minimize negative impacts and enhance positive impacts by incorporating in the engineering design.

2.5 PROJECT LOCATION

2.5.1 Bangalore-Chennai Expressway

The project road will connect the Hoskote, Bangarapet, Kolar of Bangalore rural district and Kolar districts of state Karnataka. After a thorough and careful study of various alternate alignments, the Main alignment of Bangalore-Chennai Expressway was finalised keeping in view the engineering, environmental and social aspects. The final alignment considered for feasibility and preliminary study of BCE, is a new alignment which starts from Bangalore near village Kolatturu of Hoskote Takuk on NH-4 at Km 301.200, and ends at Km 71.000 near N.G.Hulkur Village, Bangarpet Taluka, Kolar District, Karnataka. The total length of the proposed BCE project is 73.750 Km ((including 0.700 km of interchange at start point and 2.050 Km long spur alignment). The section of BCE alignment in Karnataka state passes through mainly cultivation land with other minor types of land uses like waste land and barren land. The details of the project road are given in Table 2.1 to Table 2.3. The index map is given as **Annexure 2.1** and Location Map is given on SOI toposheet as **Annexure 2.2** and on Google Earth as **Annexure 2.3**

Table 2-1: Details of the Project in the State of Karnataka

Sl. No.	Section	Design Chainage(km)		Length (km)
		From	To	
1	Start NH-4 Bangalore atr Village Kolatturunear, Hoskote to Bethamangala (near Mulbagal)	0+000	71+000	71.700 (including 0.700 km of interchange at start point)
2	Spur Alignment for connectivity to Kolar Goldfield at km 52.08 of BCE	Kolar Gold Fields	2+050	2.050
Total				**73.750**

For facilitating construction of BCE-Phase-I, the project has been divided into three construction packages which are as follows:

Table 2-2: Details of the Packages in the Phase I of Main Alignment of the Project

Sl. No.	Section	Design Chainage(km)		Length (km)
		From	To	
1	**Package I** (from Km 0.000 to Km 26.400 (including 0.700 Km approach towards NH 207 with interchange on NH4 at start point) (Bangalore to Malur section in the state of Karnataka under Bharatmala)	0+000	26.400	27.100 (including 0.700 km of interchange at start point)
2	**Package II** (from Km 26.400 to Km53.500 Malur to Bangarpet Section) in the State of Karnataka under Bharatamala.	26+400	53+500	27.100
3	**Package III** (from Km 53.500 to Km 71.000 (Bangarpet to Bethamangala Section) in the State of Karnataka under Bharatamala.	53+500	71+000	17.500
Total				**71.700**

2.5.2 Spur Alignment

Based on the reconnaissance survey, traffic study and further discussion with NHAI, one spur is proposed on the project road for facilitating the connectivity to the area with the proposed Expressway. The details are given in **Table 2.3**.

Table 2-3: Details of Spur

Sl. No	Description	From	To	Length(Km)
1	Spur Alignment	km 52.08 of BCE	Kolar Gold Fields	2.05

2.6 PROPOSED DEVELOPMENT

As stated earlier the proposed project is the part of National Highway Development project (NHDP) Phase-VI to facilitate high speed travel in this corridor, which carries one of the highest volumes of traffic along the existing National Highway route serving the corridor. The project road under the proposal starts from Bangalore, Km 0.000 (including 0.700 km of interchange at start point) near Hoskote and ends at Km 71.000 in Bethamangala near N.G.Hulkur Village,

Bangarpet Taluka, Kolar District, Karnataka of 8-lane configuration. The salient feature of the proposed project is summarized in **Table 2.4.**

The BCE project is a green field alignment with 90 m wide Right of Way considering eight lane divided configuration with paved shoulder. The typical cross sections along the project highway are indicated in **Figure 2-1** to **Figure 2-6**.

Table 2-4: Salient Features of the Project

A. General Information:

S. No.	Project Components	Details
1.	Project	Construction of Bangalore Chennai Expressway including spur alignment in the states of Karnataka.
2.	Administrative locations	Districts: Bangalore Rural, Kolar.
3.	State	Karnataka.
4.	Length of the Project road	Bangalore rural District :11.682 Km Kolar District: 59.318 Km + Spur 2.050 Km Total Length in Kolar District: 61.368 Kms Total Length including Spur : 73.050 (Km 71.000 + Km 2.050)
5.	Terrain	The project road is in plain and Rolling terrain
6.	Major Settlement along the Project Stretch	Hoskote, Bangarapet, Kolar Gold Fields, Bethamangala.
7.	Rivers/Streams/Canals	The project mainly crosses natural streams/nallas.
8.	Ponds/Tanks	14 (Bangalore Rural District: 2 Kolar District: 12)
9.	Forest area	Nil
10.	Ecologically Protected areas	The project does not pass through any National Park, Wildlife Sanctuary, Tiger Reserve, or notified Eco-sensitive areas/Protected areas. Neither the project falls in eco-sensitive zone

B. Other features:

S. No.	Items	Proposed
1.	ROW	• Main alignment =90 m • Spur alignment =45 m At Rest Area= 690 m for 425 m length
2.	Carriageway	4 lane divided carriageway with 21 m depressed median expandable to 8-Lane configuration
3.	Design Speed	120 Kmph
4.	Major Bridge	15 Nos. (13 nos. in Main Expressway and 2 nos. im the Interchange)
5.	Minor Bridge	44 Nos. (41 Nos. at Main Alignment & 3 Nos. at Interchange)
6.	ROB	1 No.
7.	No. of Culverts (Box)	123 Nos. (98 Nos. along Main Alignment & 23 Nos. along Interchange)

S. No.	Items	Proposed
8.	Vehicular Underpass	35 Nos. (33 Nos. along Main Alignment & 2 Nos. along Interchange)
9.	Vehicular Overpass	6 Nos.
10	Light Vehicular Underpass	19 Nos.
11.	Interchange	4 Nos.
13.	Rest Area	2 Nos. (Including Both Sides)
14.	Toll Plaza	4 Nos.
15.	Truck Lay Byes	2 Nos. (Including Both Sides)
16.	Connecting roads	9.618 Km
17.	IOCL Crossing	2 nos.
18.	Wayside Amenities	1 no. at 47.906
19.	Street Light	The street light has been proposed for locations at LVUP, VUP, Interchange, Check Post, Rest Area and Toll Plaza Locations.
20.	High Mast Light	The High mast lighting has been proposed along the project highway locations in interchange locations, Rest area, Toll plaza locations and check post locations.
21.	Construction Cost of the Project	Rs. 2676.85 crores.

2.6.1 Cross Section Schedule

The Project Highway starts from Bangalore near Hoskote on NH-4 at Km 301.200, and ends at Km 71.000 in Bethamangala near N.G.Hulkur Village, Bangarpet Taluk, Kolar District, Karnataka shall be designed considering the future eight lane dual carriageway configuration. However presently it is proposed to construct the Expressway in Phase-I with 4-lane dual carriageway with paved shoulder with 21 m wide depressed median. The expressway expansion will be undertaken in phased manner. It will facilitate future expansion on median side. This intern requires no additional land on later date. Hence the proposal of 90m ROW has been undertaken. As per the traffic projection, the expressway will be requiring 6-lanes in the years 2030 to 2035 and require 8-lanes configuration in the years 2041 to 2045.

Typical cross-sections have been developed based on site requirements and to meet design standards stated in the Manual of Specifications & Standard as per IRC: SP: 99-2013. Altogether at total 13 typical cross section has been proposed for the construction of proposed Expressway for Phase-I, which includes typical cross sections for main alignment and interchanges. The schedule of Typical Cross Section at different locations is provided in **Annexure 2.4**.

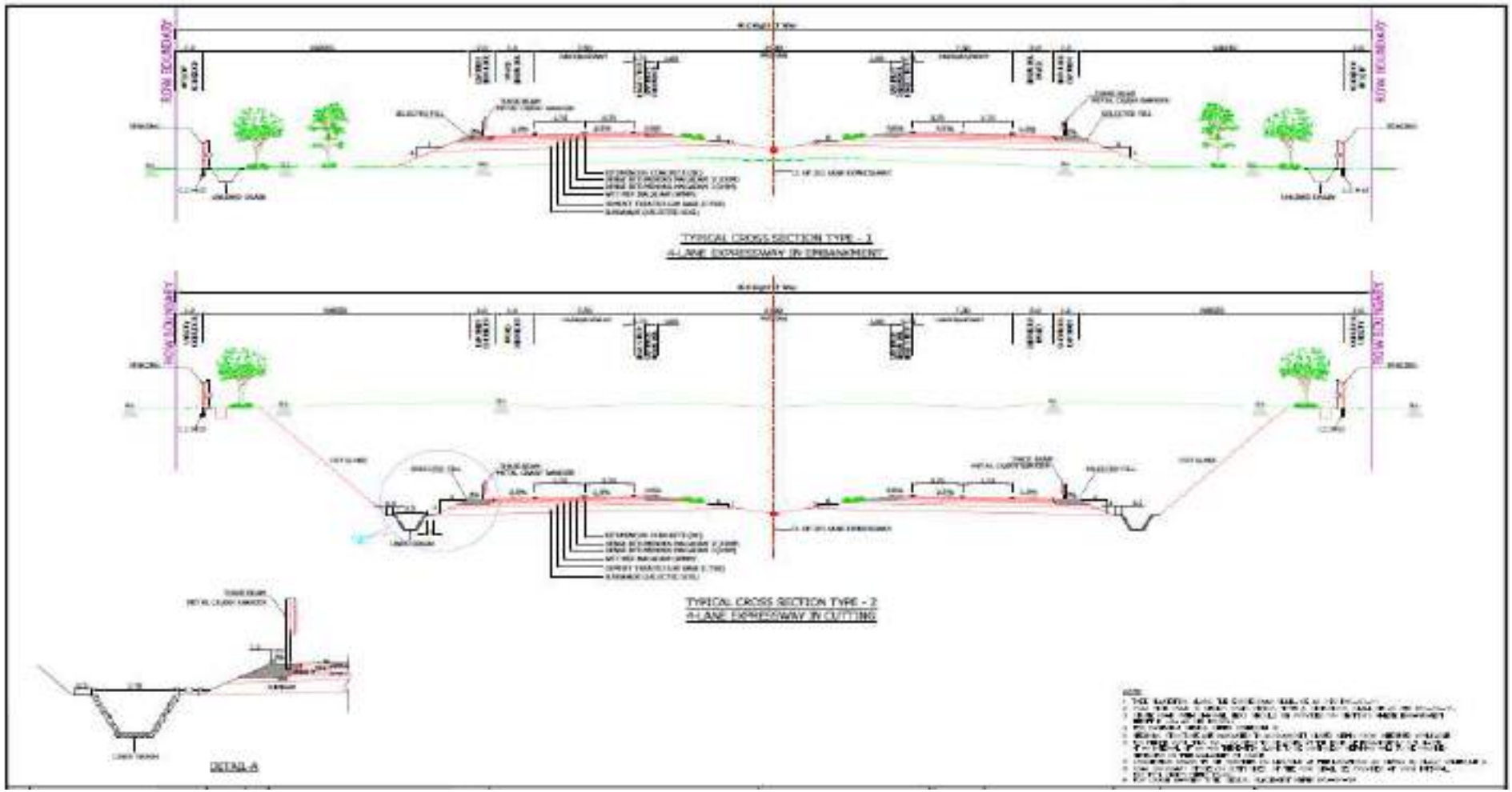


Figure 2.1: The typical cross section along the project highway

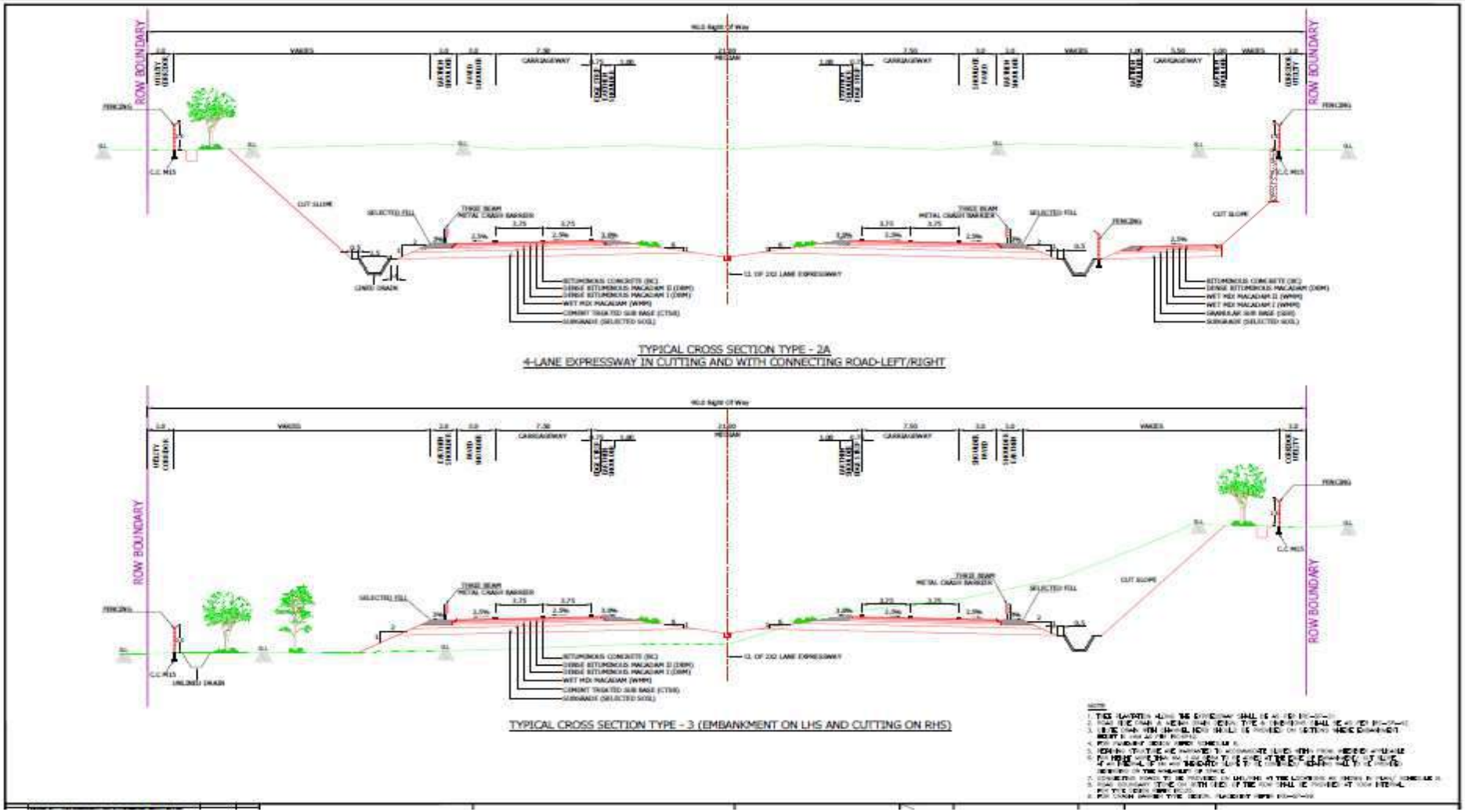


Figure 2.2: The typical cross section along the project highway

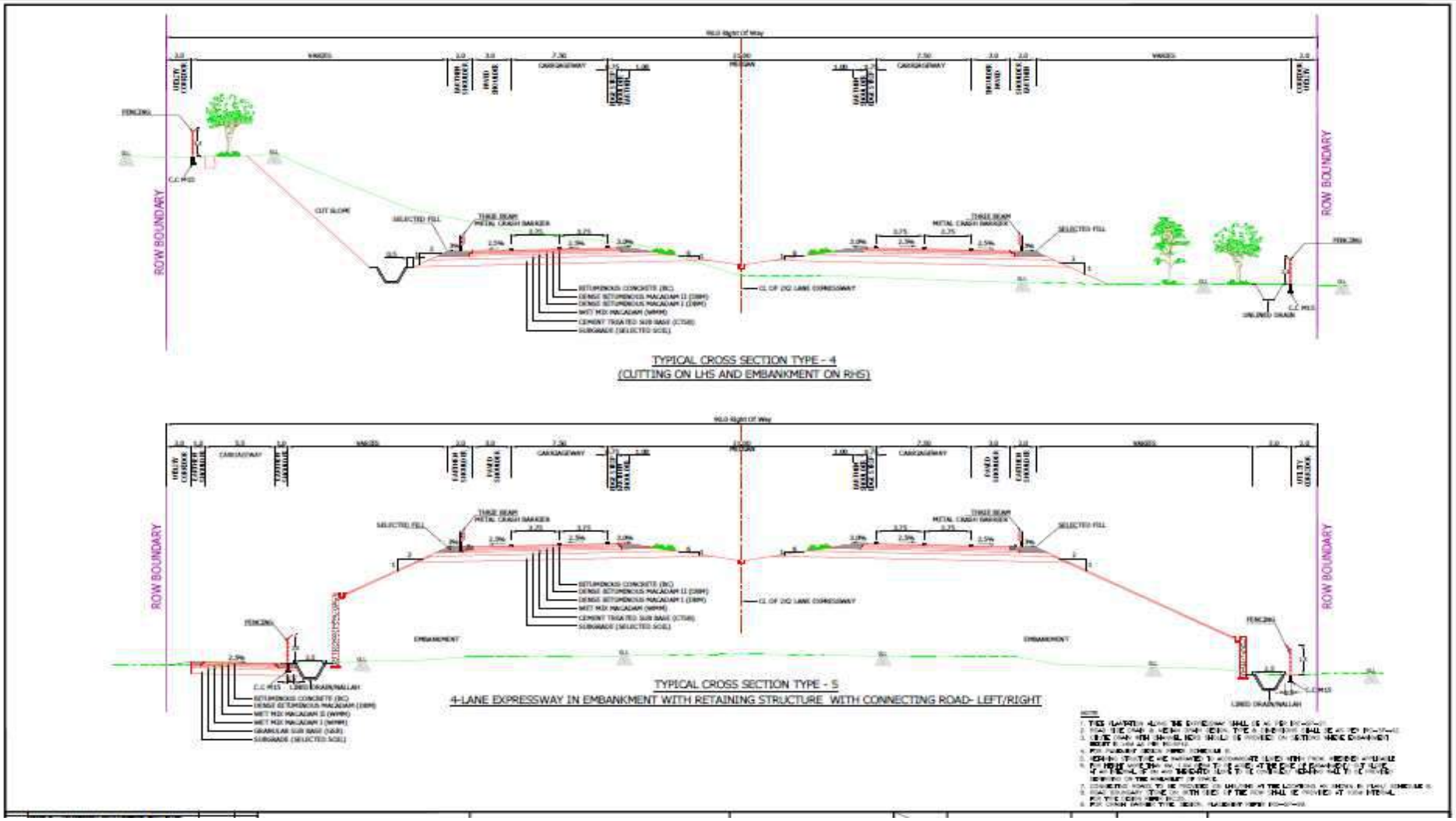


Figure 2.3: The typical cross section along the project highway

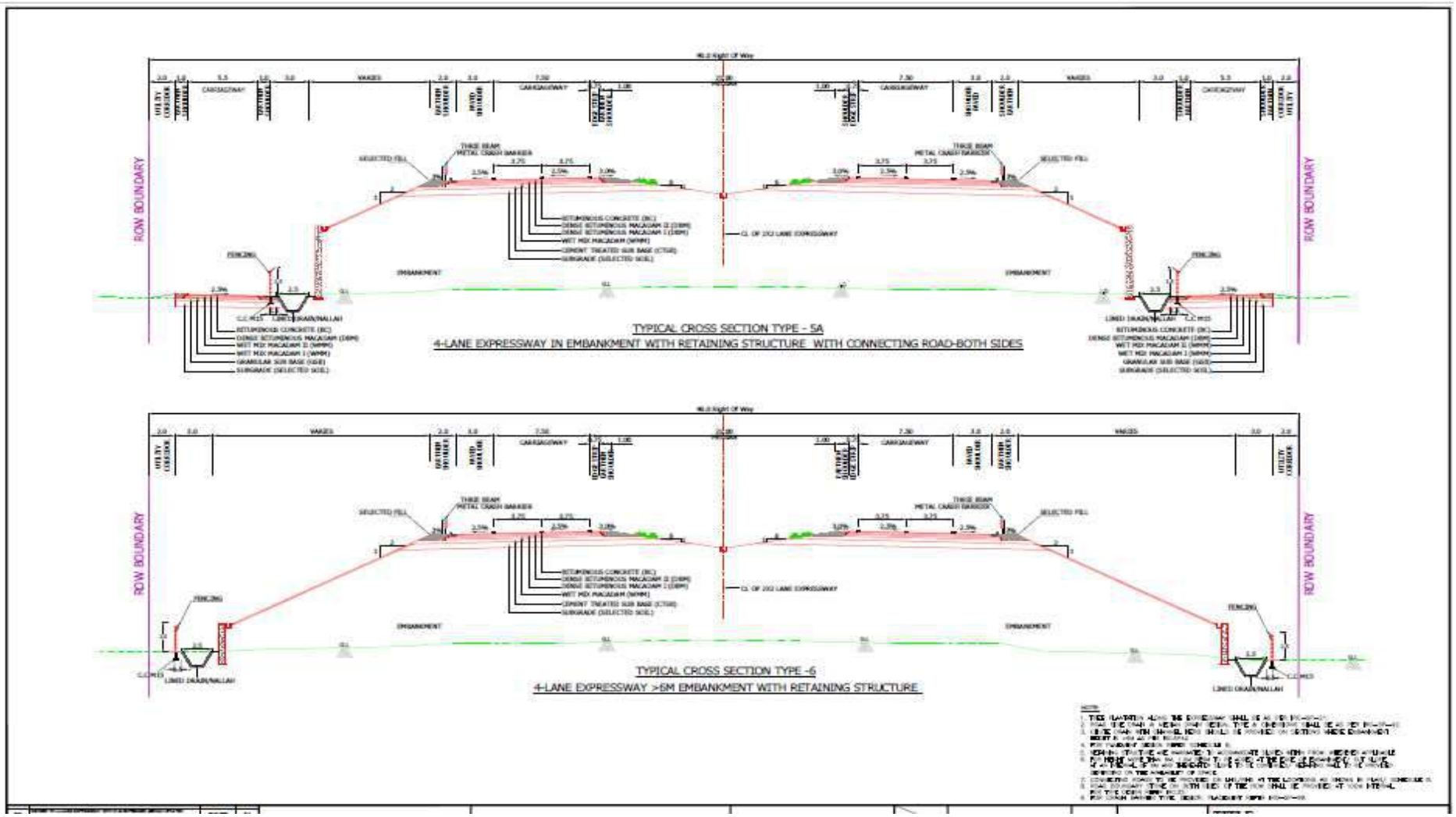


Figure 2.4: The typical cross section along the project highway

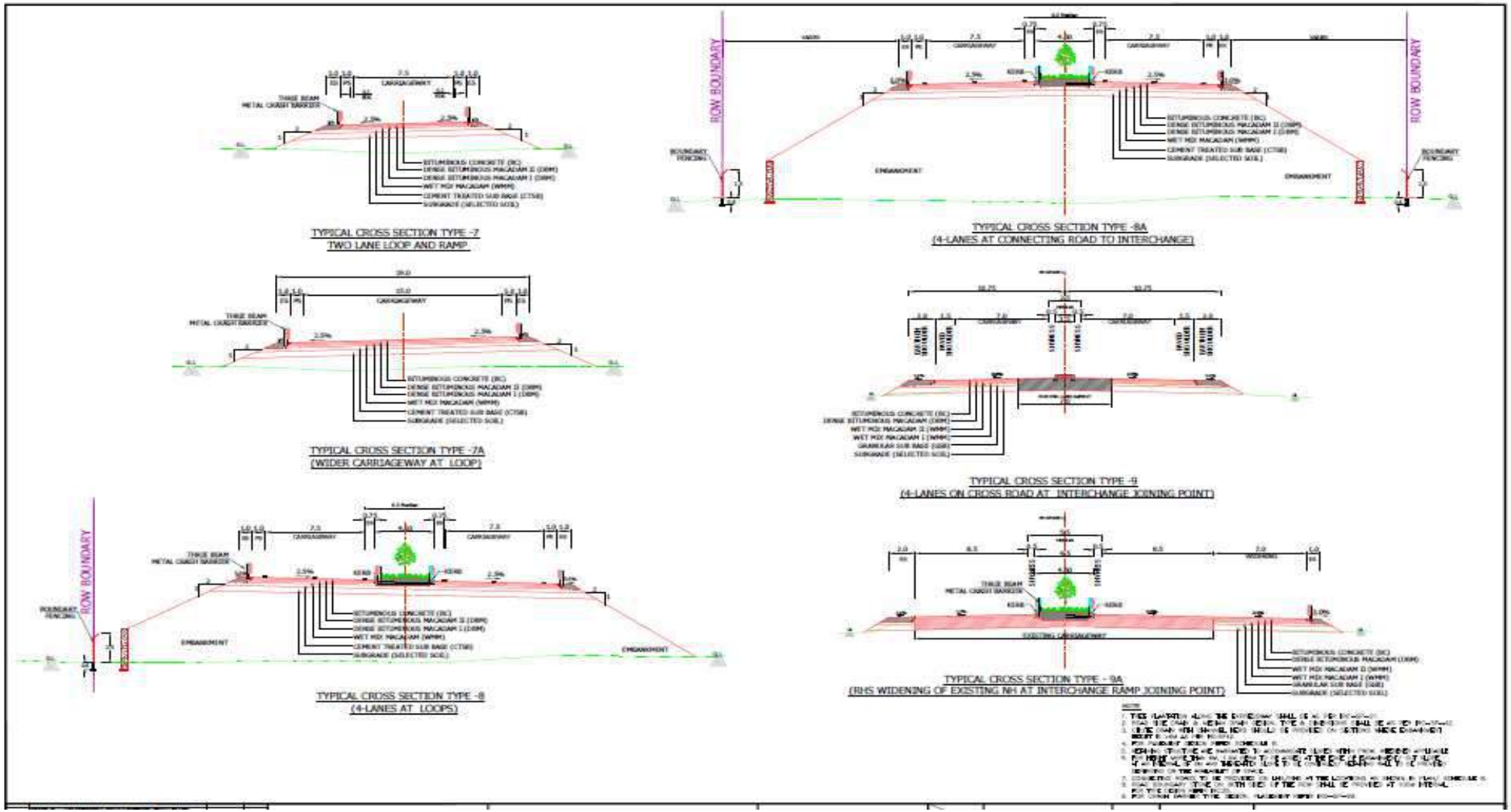


Figure 2.5: The typical cross section along the project highway

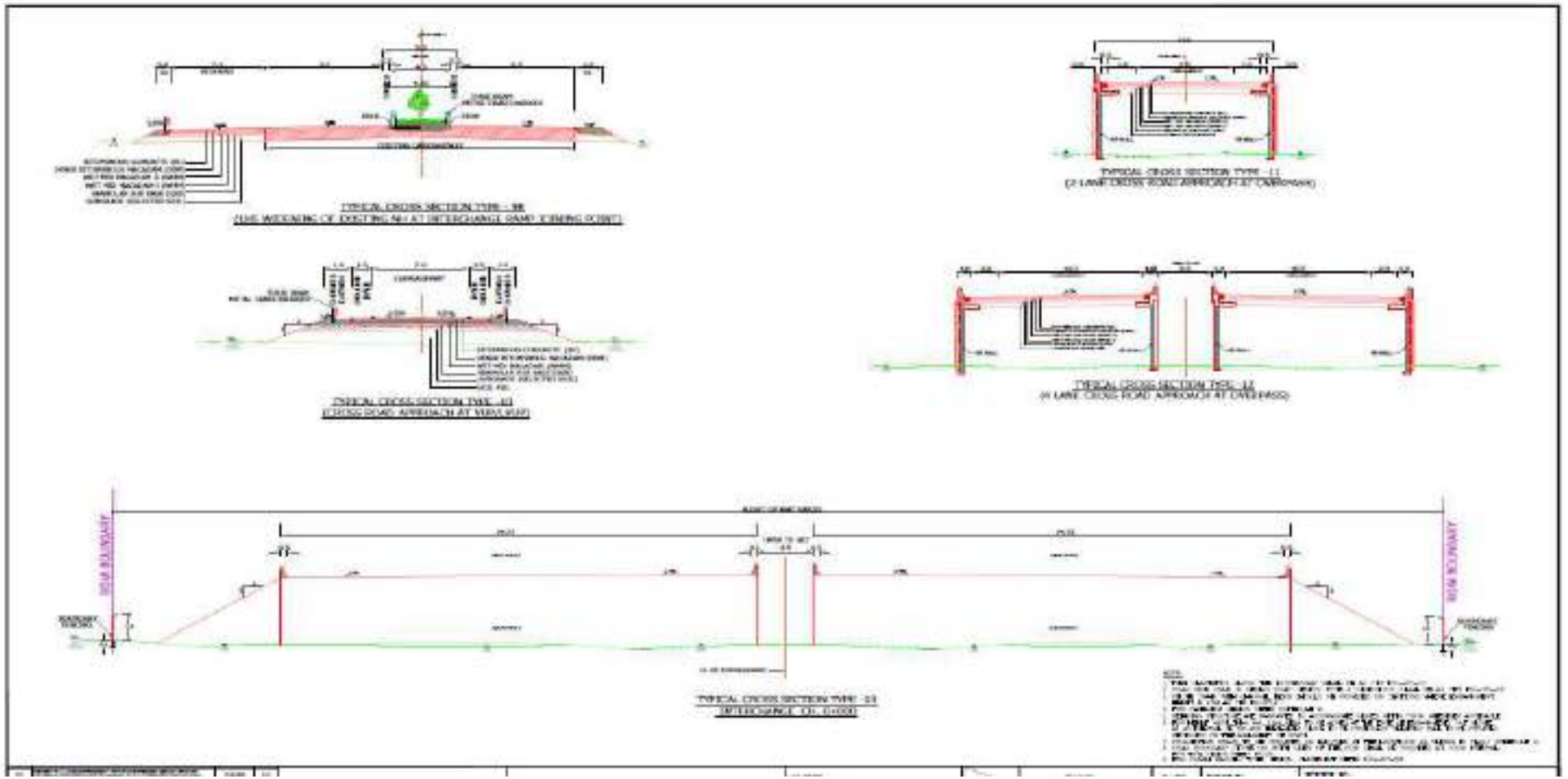


Figure 2.6: The typical cross section along the project highway

2.7 PROPOSED PLAN FOR PROJECT

2.7.1 Geometric Design Standards

The proposed Expressway has been designed with a design speed of 120Km/h. Right of way (ROW) is the width of the land acquired for the purpose of constructing the road and other appurtenances associated with it. As per the guidelines circulated by NHAI, the suggested width of the ROW is 90-120m. In the present project, it was proposed to have the width of the ROW as 90m.

The guidelines recommend fencing of the RoW to avoid encroachments hence the RoW shall be fenced. The interchanges comprise of grade separation structures for straight movement and combination of ramps for direct and semi direct connections and loops to accommodate turning movements and designs have been carried out in compliance to the Manual of Expressways.

2.7.2 Pavement Design

The pavement is designed for construction of new 4-lane (2 x 2) divided carriageway including connecting roads and interchanges. The flexible pavement is designed as per IRC 37-2018, using IITPAVE software for stress-strain calculations. The design of pavement is done by using 90% reliability fatigues and rutting equations.

The pavement composition is proposed as 50 mm BC, 190mm DBM, 150mm WMM and 300 mm Cement Treated Subbase. The thickness of the cement concrete pavement has been calculated as 320mm. In addition, 150mm DLC, 150mm GSB and 500mm selected sub-grade will be provided at toll plaza sections including tapering sections. Dowels and tie bars have been designed according to the codal provisions. The average embankment height will be 2 m except at bridge approaches.

(a) Following minimum pavement design is to be adopted for Main Carriageway (including paved shoulder)

Pavement Layer	Pavement Layer Thickness (mm)
Wearing Coat (BC)	50
Bituminous Base Layer (DBM)	190
Non Bituminous Base Layer (WMM)	150
Cement Treated Sub Base (7days UCS 1.5-3.0MPa)	300
Subgrade with min 8% CBR	500

(b) Following minimum pavement design is to be adopted for Toll Plaza:

The pavement type at Toll Plaza including tapering zone shall be rigid. Minimum thickness of 320mm cement concrete pavement (M-40) shall be provided.

Pavement Layer	Pavement Layer Thickness (mm)
Pavement Quality Concrete (PQC)	320
Debonding layer of polythene sheet (150 micron thick)	
Dry Lean Concrete (DLC) Sub-base	150
Granular Sub Base (GSB)	150

Pavement Layer	Pavement Layer Thickness (mm)
Subgrade	500

2.7.3 Structures

All bridges on the expressway shall be 4-laned structures (2-lane dual carriageway) as per IRC: SP:99-2013. All the structures (except culverts) shall have independent structure for each direction of travel. The overpasses shall be 2-laned/4laned structures with footpath on both sides or to match with the existing cross road carriageway configuration complying to applicable IRC guidelines. The median width shall be compatible with the median width of the adjacent pavement sections. All the bridges shall be designed with open to sky median. For the river bridges, open foundation will be proposed where ever possible as hard strata is available at shallow depths in most of the locations.

All structures on the proposed Expressway shall be designed as 2 individual carriageways with a configuration of four lanes plus shoulder each. Overall deck width of structures shall be 13.75 m to match with the proposed expressway cross section (comprising of 7.50m carriageway width, 0.75m kerb shyness towards median side, 4.5 m shoulder towards outer side with 0.5m high containment crash barrier on either end of deck).

2.7.4 Right of Way (ROW)

The proposed Right of Way (ROW) of the Bangalore-Chennai expressway is 90m keeping in view the 8- lane dual carriageway configuration of Expressway. The ROW for Spur alignment varies from 47m to 133m.

Additional ROW will be required as per the followings:

- At Rest Area estimated additional ROW of 425m x 345m will be required on either side of the expressway.
- At Interchange Connecting roads varying from minimum of 47 m to maximum of 133m.

As explained in the earlier section that for facilitating the construction the project has been divided into three construction packages. As per present proposal the Expressway will be constructed with 4-lane dual carriageway configuration with 21 m depressed median. Lather on this will be expanded to 6 and 8 lanes in subsequent stage whenever, the traffic volume increased to 6 lane/8 lane capacity towards median side without acquisition of additional land and impacting the area towards ROW boundary.

2.7.5 Land Requirement for Proposed Project

Total area of 764.08 Ha of land will be required for the proposed 90 m RoW and the additional area at interchanges and rest areas Bangalore-Chennai expressway Phase I for construction of the project.

2.7.6 Traffic Surveys

Two National Highways viz. NH-4 & NH-46 is presently connecting the Bangalore and Chennai Cities. The NH-4 (length 325 km) is passing through hilly region with steep gradients and hence is not preferred by motorists. NH-46 is having gentle gradients. Majority of the traffic is plying on this highway presently even though it is having longer length (about 360 km).

Project Proposal

THe project is a part of proposed Bangalore-Chennai Expressway connecting the upcoming industrial corridor between Bangalore with Chennai. The alignment of the entire BCE has been identified in such a way that, it is gentle and shorter in length with higher speeds and expressway standards. This alignment will reduce the travel time between these two cities to approximately 3 hours which otherwise takes 5 hours 30 min.

Homogeneous sections

To assess the diverted traffic on the proposed BCE, the total alignment is divided into 5 homogeneous sections and three phases. The details of the homogeneous sections assumed are presented below table:

Table 2-5: Homogeneous Sections

Sections	Homogenous Sections	From Chainage	To Chainage	Length
Hoskote to Kolar	HS-I	0.00	52.10	42.00
Kolar to Palamaner (NH-219)	HS-II	52.10	94.10	16.30
Palamaner to Chittoor (NH-4)	HS-III	94.10	157.720	63.62
Chittoor to Kanchipuram (NH-4)	HS-IV	157.720	224.18	66.46
Kanchipuram (NH-4) to Sripeuembadur	224.18	224.18	262.45	38.27

Reconnaissance Survey

The proposed Expressway is a new alignment. The proposed alignment is finalized by NHAI after reviewing five alternative alignments suggested by the Consultants. There are two National Highways running parallel to the proposed expressway and the travel pattern on the same needs to be understood before planning the new expressway. The consultants have done reconnaissance survey of the proposed project expressway alignment. The site visit was intended to identify and understand the following:

- Identify
  - Important traffic generators
  - Homogeneous sections of the expressway
  - Alternative diversion routes available
- Travel pattern of the study region
- Existing and proposed Land use pattern along the proposed expressway alignment
- Sensitive & special areas requiring special attention

To understand the existing travel pattern, it is necessary to collect the data through primary data collection i.e. through traffic surveys. The traffic survey locations are initially identified based on the map study of the existing network.

Presently National Highway NH 4 connects the two cities Bangalore and Chennai. NH 4 is existing throughout the length between the two cities where as NH 46 joins NH 4 near Ranipet, and joins NH 7 near Krishnagiri. NH 7 connects Bangalore with Krishnagiri.

It is proposed to travel along the existing major network to identify the proposed traffic survey locations on the network and finalize the same. Modification of the locations based on the site conditions and travel pattern is also made. Additional locations were also identified based on the travel pattern observed at site.

The following traffic surveys were planned to obtain the existing travel and traffic information:

1. Origin-Destination Survey
2. Willingness to Pay Survey for Toll Charges
3. Mid-block 7 days Classified Traffic Volume Count Survey
4. Mid-block 3 days Classified Traffic Volume Count Survey
5. Junction Count Survey
6. Vehicle speed distribution and journey time survey
7. Speed flow relationship and the existing level of service
8. Axle Load survey along the existing route

The traffic survey locations identified and finalized are given in Table 2.6. These traffic surveys were conducted as per IRC guidelines during the months of November-December, 2009 as per the schedule provided in **Table 2.6** Trained enumerators and supervisors are deployed to conduct the traffic surveys and these are supervised by Transportation Engineers.

Table 2-6: Traffic Survey Location Details

S. No.	Section	Time	Chainage	Location
I	**Mid-block 7 day Classified Traffic Volume Count Survey**			
1	Dobbaspet-Doddaballapura	7 day TVC	Km 120	Dabbaspet
2	Dodballapur – Devenhalli	7 day TVC	Km 95	Dodballapur
3	Devanahalli – Hoskote	7 day TVC	Km 70	Devenhalli
4	Hoskote-Kolar section	7 day TVC	Km 285	Kolar
5	Palamner-Chittoor	7 day TVC	Km 184/100	Mogli
6	Kanchipuram-Sriperambadur	7 day TVC	Km 55/200	Senthamangalam
7	Krishnagiri – Vellore	7 day TVC	Km 32/000	Munthapalem
8	Hosur-Krishnagiri	7 day TVC	Km 87	Krishnagiri
II	**Mid-block 3 day Classified Traffic Volume Count Survey**			
1	Kolar – Palamner	3 day TVC	Km 221/000	Nangli
2	Chittoor-Ranipet	3 day TVC	Km 139/600	Panatore
3	Arcot-Kanchipuram	3 day TVC	Km 96/000	Kaveripakkam
4	Vellore-Arcot	3 day TVC	Km 132/000	Ratnagiri

The analysis of the directional classified traffic volume counts observed at various count stations has been carried out to work out the following traffic characteristics:

- Average Daily Traffic (ADT) including toll exempted vehicles
- Hourly Variation

- Daily Variation in Traffic Volume
- Directional Distribution
- Composition of ADT
- Annual Average Daily Traffic (AADT)

The various vehicle types having different sizes and characteristics were converted into Equivalent Passenger Car Units. The Passenger Car Unit (PCU) factors recommended by Indian Road Congress in "Guidelines for Capacity of Roads in Rural Areas" (IRC-64-1990) have been used for conversion, and are presented in **Table 2.7.**

Table 2-7: PCU Factors Adopted for Study

Fast Vehicles	PCU	Slow Vehicles	PCU
Car	1.0		
Mini Bus	1.5		
Standard Bus	3.0	Agricultural Tractor	1.5
LCV/LGV	1.5	Agricultural Tractor & Trailer	4.5
2-Axle Truck	3.0	Animal/Hand Cart	8.0
3 Axle Truck	3.0	Cycle	0.5
MAV	4.5	Cycle Rickshaw	3.0
Two Wheeler	0.5		
Auto Rickshaw	1.0		
Van/Tempo	1.0		

Source: IRC: 64-1990

Average Daily Traffic

Classified Traffic Volume Count (CTVC) surveys have been conducted along the NH-4, NH-46, NH-7 & NH-219. The traffic volume count surveys were also conducted along the NH-207 also. The Classified Traffic Volume Count surveys were conducted for 7 continuous days at most of the location and for 3 continuous days at some locations.

For the location where 7 day TVC has been done, the data have been averaged to get the Average Daily Traffic (ADT) and for the locations where 3 day TVC has been done, the data has been averaged and scaled with the nearest 7 day TVC data to get the ADT. **Table 2.8** presents the ADT data for the above locations.

Table 2-8: ADT for the 7 day Classified Traffic Volume Count Survey Locations

Vehicle Type	Dabbaspet	Dod Ballapur	Deven halli	Kolar	Mogili	Sentha mangalam	Muntha palem	Krishnagiri
Two Wheeler	1,292	2,409	2,516	2,086	1,887	3,054	2,121	6,197
Three Wheeler	60	57	72	360	283	433	211	641
Car/Van/Jeep/Tempo	611	952	784	3,828	2,776	6,911	3,856	5,729
Taxi	-	-	-	-	-	-	-	162
Mini Bus	15	28	8	44	94	326	227	26

Vehicle Type		Dabbaspet	Dod Ballapur	Deven halli	Kolar	Mogili	Sentha mangalam	Muntha palem	Krishnagiri
Private Bus		6	20	9	17	14	1,213	38	44
Govt Bus		110	101	151	1,275	1,207	1,989	829	2,634
LCV		340	426	456	1,341	1,367	1,440	1,277	2,658
2 Axle Truck		401	401	361	1,250	1,198	3,673	1,032	1,972
3 Axle Truck		362	342	322	1,230	1,088	2,460	1,387	3,796
MAV		33	24	18	308	323	709	340	533
MAV >6A		2	2	1	-	23	83	4	13
HCE/EME		4	6	4	7	7	7	2	5
Agricultural Tractor		7	11	6	18	88	52	8	8
Agricultural Tractor & Trailor		38	33	43	51	123	25	24	30
Non-Motorised Vehicels	Animal & Hand drawn	5	8	4	1	17	7	-	4
	Cycle	81	165	22	20	359	102	78	130
	Cycle Rickshaw	1	3	-	-	7	12	-	2
	Others	-	-	-	-	1	6	-	-
Toll Exempted Vehicles	Car/Van/Jeep	6	5	2	4	39	59	21	37
	Ambulance	-	-	-	21	21	50	19	37
	Bus/Truck	-	-	-	-	7	9	2	4
Vehicles	Motorised	3,287	4,817	4,753	11,840	10,545	22,493	11,398	24,526
	Non-Motorised	87	176	26	21	384	127	78	136
	Total	**3,374**	**4,993**	**4,779**	**11,861**	**10,929**	**22,620**	**11,476**	**24,662**
PCU	Motorised	4,856	5,810	5,653	20,345	19,091	43,483	18,977	41,733
	Non-Motorised	84	156	43	18	340	161	39	103
	Total	**4,940**	**5,966**	**5,696**	**20,363**	**19,431**	**43,644**	**19,016**	**41,836**

Table 2-9: ADT for the 3 day Classified Traffic Volume Count survey locations

Vehicle Type		Nagili	Penator	Kaveripakkam	Ratnagiri
Two Wheeler		1,393	962	3,697	6,941
Three Wheeler		157	40	160	637
Car/Van/Jeep/Tempo		1,498	671	7,220	7,611
Taxi		-	-	-	-
Mini Bus		25	16	336	375
Private Bus		7	6	64	66
Govt Bus		861	165	1,912	1,990
LCV		860	511	3,098	2,559
2 Axle Truck		914	914	3,014	1,801
3 Axle Truck		784	1,057	2,815	1,662
MAV		202	107	598	481
MAV >6A		24	1	14	9
HCE/EME		11	1	6	6
Agricultural Tractor		10	3	23	9
Agricultural Tractor & Trailor		74	12	55	71
Non Motorised	Animal & Hand drawn	5	4	9	1

Vehicle Type		Nagili	Penator	Kaveripakkam	Ratnagiri
Vehicles	Cycle	184	83	188	279
	Cycle Rickshaw	6	-	1	5
	Others	1	-	-	-
Toll Exempted Vehicles	Car/Van/Jeep	10	2	33	37
	Ambulance	5	2	46	45
	Bus/Truck	3	1	11	5
Vehicles	Motorised	6,837	4,470	23,102	24,308
	Non Motorised	196	87	198	285
	Total	**7,034**	**4,557**	**23,301**	**24,593**
PCU	Motorised	12,831	8,963	41,004	35,375
	Non Motorised	152	74	172	160
	Total	**12,983**	**9,037**	**41,176**	**35,535**

The obtained Average Daily Traffic (ADT) will have to be adjusted to account for the seasonal variation to obtain the Annual Average Daily Traffic (AADT).

Table 2-10: AADT for the 7 day Classified Traffic Volume Count Survey Locations

Vehicle Type		Dabbaspet	Dod ballapur	Deven halli	Kolar	Mogili	Sentha mangalam	Muntha palem	Krishnagiri
Two Wheeler		1,357	2,529	2,642	2,107	1,962	3,176	2,121	6,383
Three Wheeler		63	60	76	364	294	450	211	660
Car/Van/Jeep/Tempo		642	1,000	823	3,866	2,887	7,187	3,856	5,901
Taxi		-	-	-	-	-	-	-	167
Mini Bus		16	31	9	48	100	346	216	28
Company Bus		7	22	10	18	15	1,286	36	47
Bus		120	110	165	1,377	1,279	2,108	788	2,818
LCV		371	464	497	1,448	1,449	1,526	1,213	2,844
2 Axle Truck		437	437	393	1,350	1,270	3,893	980	2,110
3 Axle Truck		395	373	351	1,328	1,153	2,608	1,318	4,062
MAV		36	26	20	333	342	752	323	570
MAV >6A		2	2	1	-	24	88	4	14
HCE/EME		4	7	4	8	7	7	2	5
Agricultural Tractor		8	12	7	19	93	55	8	9
Agricultural Tractor & Trailor		41	36	47	55	130	27	23	32
Non Motorised Vehicles	Animal & Hand drawn	5	8	4	1	17	7	-	4
	Cycle	81	165	22	20	359	102	78	130
	Cycle Rickshaw	1	3	-	-	7	12	-	2
	Others	-	-	-	-	1	6	-	-
Toll Exempted Vehicles	Car/Van/Jeep	6	5	2	4	41	61	21	38
	Ambulance	-	-	-	23	22	53	18	40
	Bus/Truck	-	-	-	-	7	10	2	4
Vehicles	Motorised	3,504	5,114	5,046	12,348	11,078	23,633	11,139	25,732
	Non Motorised	87	176	26	21	384	127	78	136
	Total	**3,591**	**5,290**	**5,072**	**12,369**	**11,462**	**23,760**	**11,217**	**25,868**
PCU	Motorised	5,240	6,244	6,077	21,606	20,156	45,913	18,286	44,268
	Non Motorised	84	156	43	18	340	161	39	103

Vehicle Type		Dabbaspet	Dod ballapur	Deven halli	Kolar	Mogili	Sentha mangalam	Muntha palem	Krishnagiri
	Total	**5,324**	**6,400**	**6,120**	**21,624**	**20,496**	**46,074**	**18,325**	**44,371**

Table 2-11: AADT for the 3 day Classified Traffic Volume Count Survey locations

Vehicle Type		Nagili	Penator	Kaveripakkam	Ratnagiri
Two Wheeler		1,434	991	3,808	7,149
Three Wheeler		162	42	165	657
Car/Van/Jeep/Tempo		1,544	690	7,437	7,839
Taxi		-	-	-	-
Mini Bus		26	17	352	394
Company Bus		7	6	66	69
Bus		903	173	2,008	2,090
LCV		903	537	3,253	2,687
2 Axle Truck		960	960	3,166	1,891
3 Axle Truck		823	1,109	2,957	1,745
MAV		212	112	628	505
MAV >6A		25	-	15	9
HCE/EME		12	1	6	6
Agricultural Tractor		10	3	23	8
Agricultural Tractor & Trailor		74	12	55	71
Non Motorised Vehicles	Animal & Hand drawn	5	4	10	-
	Cycle	184	83	188	279
	Cycle Rickshaw	7	-	1	5
	Others	1	-	-	-
Toll Exempted Vehicles	Car/Van/Jeep	10	2	34	38
	Ambulance	5	2	48	47
	Bus/Truck	3	-	13	5
Vehicles	Motorised	7,113	4,657	24,032	25,212
	Non Motorised	197	87	199	284
	Total	**7,310**	**4,744**	**24,231**	**25,496**
PCU	Motorised	13,409	9,378	42,857	36,886
	Non Motorised	156	74	177	155
	Total	**13,565**	**9,452**	**43,034**	**37,041**

The salient features are:

- 2/3 wheelers are consistently higher at more than 40% at locations Dabbaspet, Dodballapur, and Devenhalli sections. This shows high usage of personalized modes and IPT modes on this section.
- 2/3 wheelers percentages are similar at Kolar, Nangli and Mogili sections at about 20-21 %. MAV percentage is similar at Kolar and Mogili (13-14%) whereas at Nangli it is higher at 25%. 2axle, LCV and buses have similar composition at these three locations.
- Slow moving vehicles are consistently low as these are National Highway locations.

Hourly variation graphs

The hourly variation of traffic for a typical day is also studied. The location wise graphs are enclosed in **Annexures 2.5.**

Daily Variation of Traffic Flow

Daily variation of Traffic flow has been studied and is presented in **Figure 2.7** to **Figure 2.9**.

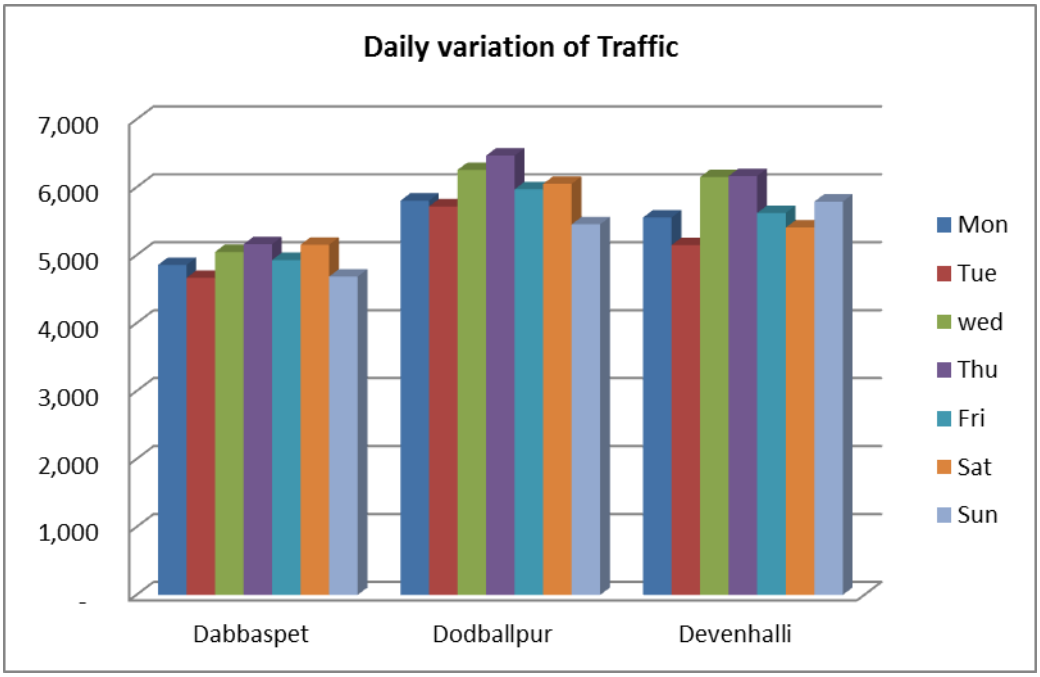


Figure 2.7: Daily variation of Traffic – 7 day CTVC

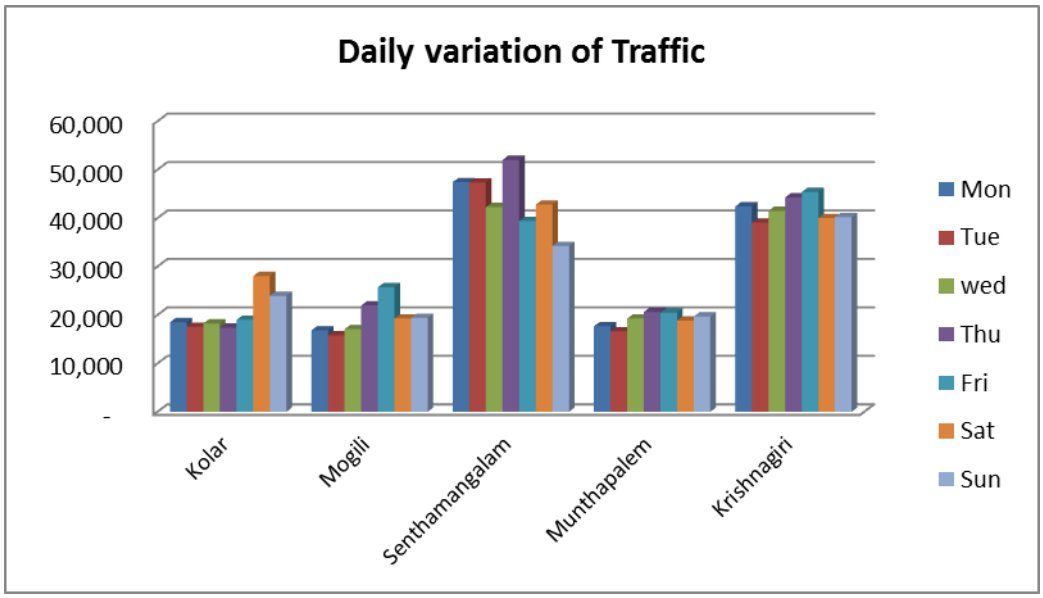


Figure 2.8: Daily Variation of Traffic – 7 day CTVC

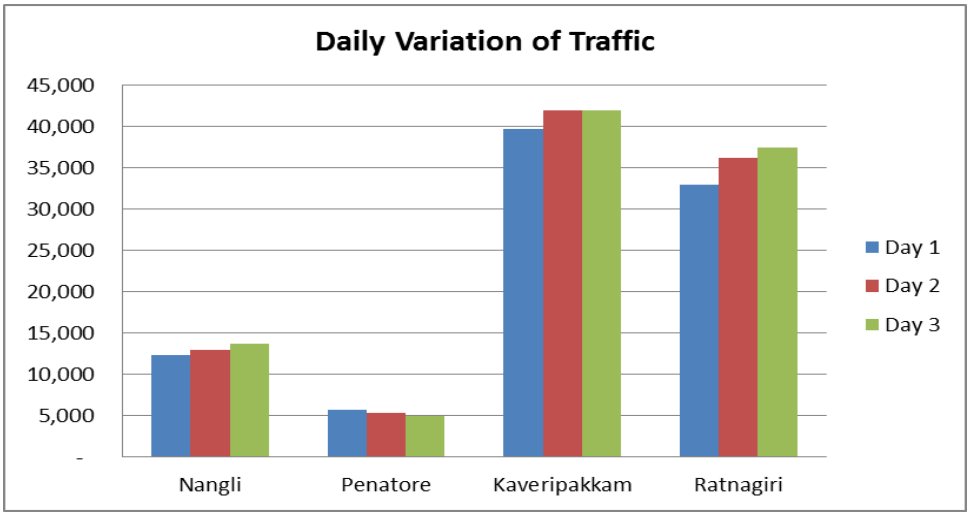


Figure 2.9: Daily Variation of Traffic – 3 day CTVC

Directional Distribution

The directional distribution of traffic is also studied. There is no significant variation in the directional distribution. The location wise directional distribution is presented in the **Table 2.12**.

Table 2-12: Directional Distribution of Traffic –CTVC locations

S. No.	Location	Dir 1	Dir 2
1	Dabbaspet	47%	53%
2	Dodballpur	48%	52%
3	Devenhalli	49%	51%
4	Kolar	50%	50%

There is not much variation % in the directional distribution of traffic. It hardly varies by 6 %.

Traffic Composition

The composition of traffic at all the locations is presented in **Figure 2.10** to **Figure 2.13**.

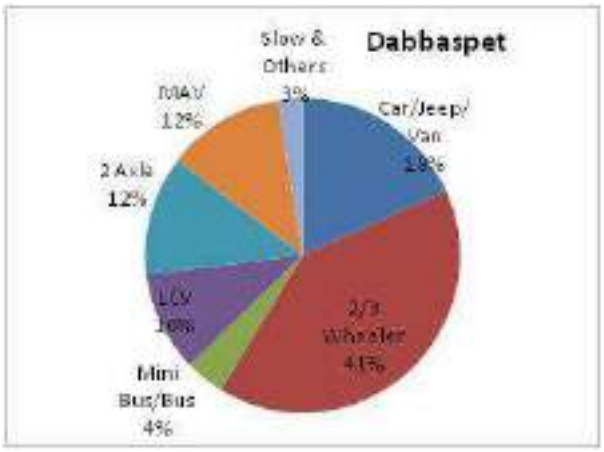


Figure 2.10: Traffic Composition at Dabbaspet

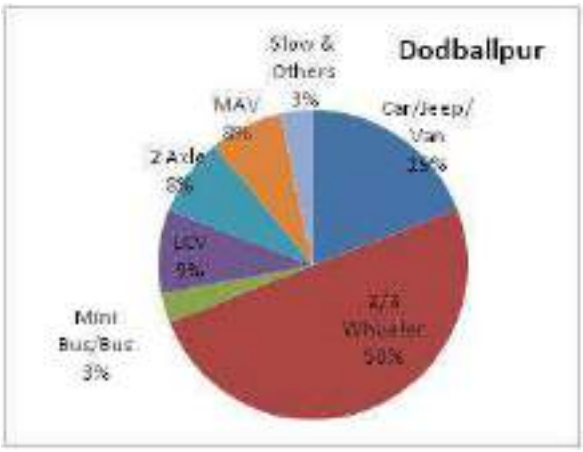


Figure 2.11: Traffic Composition at Dodballapur

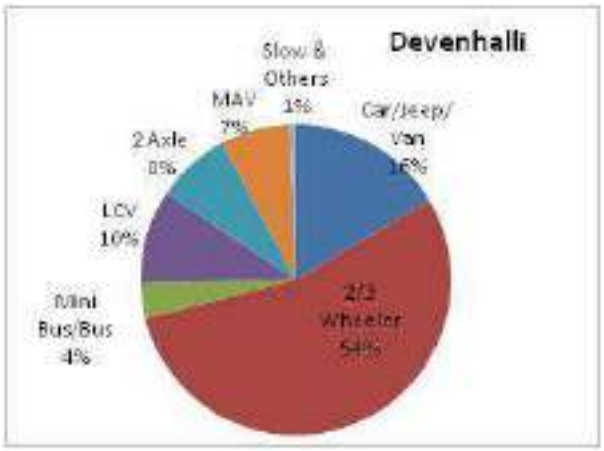


Figure 2.12: Traffic Composition at Devenhalli

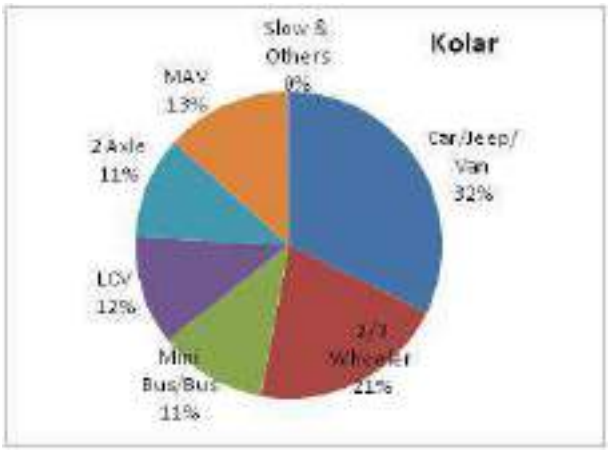


Figure 2.13: Traffic Composition at Kolar

The salient features are:

- 2/3 wheelers are consistently higher at more than 40% at locations Dabbaspet, Dodballapur, and Devenhalli sections. This shows high usage of personalized modes and IPT modes on this section.
- 2/3 wheelers percentages are similar at Kolar, Nangli and Mogili sections at about 20-21 %. MAV percentage is similar at Kolar and Mogili (13-14%) whereas at Nangli it is higher at 25%. 2axle, LCV and buses have similar composition at these three locations.
- Cars are similar at Kaveripakkam and Senthamangalam sections. Buses are higher at Senthamangalam due to presence of SEZs and operation of many company bus services at this location. This effect gets reduced in Kaveripakkam section.
- About 40 % of the trips are commercial trips at Krishnagiri and Munthapalem sections. This gets reduced to 30 % at Ratnagiri section.
- Slow moving vehicles are consistently low as these are National Highway locations.

2.7.7 Traffic Forecast model

Traffic Forecast

With the above growth rates the traffic is projected on the Expressway. The mode wise yearly projected traffic for different horizon years is provided

Capacity Assessment for Phase-1

The Guidelines for Expressways issued by IRC is used in assessing the capacity of the Expressway. As per the guidelines the design service volume for Expressway (IRC: SP:99-2013) is given below.

Table 2-13: Design Service Volume for Expressways in Plain and Rolling Terrain

Design Service Volume in PCUs per day for LOS B		
4-Lane	6-Lane	8- lane
86,000 for Peak hour flow (8%) 65,000 for Peak hour flow (8%)	1,30,000 for Peak hour flow (8%) 98,000 for Peak hour flow (8%)	1,73,000 for Peak hour flow (8%) 1,30,000 for Peak hour flow (8%)

The Traffic survey analysis 8% Peak hour flow is obtained for the study network. So this 8% Peak Hour Flow Design Service Volume was used for the Capacity assessment and the same is adopted for the present analysis also.

The Section wise and Year Wise Capacity analysis is done and summary is presented bellow in **Table 2.15** and the cells highlighted in green colour are qualifying for 6-lanes as per the expressway capacity analysis. However, NHAI has recommended for implementation with 8 lane express way to meet the future demands.

Traffic Forecast: Traffic projection of Phase-I (from Ch.0.000 to 71.000) for different horizon years is presented in the below table

Table 2-14: Traffic Projection of Proposed Expressway Phase-I for different Horizon Years

Year	CJV	Bus	LCV	Trucks	MAV	Diverted PCU's	Induced PCU's	Generated PCU'S	Total PCU'S
2021	17217	4108	3933	1079	270	39890	1596	2000	43486
2022	17971	4372	4115	1135	293	41990	1680	2091	45761
2023	18758	4654	4306	1193	318	44200	1768	2187	48155
2024	19580	4953	4506	1254	345	46526	1861	2287	50674
2025	20437	5272	4715	1319	374	48975	1959	2391	53325
2026	21332	5611	4934	1387	406	51553	2062	2500	56115
2027	22436	5818	5222	1464	420	54008	2160	2593	58762
2028	23597	6032	5526	1545	434	56581	2263	2689	61533
2029	24819	6254	5848	1631	449	59276	2371	2789	64436
2030	26103	6484	6189	1721	464	62099	2484	2893	67476
2031	27454	6723	6550	1817	480	65057	2602	3000	70659
2032	28908	7084	6887	1918	506	68520	2741	3178	74438
2033	30439	7464	7242	2026	533	72167	2887	3366	78419
2034	32052	7865	7615	2139	561	76008	3040	3565	82614
2035	33749	8287	8008	2258	591	80054	3202	3776	87033
2036	35537	8732	8420	2384	623	84315	3373	4000	91688
2037	37987	9393	9089	2613	666	90641	3626	4095	98362
2038	40606	10103	9811	2864	712	97441	3898	4193	105531
2039	43406	10868	10590	3139	761	104751	4190	4293	113234
2040	46398	11690	11432	3441	814	112610	4504	4395	121509
2041	49597	12575	12340	3771	870	121058	4842	4500	130400
2042	53175	13646	13435	4150	936	130949	5238	4500	140686
2043	57012	14809	14628	4568	1008	141647	5666	4500	151813
2044	61125	16070	15927	5027	1084	153220	6129	4500	163848
2045	65535	17439	17341	5533	1167	165738	6629	4500	176867

Year	CJV	Bus	LCV	Trucks	MAV	Diverted PCU's	Induced PCU's	Generated PCU'S	Total PCU'S
2046	70263	18925	18880	6089	1256	179279	7171	4500	190950
2047	75540	20339	20387	6627	1345	193080	7723	4500	205303
2048	81214	21859	22015	7212	1440	207944	8318	4500	220761
2049	87314	23492	23773	7849	1543	223952	8958	4500	237409
2050	93872	25247	25671	8542	1652	241192	9647	4500	255339
2051	100923	27134	27720	9297	1769	259759	10390	4500	274649

From the above presented capacity augmentation, it shows that the Design Service Volume for 4 lanes, 6 lanes and 8 lane carriageway configuration will get saturated in the year 2029, 2037 and 2041 respectively. However, after meeting with NHAI on several occasions it has been decided to build the expressway 4-lane with 4-lane structures extendable to 8-lane

2.7.8 Connecting Roads

There will not be service roads exist along the project road, in order to make the project road access control and ascertaining the safety of local traffic and people. As per IRC SP 99 to maintain proper circulation of local traffic, continuity of travel and to facilitate crossing over to the other side of the project Expressway through under/over passes connected roads have been proposed covering a total length of 9.618 km (both side) (including length along Interchanges).

Table 2-15: Connecting Roads for Main Expressway

Sl. No.	Stretches (Km)		Length (km)	Width (m)*
	From	To		
Left side Connecting Road (Main Expressway)				
1	4.125	4.364	0.239	As per Typical CS
2	6.639	7.039	0.400	
3	13.168	13.329	0.161	
4	25.750	25.950	0.200	
5	37.169	37.241	0.072	
6	59.300	59.778	0.478	
7	62.494	62.700	0.206	
8	63.000	63.316	0.316	
9	64.412	64.718	0.306	
Right side Connecting Road (Main Expressway)				
1	13.341	13.700	0.359	As per Typical CS
2	29.330	29.500	0.170	
3	37.229	37.321	0.092	
4	59.300	59.778	0.478	
5	61.712	61.837	0.125	
6	61.837	62.506	0.669	

Sl. No.	Stretches (Km)		Length (km)	Width (m)*
	From	To		
7	63.304	63.670	0.366	
8	64.200	64.540	0.340	
9	69.470	69.630	0.160	

Table 2-16: Connecting Roads for Interchanges

Sl. No.	Stretches(Km)		Length (km)	Width (m)
	From	To		
Connecting Road – Interchange (Main Expressway) – INT-02 at km 24+138				
1	0+000	1+181	1.181	Varying
Connecting Road – Interchange (Main Expressway) – INT-03 at km 52+085				
1	0.000	0.327	0.327	Varying
2	0.327	0.567	0.240	Varying
3	0.567	0.685	0.118	Varying
4	0.685	0.947	0.262	Varying
5	0.947	1.027	0.080	Varying
6	1.027	1.225	0.198	Varying
7	1.225	1.233	0.008	Varying
8	1.233	1.289	0.056	Varying
9	1.289	1.515	0.226	Varying
10	1.515	1.540	0.025	Varying
11	1.540	1.661	0.122	Varying
12	1.661	2.143	0.482	Varying
Connecting Road – Interchange (Main Expressway) – INT-04 at km 68+620				
1	0.000	0.500	0.500	Varying
2	0.500	0.745	0.245	Varying
3	0.745	0.825	0.080	Varying
4	0.825	1.100	0.275	Varying
5	1.100	1.157	0.057	Varying

2.7.9 Vehicular/Light Vehicular Underpasses/Overpasses

Provision of underpasses at strategic locations within the project stretch is an important consideration in highway development. The project road traverses through many villages. Safe crossing facilities should be provided as the project road is designed for 120 Kmph speed and is designed for access control.

The proposed light vehicular underpasses, vehicular overpasses and vehicular underpasses are given in **Table 2.17** to **2.20** respectively.

Table 2-17: Details of Light Vehicular Underpasses (LVUP)

S. No.	Chainage(km)	Type of crossing	Name of Village	Span Arrangement (no. x m)	Type of Structure	Minimum Vertical Clearance required (m)	Total width of structure*
Package 1 – Main Expressway							
1	1+700	VR	Kolatturu	1 x 12	RCC Box	4.0	2 X 13.75
2	4+832	VR	Jinnagara	1 x 12	RCC Box	4.0	2 X 13.75
3	8+320	VR	Karibeeranahosahalli	1 x 12	RCC Box	4.0	2 X 13.75
4	19+510	VR	Maliyappanahalli	1 x 12	RCC Box	4.0	2 X 13.75
5	25+160	VR	Nambiganahalli	1 x 12	RCC Box	4.0	2 X 13.75
6	25+786	VR	Nambiganahalli	1 x 12	RCC Box	4.0	2 X 13.75
Package 2 – Main Expressway							
7	29+490	VR	Karamgutte	1 x 12	RCC Box	4.0	2 X 13.75
8	34+120	VR	Vadagere	1 x 12	RCC Box	4.0	2 X 13.75
9	36+768	VR	Sulikunte	1 x 12	RCC Box	4.0	2 X 13.75
10	38+543	VR	Madigarahalli	1 x 12	RCC Box	4.0	2 X 13.75
11	40+595	VR	Kuppanahalli	1 x 12	RCC Box	4.0	2 X 13.75
12	48+488	VR	Doddurukarapanahalli	1 x 12	RCC Box	4.0	28.75 + 21.25
Package 3 – Main Expressway							
13	57+110	VR	Nagasettihalli	1 x 12	RCC Box	4.0	2 X 13.75
14	58+900	VR	Parisepalli	1 x 12	RCC Box	4.0	2 X 13.75
15	59+455	VR	Bethamangala	1 x 12	RCC Box	4.0	2 X 13.75
16	61+831	VR	Bethamangala	1 x 12	RCC Box	4.0	2 X 13.75
17	62+150	VR	Doddakari	1 x 12	RCC Box	4.0	2 X 13.75
18	62+500	VR	Bethamangala	1 x 12	RCC Box	4.0	2 X 13.75
19	66+411	VR	Pillagundlahalli	1 x 12	RCC Box	4.0	2 X 13.75

Table 2-18: Details of Vehicular Overpasses

S. No.	Chainage	Type of crossing	Names of Connecting Villages	Name of Village	Span Arrangement	Type of Structure	Minimum Vertical Clearance required	Total width of structure
Package 1 – Main Expressway								
1	1+030	VR	Dandupalya - Kolatturu	Kolatturu	2 x 40	PSC Box Girder	5+5	1 x 12.0
2	10+130	SH 95	KaribeeranaHosahalli - Gonakanahalli	Gonakanahalli	2 x 40	PSC Box Girder	5+5	2 x 15.1
3	15+573	VR	Hedaginabele -	Bellavi	2 x 40	PSC Box	5+5	1 x 12.0

S. No.	Chainage	Type of crossing	Names of Connecting Villages	Name of Village	Span Arrangement	Type of Structure	Minimum Vertical Clearance required	Total width of structure
			Bellavi			Girder		
Package 2 – Main Expressway								
4	31+310	VR	Parswaganahalli - Nakkanahalli	Kuntanahalli	2 x 40	PSC Box Girder	5+5	1 x 12.0
5	33+562	VR	Swamigalagollahalli - Vadagere	Karadugurki	2 x 40	PSC Box Girder	5+5	1 x 12.0
6	45+033	VR	Karabele - Maragal	Maragal	2 x 40	PSC Box Girder	5+5	1 x 12.0

Table 2-19: Details of Vehicular Underpasses along Main Alignment

S. No.	Chainage	Type of crossing	Name of Connecting Villages	Name of Village	Span Arrangement	Type of Structure	Minimum Vertical Clearance required	Total width of structure*
Package 1 – Main Expressway								
1	2+520	SH 95	Jadigenahalli - Dandupalya	Kannuralli	1 x 30	PSC I Girder	5+5	2 X 13.75
2	4+358	VR	Sarakariguttahalli - Cheemandahalli	Jinnagara	1 x 12	RCC Box	5+5	2 X 13.75
3	4+985	MDR	Jinnagara - Vagata	Vagata	1 x 30	PSC I Girder	5+5	2 X 13.75
4	6+100	NH 648	Arlemakanahalli - Chandrapura	Chandrapura	1 x 30	PSC I Girder	5+5	2 X 13.75
5	7+033	VR	Vadagenahalli - Jadigenahalli	Vadagenahalli	1 x 12	RCC Box	5+5	2 X 13.75
6	8+745	VR	Karibeeranahosahalli - Belamangala	Karibeeranahosahalli	1 x 12	RCC Box	5+5	2 X 13.75
7	10+945	VR	Thaggalihosahalli - Kattegenahalli	Thiratahalli	1 x 12	RCC Box	5+5	2 X 13.75
8	11+650	VR	Chkkathaggali - Kattegenahalli	Thaggalihosahalli	1 x 12	RCC Box	5+5	2 X 13.75
9	13+335	VR	Yelachammanahalli - Hedaginabele	Hedaginabele	1 x 12	RCC Box	5+5	2 X 13.75
10	17+720	VR	M. Sonnahalli - Abbe halli	Abbenahalli	1 x 20	PSC I Girder	5+5	2 X 13.75
11	19+857	VR	Ramenahalli - Kanivanahalli	Maliyappanahalli	1 x 12	RCC Box	5+5	2 X 13.75
12	21+960	MDR	Thornahalli - Doddashivara	Doddashivara	1 x 30	PSC I Girder	5+5	2 X 13.75
13	22+400	MDR	Hungenhalli - Doddashivara	Varadenahalli	1 x 30	PSC I Girder	5+5	2 X 13.75
14	23+750	VR	Hungenhalli - Doddasabbenahalli	Chikkasabbenahalli	1 x 12	RCC Box	5+5	2 X 13.75 + 2 x 12.5
Package 2 – Main Expressway								
15	28+126	VR	Anepura - Nidaramangala	Anepura	1 x 12	RCC Box	5+5	2 X 13.75

S. No.	Chainage	Type of crossing	Name of Connecting Villages	Name of Village	Span Arrangement	Type of Structure	Minimum Vertical Clearance required	Total width of structure*
16	28+680	VR	Karamgutte - Annepura	Anepura	1 x 12	RCC Box	5+5	2 X 13.75
17	32+327	SH 99	Parswaganahalli - Karadagurki	Swamigalagollahalli	1 x 30	PSC I Girder	5+5	2 X 13.75
18	37+235	VR	Mugalabele - Madamangala	Madamangala	1 x12	RCC Box	5+5	2 X 13.75
19	39+610	VR	Madigarahalli - Siddanahalli	Siddanahalli	1 x12	RCC Box	5+5	2 X 13.75
20	43+687	VR	Karabele - Birandahalli	Maragal	1 x 12	RCC Box	5+5	2 X 21.25
21	47+245	VR	Ithandahalli - Nernahalli	Ithandahalli	1 x 12	RCC Box	5+5	13.75 + 21.25
22	49+220	VR	Kavaranahalli - Doddarahalli	Doddurukarapanahalli	1 x12	RCC Box	5+5	2 x 13.75
Package 3 – Main Expressway								
23	55+250	VR	Reddyhalli - Krishnarajapura	Pedampalli	1 x 30	PSC I Girder	5+5	2 x 13.75
24	56+200	VR	Pedampalli - Kammasandra	Thammenahalli	1 x 12	RCC Box	5+5	2 x 13.75
25	57+824	VR	Thammenahalli - Ramapura	Hosa(kotta)palya	1 x 12	RCC Box	5+5	2 x 13.75
26	58+435	SH 95	Nagasettihalli - Kothapalya	Hosa(kotta)palya	1 x 30	PSC I Girder	5+5	2 x 13.75
27	60+560	VR	Bethamangala - Madivala	Bethamangala	1 x 30	PSC I Girder	5+5	2 x 13.75
28	63+310	VR	Doddakari(m)kambampalli - Deverahalli	Doddakari(m) kambampalli	1 x 12	RCC Box	5+5	2 x 13.75
29	64+472	VR	Doddakari(m)kambampalli - Kuluru	Kuluru	1 x 30	PSC I Girder	5+5	2 x 13.75
30	65+533	VR	Nernahalli - Kuluru	Vadrahalli	1 x 12	RCC Box	5+5	2 x 13.75
31	66+922	VR	Vadrahalli - Ramasagara	Rayasandra	1 x 12	RCC Box	5+5	2 x 13.75
32	67+673	VR	Pillagundlahallii - Sarvareddihalli	Rayasandra	1 x 30	PSC I Girder	5+5	2 x 13.75
33	69+485	VR	Rayasandra - Gopenahalli	Vengasandra	1 x 30	PSC I Girder	5+5	2 x 13.75

Table 2-20 : Details of Vehicular Underpasses along Interchanges

S. No.	Chainage	Type of crossing	Location of Interchange	Span Arrangement	Type of Structure	Minimum Vertical Clearance required	Total width of structure*
1	0+114 of Connecting Road (INT-02)	VR	Chikkasabbenahalli	1 x 12	RCC Box	5.5	45
2	0+300 of Ramp-2 (INT-02)	VR	Chikkasabbenahalli	1 x 12	RCC Box	5.5	20

2.7.10 Interchange Structures

Four interchange locations has been proposed, the detail are given in **Table 2.21**.

Table 2-21: Details of Interchange Structures

S. No.	Chainage	Type of crossing/ Connecting to	Name of Location of Crossing	Span Arrangement	Type of Structure	Total length of structure	Minimum Vertical Clearance required	Total width of structure
1	0+000	NH 75 & NH 207	Kolatturu	2 x 35	PSC I Girder	70	5.5	2 x 34.75
2	24+138	Malur-Kolar Road	Chikkasabbenahalli	2 x 45	PSC Box Girder	90	5.5	2 x 11.75
3	52+085	Kolar Gold Field Road- Bethamangala Road (SH 95)	Doddurukarapanahalli	1 x 35	PSC I Girder	35	5.5	34.75 + 24.25
4	68+620	Bethamangala- Venkatagirikota Road (SH 95)	Vengasandra	2 x 45	PSC Box Girder	90	5.5	2 x 11.75

2.7.11 Bridges

There are 15 nos. of major bridges and 44 nos. of minor bridges proposed along the project road. The proposed major and minor bridges are given in **Table 2.22** and **Table 2.23** respectively

Table 2-22: Details of Major Bridges

S. No.	Chainage	Type of crossing	Name of Village	Span Arrangement	Type of Structure	Total length of structure	Total width of structure	Name of Tank
	Package 1 Main Expressway							
1	7+370	Tank	Vadagenahalli	9 X 30	PSC I Girder	270	2 x 13.75	Vadagenahalli
2	11+895	Tank	Gangapura	5 X 25	PSC I Girder	125	2 x 13.75	Gangapura
3	17+220	Tank	Abbenahalli	12 X 30	PSC I Girder	360	2 x 13.75	Madivala
4	21+043	Tank	Obalapura	5 X 25	PSC I Girder	125	2 x 13.75	Maliyappanahalli
	Package 2 Main Expressway							
5	30+705	Tank	Kuntanahalli	6 X 30	PSC I Girder	180	2 x 13.75	Kuntanahalli
6	35+640	Tank	Naganathapura	10 X 25	PSC I Girder	250	2 x 13.75	Naganathapura
7	40+880	Tank	Kuppanahalli	3 X 30	PSC I Girder	90	2 x 21.25	Kuppanahalli
8	41+396	Tank	Kuppanahalli	10 X 25	PSC I Girder	250	2 x 21.25	-
9	44+300	Tank	Margal	4 X 25	PSC I Girder	100	2 x 13.75	Margal
10	45+953	Tank	Iythandahalli	5 X 30 + 1 X 15	PSC I Girder	165	2 x 13.75	Iythandahalli
11	47+600	Tank	Iythandahalli	5 X 30	PSC I Girder	150	2 x 32.0	Kaveranahalli
12	49+875	Tank	Doddurukarapanahalli	15 X 30	PSC I Girder	450	2 x 13.75	Karapanahalli
	Package 3 Main Expressway							
13	64+100	Tank	Kuluru	5 X 25	PSC I Girder	125	2 x 13.75	Kuluru
Interchange Locations								
	Package 2							
1.	0.447 Connecting Road of INT-03	Tank	Krishnarajapura	8 x 30	PSC I Girder	240	2 x 11.75	-
	Package 3							

S. No.	Chainage	Type of crossing	Name of Village	Span Arrangement	Type of Structure	Total length of structure	Total width of structure	Name of Tank
2.	0.525 INT-4/Ramp-1	Tank	Rayasandra	5 x 30	PSC I Girder	150	2 x 11.50	-

Table 2-23 : Details of Minor Bridges

S. No.	Chainage	Type of crossing	Village Name	Span Arrangement	Type of Structure	Total length of structure
	Package 1 Main Expressway					
1	1+860	Drain/Nallah	Kolatturu	2 X 20	PSC I Girder	2 x 13.75
2	2+160	Drain/Nallah	Kolatturu	2 X 20	PSC I Girder	2 x 13.75
3	4+435	Tank	Jinnagara	2 X 20	PSC I Girder	2 x 13.75
4	5+200	Drain/Nallah	Vagata	2 x 4.0 x 2.5	RCC Box	2 x 13.75
5	6+210	Drain/Nallah	Chandrapura	3 x 5.0 x 3.5	RCC Box	2 x 13.75
6	10+976	Drain/Nallah	Thiratahalli	2 x 4.0 x 2.5	RCC Box	2 x 13.75
7	11+354	Drain/Nallah	Thaggalihosahalli	1 x 35	PSC I Girder	2 x 13.75
8	13+164	Drain/Nallah	Hedaginabele	2 x 4.0 x 3.5	RCC Box	2 x 13.75
9	20+126	Drain/Nallah	Maliyappanahalli	2 x 6.5 x 3.5	RCC Box	2 x 13.75
10	20+450	Drain/Nallah	Maliyappanahalli	2 x 4.0 x 2.5	RCC Box	2 x 13.75
11	23+330	Drain/Nallah	Chikkasabbenahalli	1 x 30	PSC I Girder	2 x 13.75
	Package 2 Main Expressway					
12	27+005	Drain/Nallah	Hijuvanahalli	3 x 3.0 x 3.0	RCC Box	2 X 13.75
13	27+239	Drain/Nallah	Hijuvanahalli	1 x 30.0	PSC I Girder	2 X 13.75
14	28+150	Drain/Nallah	Anepura	3 x 2.5 x 3.0	RCC Box	2 X 13.75
15	28+200	Drain/Nallah	Anepura	3 x 2.5 x 3.0	RCC Box	2 X 13.75
16	28+250	Drain/Nallah	Anepura	3 x 2.5 x 3.0	RCC Box	2 X 13.75
17	28+840	Drain/Nallah	Karamgutte	3 x 6.0 x 3.0	RCC Box	2 X 13.75
18	35+035	Drain/Nallah	Naganathapura	2 x 4.0 x 3.5	RCC Box	2 X 13.75
19	35+227	Drain/Nallah	Naganathapura	3 x 6.5 x 3.5	RCC Box	2 X 13.75
20	36+209	Drain/Nallah	Sulikunte	2 x 6.0 x 2.5	RCC Box	2 X 13.75
21	36+452	Drain/Nallah	Sulikunte	2 x 5.0 x 3.5	RCC Box	2 X 13.75
22	37+780	Drain/Nallah	Madamangala	2 x 4.0 x 3.5	RCC Box	2 X 13.75
23	39+226	Drain / Nallah	Siddanahalli	2 x 20.0	PSC I girder	2 X 13.75
24	40+950	Drain/Nallah	Kuppanahalli	2 x 4.0 x 3.5	RCC Box	2 X 21.25
25	46+688	Drain/Nallah	Ithandahalli	3 x 6.0 x 3.0	RCC Box	2 X 13.75
26	47+342	Drain/Nallah	Ithandahalli	3 x 5.0 x 3.5	RCC Box	17.25+ 21.25

S. No.	Chainage	Type of crossing	Village Name	Span Arrangement	Type of Structure	Total length of structure
27	48+926	Drain/Nallah	Doddurukarapanahalli	3 x 5.0 x 3.5	RCC Box	2 X 13.75
28	50+428	Drain/Nallah	Doddurukarapanahalli	3 x 6.5 x 3.5	RCC Box	2 X 13.75
29	51+134	Drain/Nallah	Doddurukarapanahalli	2 x 6.5 x 3.5	RCC Box	2 X 13.75
30	51+269	Drain/Nallah	Doddurukarapanahalli	2 x 6.5 x 3.5	RCC Box	2 X 13.75
31	52+330	Drain/Nallah	Doddurukarapanahalli	2 x 6.5 x 3.5	RCC Box	2 x 13.75 + 2 x 12.50
32	52+665	Drain/Nallah	Gattakamadenahalli	3 x 5.5 x 3.5	RCC Box	22.4 + 13.75
33	53+033	Drain/Nallah	Gattakamadenahalli	3 x 6.0 x 3.0	RCC Box	2 X 13.75
34	53+123	Drain/Nallah	Gattakamadenahalli	4 x 6.5 x 3.0	RCC Box	2 X 13.75
35	53+195	Drain/Nallah	Gattakamadenahalli	4 x 6.5 x 3.0	RCC Box	2 X 13.75
	Package 3 Main Expressway					
36	55+165	Drain/Nallah	Pedampalli	3 x 4.0 x 3.0	RCC Box	2 x 13.75
37	56+780	Drain/Nallah	Thammenahalli	4 x 6.5 x 3.0	RCC Box	2 x 13.75
38	57+370	Drain/Nallah	Hosa(kotta)palya	2 x 25.0	PSC I girder	2 x 13.75
39	59+278	Drain/Nallah	Parisepalli	2 x 4.5 x 3.5	RCC Box	2 x 13.75
40	61+066	Palar River	Bethamangala	2 x 30.0	PSC I girder	2 x 13.75
41	69+168	Drain/Nallah	Vengasandra	4 x 5.5 x 3.0	RCC Box	13.75+25.25
Interchange Locations						
	Package 1					
1.	1.059 of Connecting Road of INT-02	Nala	Chikkasabbenahalli	3 x 7.0 x 3.0	RCC Box	2 X 11.75
	Package 2					
2.	1.229 of Connecting Road of INT-03	Drain/Nallah	Doddutu Karapannahalli	2 x 4.0 x 3.0	RCC Box	2 x 18.50
3	1.527of Connecting Road of INT-03	Drain/Nallah	Doddutu Karapannahalli	1 x 25.0	PSC I girder	2 x 11.75

2.7.12 Rail Over Bridge (ROB)

One ROB has been proposed, the details of ROB is given in **Table 2.24**.

Table 2-24: Details of Proposed ROBs/RUBs

S. No.	Chainage	Type of crossing	Span Arrangement	Type of Structure	Total length of structure	Total width of structure*
1	41+960	Railway Crossing &	1 x 33.25 + 1 x 13.25 + 1 x 36.0 + 1 x 13.25	PSC I girder/ Steel Composite	102.2	2 x 21.25

S. No.	Chainage	Type of crossing	Span Arrangement	Type of Structure	Total length of structure	Total width of structure*
		SH 5		Girder		

2.7.13 Culverts

There are 123 nos. of culverts along the proposed project road and the interchanges. The details of the culverts along the proposed road and interchanges are mentioned in **Table 2.25** and **Table 2.26** respectively.

Table 2-25: Details of Proposed Culverts along Main Alignment

S. No	Chainage	Span Arrangement	Type of Water Body	Name of Village	Type of structure	Formation width of structure
	Package 1 Main Expressway					
1	0+401	1 x 2.0 x 2.5	-	Kolatturu	RCC Box	As per TCS
2	1+595	1 x 2.0 x 2.5	Stream/Nallah	Kolatturu	RCC Box	As per TCS
3	2+350	1 x 2.0 x 2.5	-	Kolatturu	RCC Box	As per TCS
4	3+500	1 x 2.0 x 2.5	-	Kannuralli	RCC Box	As per TCS
5	3+800	1 x 2.0 x 2.5	-	Kannuralli	RCC Box	As per TCS
6	5+460	1 x 2.0 x 2.5	-	Vagata	RCC Box	As per TCS
7	5+800	3 x 2.0 x 2.5	-	Vagata	RCC Box	As per TCS
8	6+950	2 x 3.0 x 3.0	-	Vadagenahalli	RCC Box	As per TCS
9	7+620	1 x 2.0 x 2.5	-	Vadagenahalli	RCC Box	As per TCS
10	7+705	1 x 2.0 x 2.5	-	Vadagenahalli	RCC Box	As per TCS
11	7+770	1 x 2.0 x 2.5	-	Karibeeranahosahalli	RCC Box	As per TCS
12	8+210	1 x 2.0 x 2.5	-	Karibeeranahosahalli	RCC Box	As per TCS
13	8+540	1 x 2.0 x 2.5	-	Karibeeranahosahalli	RCC Box	As per TCS
14	12+028	1 x 2.0 x 2.5	-	Gangapura	RCC Box	As per TCS
15	12+250	1 x 2.0 x 2.5	Stream/Nallah	Gangapura	RCC Box	As per TCS
16	12+530	1 x 2.0 x 2.5	Stream/Nallah	Gangapura	RCC Box	As per TCS
17	14+610	1 x 2.0 x 2.5	Stream/Nallah	Hedaginabele	RCC Box	As per TCS
18	14+706	2 x 3.0 x 3.0	Stream/Nallah	Hedaginabele	RCC Box	As per TCS
19	14+750	1 x 2.0 x 2.5	-	Hedaginabele	RCC Box	As per TCS
20	14+850	1 x 2.0 x 2.5	-	Hedaginabele	RCC Box	As per TCS
21	14+950	1 x 2.0 x 2.5	-	Hedaginabele	RCC Box	As per TCS
22	18+689	1 x 3.5 x 3.0	Stream/Nallah	Abbenahalli	RCC Box	As per TCS

S. No	Chainage	Span Arrangement	Type of Water Body	Name of Village	Type of structure	Formation width of structure
23	18+790	1 x 5.0 x 3.0	-	Maliyappanahalli	RCC Box	As per TCS
24	18+920	1 x 3.5 x 3.0	-	Maliyappanahalli	RCC Box	As per TCS
25	19+128	2 x 2.5 x 2.5	-	Maliyappanahalli	RCC Box	As per TCS
26	21+294	2 x 2.5 x 2.5	Stream/Nallah	Obalapura	RCC Box	As per TCS
27	21+507	1 x 2.0 x 2.5	Stream/Nallah	Obalapura	RCC Box	As per TCS
28	22+430	1 x 2.0 x 2.5	-	Varadenahalli	RCC Box	As per TCS
29	22+890	1 x 2.0 x 2.5	Stream/Nallah	Varadenahalli	RCC Box	As per TCS
30	23+120	1 x 2.0 x 2.5	-	Varadenahalli	RCC Box	As per TCS
31	24+500	1 x 2.0 x 2.5	-	Doddasabbenahalli	RCC Box	As per TCS
32	25+090	1 x 2.0 x 2.5	-	Nambiganahalli	RCC Box	As per TCS
33	25+861	1 x 2.0 x 2.5	-	Nambiganahalli	RCC Box	As per TCS
34	26+218	2 x 3.0 x 3.0	-	Nambiganahalli	RCC Box	As per TCS
	Package 2 Main Expressway					
35	26+860	1 x 2.0 x 2.5	-	Hijuvanahalli	RCC Box	As per TCS
36	27+529	1 x 2.0 x 2.5	Stream/Nallah	Hijuvanahalli	RCC Box	As per TCS
37	27+764	2 X 2.0 X 2.5	-	Hijuvanahalli	RCC Box	As per TCS
38	27+966	1 x 2.0 x 2.5	Stream/Nallah	Hijuvanahalli	RCC Box	As per TCS
39	28+113	2 X 2.5 X 3.0	Stream/Nallah	Anepura	RCC Box	As per TCS
40	28+333	3 x 2.0 x 2.5	Stream/Nallah	Anepura	RCC Box	As per TCS
41	29+640	1 x 2.0 x 2.5	-	Karamgutte	RCC Box	As per TCS
42	30+500	1 x 2.0 x 2.5	-	Kuntanahalli	RCC Box	As per TCS
43	31+735	1 x 2.0 x 2.5	-	Karadugurki	RCC Box	As per TCS
44	32+166	1 x 2.0 x 2.5	-	Karadugurki	RCC Box	As per TCS
45	33+000	1 x 2.0 x 2.5	-	Swamigalagollahalli	RCC Box	As per TCS
46	34+160	1 x 2.0 x 2.5	-	Vadagere	RCC Box	As per TCS
47	34+205	1 x 2.0 x 2.5	-	Vadagere	RCC Box	As per TCS
48	34+315	1 x 2.0 x 2.5	-	Vadagere	RCC Box	As per TCS
49	34+540	1 x 3.0 x 3.0	-	Sulikunte	RCC Box	As per TCS
50	35+800	1 x 2.0 x 2.5	Stream/Nallah	Naganathapura	RCC Box	As per TCS
51	37+110	1 x 2.0 x 2.5	-	Mugalabele	RCC Box	As per TCS
52	38+920	1 x 2.0 x 2.5	-	Madigarahalli	RCC Box	As per TCS
53	39+780	1 x 2.0 x 2.5	-	Siddanahalli	RCC Box	As per TCS

S. No	Chainage	Span Arrangement	Type of Water Body	Name of Village	Type of structure	Formation width of structure
54	40+380	1 x 2.0 x 2.5	Stream/Nallah	Kuppanahalli	RCC Box	As per TCS
55	41+665	1 x 2.0 x 2.5	-	Kuppanahalli	RCC Box	As per TCS
56	42+475	1 x 2.0 x 2.5	-	Birandahalli	RCC Box	As per TCS
57	42+938	1 x 6.0 x 3.0	Stream/Nallah	Birandahalli	RCC Box	As per TCS
58	43+395	2 x 3.0 x 3.0	Stream/Nallah	Karabele	RCC Box	As per TCS
59	43+603	1 x 3.0 x 3.0	Stream/Nallah	Maragal	RCC Box	As per TCS
60	44+865	2 x 3.0 x 3.0	-	Maragal	RCC Box	As per TCS
61	45+698	2 X 3.0 X 3.0	Stream/Nallah	Ithandahalli	RCC Box	As per TCS
62	46+275	1 x 2.0 x 2.5	-	Ithandahalli	RCC Box	As per TCS
63	46+900	1 x 2.0 x 2.5	-	Ithandahalli	RCC Box	As per TCS
64	48+450	1 x 2.0 x 2.5	-	Doddurukarapanahalli	RCC Box	As per TCS
65	48+720	1 x 2.0 x 2.5	-	Doddurukarapanahalli	RCC Box	As per TCS
66	49+455	1 x 2.0 x 2.5	-	Doddurukarapanahalli	RCC Box	As per TCS
67	52+960	2 x 3.0 x 3.0	Stream/Nallah	Gattakamadenahalli	RCC Box	As per TCS
	Package 3 Main Expressway					
68	53+640	1 x 3.0 x 2.5	-	Reddyhalli	RCC Box	As per TCS
69	54+525	1 x 3.0 x 2.0	Stream/Nallah	Reddyhalli	RCC Box	As per TCS
70	54+769	1 x 3.0 x 2.5	Stream/Nallah	Reddyhalli	RCC Box	As per TCS
71	55+050	1 x 2.0 x 2.5	Stream/Nallah	Reddyhalli	RCC Box	As per TCS
72	55+927	2 x 2.5 x 2.5	Stream/Nallah	Pedampalli	RCC Box	As per TCS
73	56+100	2 x 3.0 x 2.5	-	Thammenahalli	RCC Box	As per TCS
74	56+863	2 x 2.5 x 2.5	Stream/Nallah	Thammenahalli	RCC Box	As per TCS
75	58+540	2 x 3.0 x 3.0	-	Hosa(kotta)palya	RCC Box	As per TCS
76	59+435	2 x 3.0 x 2.5	Stream/Nallah	Bethamangala	RCC Box	As per TCS
77	59+537	1 x 2.0 x 2.5	Stream/Nallah	Bethamangala	RCC Box	As per TCS
78	59+995	1 x 2.0 x 2.5	Stream/Nallah	Bethamangala	RCC Box	As per TCS
79	60+100	1 x 2.0 x 2.5	Stream/Nallah	Bethamangala	RCC Box	As per TCS
80	61+340	1 x 2.0 x 2.5	Stream/Nallah	Doddakari	RCC Box	As per TCS
81	61+940	1 x 3.5 x 3.0	Stream/Nallah	Doddakari	RCC Box	As per TCS
82	62+077	1 x 2.0 x 2.5	Stream/Nallah	Doddakari	RCC Box	As per TCS
83	62+965	1 x 3.5 x 3.0	Stream/Nallah	Bethamangala	RCC Box	As per TCS
84	63+207	1 x 2.0 x 2.5	-	Doddakari(m)kambampalli	RCC Box	As per TCS

S. No	Chainage	Span Arrangement	Type of Water Body	Name of Village	Type of structure	Formation width of structure
85	63+904	1 x 2.0 x 2.5	Stream/Nallah	Kuluru	RCC Box	As per TCS
86	64+960	2 x 2.0 x 2.5	Stream/Nallah	Vadrahalli	RCC Box	As per TCS
87	65+783	1 x 3.0 x 3.0	Stream/Nallah	Vadrahalli	RCC Box	As per TCS
88	66+115	2 x 2.5 x 2.5	Stream/Nallah	Pillagundlahalli	RCC Box	As per TCS
89	67+210	2 x 2.5 x 2.5	-	Rayasandra	RCC Box	As per TCS
90	67+920	1 x 6.0 x 3.0	Stream/Nallah	Rayasandra	RCC Box	As per TCS
91	68+000	1 x 6.0 x 3.0	Stream/Nallah	Vengasandra	RCC Box	As per TCS
92	68+152	2 x 3.0 x 2.0	-	Vengasandra	RCC Box	As per TCS
93	68+490	1 x 2.0 x 2.5	-	Vengasandra	RCC Box	As per TCS
94	68+565	2 x 3.0 x 2.5	-	Vengasandra	RCC Box	As per TCS
95	68+647	1 x 2.0 x 2.5	-	Vengasandra	RCC Box	As per TCS
96	68+858	1 x 3.5 x 3.0	Stream/Nallah	Vengasandra	RCC Box	As per TCS
97	70+580	1 x 3.0 x 3.0	-	Vengasandra	RCC Box	As per TCS
98	70+840	1 x 2.0 x 2.5	-	N.G.Hulkur	RCC Box	As per TCS

Table 2-26): Details of Proposed Culverts along Interchanges

Sl. No.	Interchange (on BCE in km)	Type	Location		Size No. x Width (m) x Height (m)
			Ramp/loop	Chainage (km)	
	Package 1 IC				
1	0.000	RCC Box	Loop 1	0.550	1 x 2 x 2.5
		RCC Box	Loop 2	0.575	1 x 2 x 2.5
		RCC Box	Loop 3	0.450	1 x 2 x 2.5
		RCC Box	Loop 3	0.640	1 x 2 x 2.5
		RCC Box	Loop 4	0.150	1 x 2 x 2.5
		RCC Box	Ramp 1	0.200	1 x 2 x 2.5
		RCC Box	Ramp 2	0.100	1 x 2 x 2.5
		RCC Box	Ramp 2	0.790	1 x 2 x 2.5
		RCC Box	Ramp 3	0.560	1 x 2 x 2.5
		RCC Box	Ramp 4	0.600	1 x 2 x 2.5
		RCC Box	NH 207	0.510	1 x 2 x 2.5
2	24.138	RCC Box	Ramp 1	0.200	1 x 2 x 2.5
	Package 2 IC				

Sl. No.	Interchange (on BCE in km)	Type	Location		Size No. x Width (m) x Height (m)
			Ramp/loop	Chainage (km)	
3.	52.085	RCC Box	Connecting road	1.323	1 x 3.0 x 3.0
	Package 3 IC				
4.	68.620	RCC Box	Ramp 3	0.210	1 x 2 x 2.5
		RCC Box	Ramp 3	0.300	2 x 3 x 2.5
		RCC Box	Loop 2	0.180	2 x 3 x 2.5
		RCC Box	Loop 2	0.105	2 x 3 x 2.5
		RCC Box	Loop 1	0.260	2 x 3 x 2.5
		RCC Box	Loop 1	0.095	2 x 3 x 2.5
		RCC Box	Ramp 1	0.175	2 x 3 x 2.5
		RCC Box	Ramp 2	0.130	1 x 2 x 2.5
		RCC Box	Connecting road	0.460	1 x 2 x 2.5

S. No.	Chainage (km)		Type of Culvert		Span Arrangement (m)	
	Existing	Design	Existing	Proposed	Existing	Proposed
	Package 1					
1	Str No : 301/1 on NH 75 (Old NH 4)	Interchange at km 0.000	Box/Slab	Box	1 x 4.6 x 2.2 (Box) on LHS & 2 x 2 x 2.2 (Slab) on RHS	Widening, replacement of existing head walls, handrails to Crash barrier, clearing and grubbing, painting etc.
2	Str No : 302/1 on NH 75 (Old NH 4)		Box	Box	1 x 1.3 x 1.2	
3	Km 1.875 of MDR (Solur Road)	VOP at km 1.030	Pipe	Pipe	1 x 0.9 m dia	

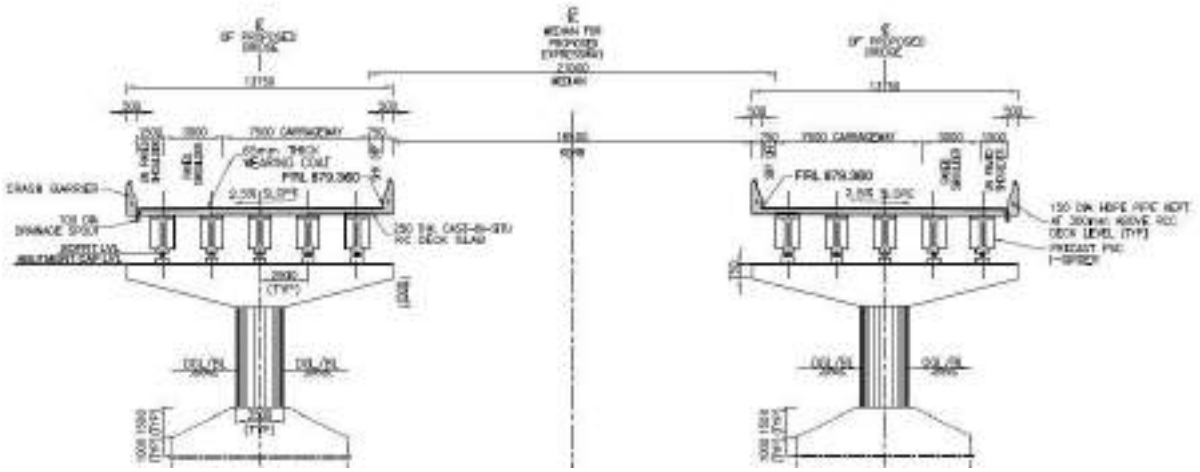
2.7.14 Engineering Mitigation Measures Provided at Irrigation Tanks

The project alignment passes through 14 number of irrigation tanks maintained by the Irrigation Department, Government of Karnataka. In order to avoid large scale impact on these water bodies, elevated structures have been proposed across all the affected water tanks/Reservoirs, for ensuring the free water flow across the Expressway without impacting the water holding capacity. The details of the structures provided in **Table 2-23**. The necessary NOC from the Line Department has been obtained for construction of expressway across these water bodies. The mitigation measures proposed are:

- De silting to be carried out after the construction of the bridge.

- The existing bund shall not be disturbed
- Weir and sluice to be maintained as is varies. Any repairs if necessary shall be carried

The typical cross section of elevated structures across these water tanks are provided in the following figure:



2.7.15 IOCL Crossing

There are two IOCL pipeline crossings along the proposed project expressway. The details are provided in **Table 2.27**

Table 2-27: Location of Proposed IOCL Crossings

Sl. No.	Chainage (km)	Name of Village	Span Arrangement (m)	Type of Structure	Total length of structure (m)	Deck Configuration (m)
1	6+626	Vadagenahalli	1 x 26	PSC I Girder	26	2 X 13.75
2	29+300	Karamgutte	1 x 26	PSC I Girder	26	2 x 13.75

2.7.16 Flyovers

There are no flyovers along the proposed project expressway.

2.7.17 Toll Plazas

Toll plazas are proposed along the project stretch. The locations are provided in **Table 2.28**.

Table 2-28: Location of Toll Plazas

Interchange No.	Interchange/ Main Exp. Chainage on BCE (in km.)	Toll Plaza	Location	Direction (Entry: to expressway, Exit: from Expressway)	No. of toll lanes (Fastag + Hybrid ETC + Extra Wide)
Toll Plaza on Main Expressway					
-	14+160/14+780	TP 1	Ch.14+160	Towards Bangalore	1+7+1*
			Ch.14+780	Towards Chennai	1+7+1*
Int. 02	24+138 (At interchange)	TP 2	Ch. 0+663 of Connecting Road	Entry	1+3+1
				Exit	1+7+1
Toll Plaza on Interchange					
INT-03	52+085 (Connecting Road to Interchange)	TP 03	Ch. 0+985 of Connecting Road	Entry	1+3+1
				Exit	1+7+1
Toll Plaza on Interchange					
INT-04	68+620 (Connecting Road to Interchange)	TP 04	Ch. 0+792 of Connecting Road	Entry	1+3+1
				Exit	1+7+1

2.7.18 Facilities and Services to the Users

Crash Barriers:

Thrie Beam-type metal beam longitudinal edge barriers will be provided on outer edges at the top of embankment throughout the length to protect any out of control vehicle from falling. Thrie beam metal barrier shall be provided for both side of the outer carriageway of Main Expressway & Interchanges. In addition, Thrie beam metal barrier has been also proposed on both sides of the raised median for Interchanges Connecting Road.

Street Lighting

At present no street lights are there on the highways section in this stretch. The street light has been proposed for locations at LVUP, VUP, Interchange, Check Post, Rest Area and Toll Plaza Locations.

Highway Lighting

The High mast lighting has been proposed along the project highway locations in interchange locations, Rest area, Toll plaza locations and check post locations.

Rest Area

The Rest area is provided at one location along the project stretch. The location of rest area is given in **Table 2.29**.

Table 2-29: Proposed Locations of Rest Area

S. No.	Chainage	Remarks
1	47+906	Left Side of Expressway
2	47+906	Right Side of Expressway

Truck Laybyes

In addition to Rest areas, Truck laybyes proposed approximately half way between Rest areas. The locations are given in **Table 2.30.**

Table 2-30: Location of Truck Laybyes

Truck Lay Bay		Village Name
Chainage	Side	
70+050	LHS	Venga Sandra
70+500	RHS	Venga Sandra

2.8 MATERIAL REQUIREMENT FOR THE PROJECT

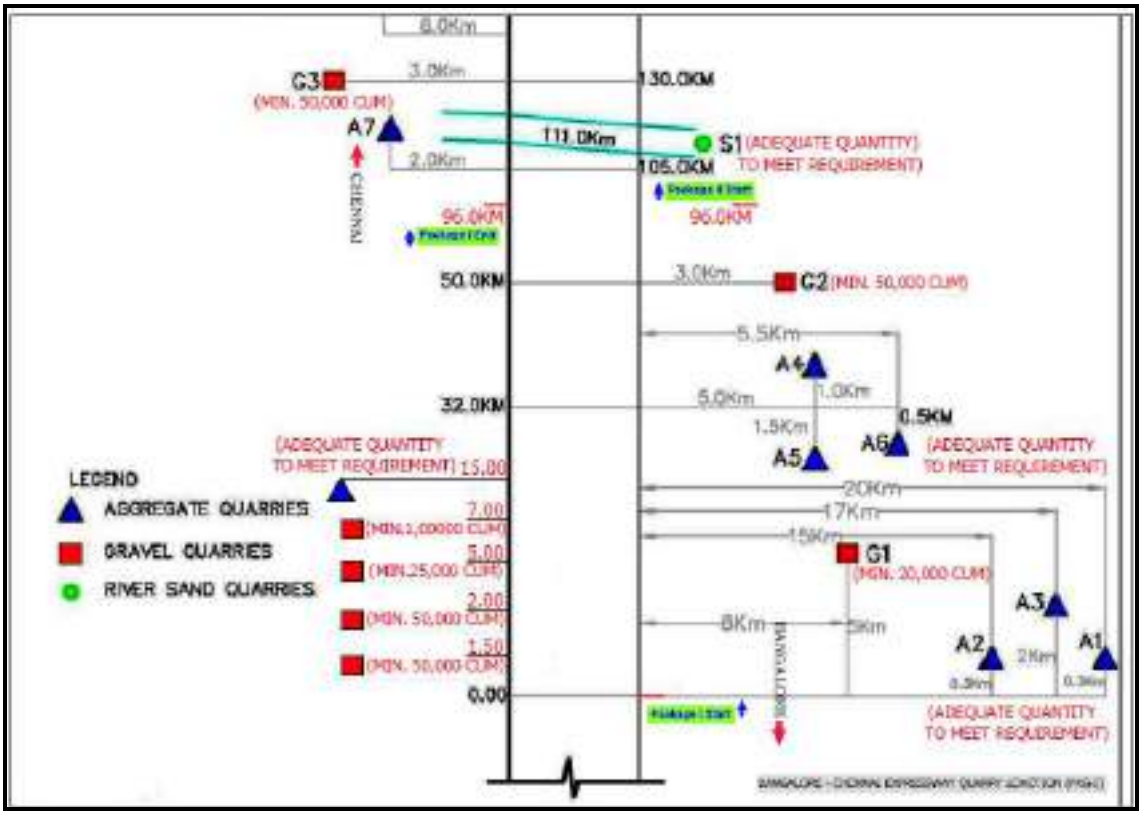
The material required for the project is given in **Table 2.31**.

Table 2-31: Material Requirement

S. No.	Type of Materials	Quantity	Source
1	Soil (Cum)	1,95,07,688	Nearby Borrow Area
2	Sand (Cum)	5,01,300	Approved Sand Quarry
3	Cement (MT)	4,28,000	Authorized Vendor
4	Aggregates (Cum)	22,17,500	Approved Quarry Site
5	Bitumen(MT)	45,600	Authorized Vendor
6	Steel (MT)	69,287	Authorized Vendor
8	HSD	2,85,43,900	Authorized Vendor
9	Fly Ash (Use of Fly ash is mandatory if thermal power plant is located within 300 Km radius)	21,42,858	Nearest Thermal Power Plant
10	Bricks	1,90,70,000	Local Vendor

2.9 MATERIAL SOURCES

2.9.1 BORROW AREAS



2.9.2 Quarry Areas

A reconnaissance survey was carried out along the project stretch. Quarry maps collected from State Government authority in Karnataka was used as guidance for inspection of various quarries. Stone metal quarries have been identified and the salient features of the quarries are given in table below.

Sl. No.	Name of the Quarry / Address / Location	Ownership of the land and area (Acres)	No. of Crushers available and Output per day	Parties to whom supplied and other details
1.	A1 - M/s.Varalaxmi Stone Crushers, Bellur (via), Narsapur (Post), Kolar Dt. Situated at 20 km from Ch.0+000 on right side towards Chennai. Land mark: IOCL Petrol Bunk	Private Land, 10 Acres	02 Nos. & 750 Cum/day	Metal sizes available are 40 mm, 20 mm, 12 mm, 6 mm and Stone dust. Supplying for road works, building works and other maintenance works, etc.,

Sl. No.	Name of the Quarry / Address / Location	Ownership of the land and area (Acres)	No. of Crushers available and Output per day	Parties to whom supplied and other details
2.	A2 - M/s. Gayatri Stone Crushers, Byrasandra village, Narsapur (Post), Kolar (District). Situated at 20 km from Ch.0+000 on right side towards Chennai. Land mark: IOCL Petrol Bunk	Private Land, 35 Acres	03 Nos. & 1000 Cum/day	Metal sizes available are 40 mm, 20 mm, 12 mm, 6 mm and Stone dust. Supplying for road works, building works and other maintenance works, etc.,
3.	A3 - M/s. Divya Bala Yesu Stone Crushers, Bendapalli village, Hoskote (Taluk), Bangalore (District) Situated at 20 km from Ch.0+000 on right side towards Chennai. Land mark: Near Confident Amon Resorts	Priovate Land, 08 Acres	01 No. & 450 cum/day	Metal sizes available are 40 mm, 20 mm, 12 mm, 6 mm and Stone dust. Supplying for road works, building works and other maintenance works, etc.,
4.	A4 - M/s. Katariya Stone Crushers, Takal village, Malur (Taluk), Kolar (District). Situated at 06 km from Ch.32+000 on right side towards Chennai	Land from Tekal Mandal Panchaya,t 03 Acres	01 No. & 150 Cum/day	Metal sizes available are 40 mm, 20 mm, 12 mm, 6 mm and Stone dust. Supplying for road works, building works and other maintenance works, etc.,
5.	A5 - M/s. Goundar Stone Crushers, Takal village, Malur (Taluk), Kolar (District). Situated at 6.5 km from Ch.32+000 on right side towards Chennai	Private Land, 05 Acres	02 No. & 450 Cum/day	Metal sizes available are 40 mm, 20 mm, 12 mm, 6 mm and Stone dust. Supplying for road works, building works and other maintenance works, etc.,
6.	A6 - M/s. Ranganath Stone Crushers, Takal village, Malur (Taluk), Kolar (District). Situated at 6.5 km from Ch.32+000 on right side towards Chennai	Private Land, 07 Acres	02 No. & 250 Cum/day	Metal sizes available are 40 mm, 20 mm, 12 mm, 6 mm and Stone dust. Supplying for road works, building works and other maintenance works, etc.,

2.9.3 Gravel Material for Granular Sub-base

SL NO	Quarry No, Name & Address	Ownership & Acres	Lead from Chainage (Km)	Remarks
1	G1 - Divya Bala Yesu Diggers, 21/22, Dodda Basavanapura Extn, Battarahalli, K R Puram, Bangalore.	Pvt Land, 200 Acres	15 Km from Ch.0+000, right side towards Chennai	The quarry is located in Hoskote Village, Shidlaghatta Road, Near Nandini Milk Dairy
2	G2 - Doddur- Karpanahalli Panchayat Quarry	Govt. Land 05 Acres	03 Km from Ch.50+000, right side towards Chennai	The quarry is located in Karpanahalli to BEML road.

2.9.4 Sand Quarry

Sand is available in the following river and already quarrying activity is undertaken:

(i) Kaundinya River (S1)

2.10 IRC SPECIFICATIONS TO BE FOLLOWED

The project will be executed under PPP model under DBFO pattern in which the Concessionaire will design in accordance with the proposed improvement, Built, Fund and operate the project till concession period. The IRC specification and guidelines will be followed during design and construction. The IRC/MORTH Codes and guidelines are given in **Table 2.32**, which will be applicable in the project.

Table 2-32: Details of IRC/MORTH Codes and guidelines

S. No.	Particular	Relevant IRC Guidelines (Name/ Number)	Remarks
1	Project Highway Design	**IRC: SP: 99-2013** Manual of Specifications and Standards for Expressway	The project highway has been designed for the design speed of 120 kmph as per IRC: SP: 99:2013 requirements.
2	Provisions of Underpasses / Overpasses (Vehicular and Pedestrian)		Vehicular Underpasses: 35 nos. vehicular underpasses has been proposed in entire road section. Light Vehicular Underpasses: 19 nos. has been proposed in entire road section. Vehicular Overpasses: 6 nos. vehicular overpasses has been proposed in entire road section. These underpasses/overpasses are provided as per site requirement considering the safe movement.
3	Design of Bridges and culverts		Major bridges: 15 Nos. Minor bridges: 44 Nos. (41 Nos. along main alignment & 3 Nos. along Interchange) Culverts: 123 Nos. (98 Nos. along main alignment & 25 Nos. along Interchange) ROB: 1 No. CD structures are proposed based on hydraulic study.
4	Traffic Safety provisions such as crash barriers, railings etc		Crash barriers/Guard Stones: At locations where embankment height is more than 3m and at sharp curves crash barrier has been proposed as per IRC: SP: 99-2013 requirements. Crash barriers/Railings: At all structures Others safety devices have been provided as per IRC: SP: 99-2013 requirements
5	Provisions of Flyovers, RUB, ROB, Grade Separators		ROB / Flyovers has been provided as per IRC codes
6	Road Safety Audit details		The VUP/LVUP has been proposed for safe movement of vehicles. The crash barrier and guard rail has been proposed as per IRC guidelines.

With respect to above, following additional IRC Codes/Guidelines to be used, which are included in IRC: SP:99-2013

S. No.	IRC Codes/Guidelines	Title of the Publication	Information
1	IRC:5-2015	Standard Specifications and Code of Practice for Road Bridges, Section I- General Features of Design (Seventh Revision)	Type design for crash barrier
2	IRC:6-2017	Standard Specifications and Code of Practice for Road Bridges, Section II- Loads and Stresses (Fourth Revision)	Design loads and stresses of structures
3	IRC:8-1990	Type design for Highway Kilometre stone (Second Revision)	Design for Highway Kilometre
4	IRC:9-1972	Traffic Census on non-urban roads (First Revision)	Traffic Census
5	IRC:25-1967	Type Design for boundary Stone	Design for boundary Stone
6	IRC:26-1967	Type Design for 200-meters Stones	Design for 200-mteres Stones
7	IRC:35-2015	Code practice for Road markings (First Revision)	Road markings
8	IRC:37-2012	Guidelines for the design of Flexible Pavements (Second Revision)	Design of Flexible Pavements
9	IRC:67-2012	Code of Practice for Road Signs (First Revision)	Road Signs
10	IRC:78-2014	Standard Specifications and Code of Practice for Road Bridges. Section VII-Foundations and Substructure (Second Revision)	Bridges
11	IRC:81-1997	Guidelines for Strengthening of Flexible Road Pavement using Benkelman Beam Deflection Technique (First Revision)	Pavement Condition survey and evaluation
12	IRC:89-1997	Guidelines for Design and Construction of River Training and Control Woks for road bridges (First Revision)	River Training and Protective works
13	IRC:104-1988	Guidelines for Environmental Impact Assessment	Carrying out Environmental Impact Assessment for the proposed project road
14	IRC:108-2015	Guidelines for Traffic prediction on Rural Highways	Traffic projection
15	IRC:SP:19-2001	Manual for Survey, Investigation and Preparation for road project (Second Revision)	Soil test and Investigation
16	IRC:SP:21-2009	Guidelines on Landscaping and Tree Plantation (First Revision)	Landscaping and Avenue plantation for the proposed project road
17	IRC:SP:42-2014	Guidelines on Road Drainage	Drainage System

3 DESCRIPTION OF ENVIRONMENT

To predict the various environmental impacts likely to arise due to the implementation of this project, it is essential to establish the baseline environmental status of the project area. This chapter describes the nature, type and dimension of the study area and describes the relevant physical, biological and socio-economic component along the 15 kilometers on both sides from the centre of the road as per guidelines of Ministry of Environment Forest and Climate Change, Government of India. However, the focus of the study was on the areas within and directly adjacent to the corridor of impact and ROW. The review of the environmental status within the project corridor is based on the secondary information collected from various sources followed by field surveys of the project area. All the data have been collected and collated to identify a general environmental condition within the project catchment area and major environmental issues to be taken care off during the design as well project implementation phase.

3.1 Physical Environment

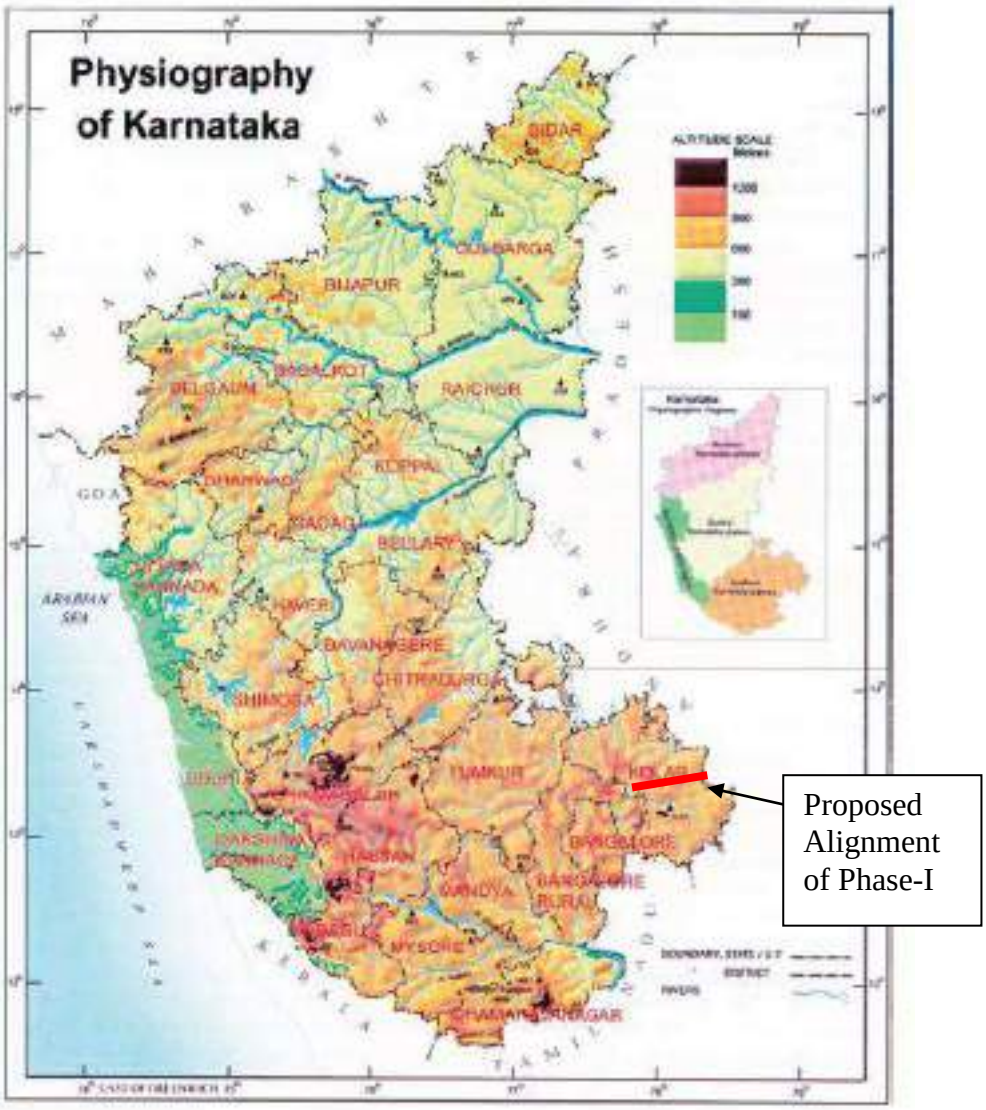
3.1.1 Physiography

The entire project stretch of proposed Bangalore-Chennai Expressway Phase-I is located in Karnataka state. The proposed project section of Bangalore Chennai Expressway (BCE) starts at village Kolathuru, Hosket Taluka of Bangalore Rural district at Existing Km 301.200 of NH-4 and ends near N.G.Hulkur Village, Bangarpet Taluka, Kolar District, Karnataka covering a total length of 71 Kms of main alignment. The geographical extension of the project road section is between 13°5'3.38" N and 77°49'20.59" E longitude in Kolathuru village and 13°00'28.49" N latitude and 78°25'34.00" E longitude near N.G. Hulkur village. It passes through two districts namely Bangalore Rural (from Km 0.000 to Km 11.682) and Kolar (from Km 11.682 to Km 71.000) of Karnataka state.

Physiographical Karnataka State forms part of two well defined macro regions of Indian Union; the Deccan Plateau and the Coastal plains and Islands. The Karnataka state has four physiographic regions, i.e., the Northern Karnataka Plateau, the central Karnataka Plateau, South Karnataka Plateau. The project area falls in the physiographic regions of South Karnataka Plateau of Karnataka State. This region largely covers the area of the Cauvery river basin lying in Karnataka. The study area shows broken and rugged topography. The project stretch lies over flat to undulating plain in the south eastern part of Karnataka. The general elevation of the region varies from 600 m above msl to 900 m msl. However residual heights of 1,500 to 1,750 meters are also found. The altitude of the project alignment however varies between 771 m to 927 m above mean sea level. The mean elevation some of the locations are - starting point 874 m, Cheemandahalli 912 m, Gonakanahalli 926 m, Kanbipura 927 m, Kanivanahalli 902 m, Nambiganahalli 912 m, Iythandhlli 850 m, Byatryanhalli 771 m, Koolur 776 and end point 779 m above mean sea level.

This South Karnataka plateau region is characterized by high degree of slope. However, the country slope in the study area show gentle slopping in the range of 1-3% to moderate slope in the range of 3-8%. The general slope in the project area is from North West to south east direction The Cauvery river basin forms a significant part of this plateau region. The river Cauvery

and its tributaries open out to form undulating plains. The project area is drained by Palar river and number of local streams and nallah. All these water bodies are ephemeral in nature.



Source: A Handbook of Karnataka, Govt. of Karnataka

Figure 3-1: **Physiographic map of Karnataka**

3.1.2 Geology and Soil

Bangalore Rural District

Bangalore Rural district forms part of the Deccan Plateau and is covered by peninsular gneiss, granites, basic dykes and laterites. Geology of the Bangalore rural district is broadly described under two groups (i) the dominating Archaean crystalline formation comprising peninsular gneissic complex with a small patch of horn blend schist in the northern part and intrusive closepet granite all along the western part of the district (ii) smaller stretches of unconsolidated

sediments. The granite gneisses are mainly of migmatitic type, highly banded in composition from granite to diorite.

Kolar District

The major rock formations in the district are as shown below;

Period	Major Rocks
Tertiary	Sheet Laterite
Nondated Intrusives	Granite & Granite-gneiss
Precambrian basic Intrusives	Dolerites
Lower Precambrain (Dharwads)	Schist & Quartzites
Archean	Gneiss, Hornblende-Biotite gneiss and other unclassified Crystallines

Seismicity

The project alignment falls under ZONE II of seismic zone of India, which is lower damage zone with MSK VI. This zone is classified as low damage risk zone. The IS code assigns zone factor of 0.16 for Zone II. Seismic zonation map of India indicating the project alignment is given in Figure 3.2 below:

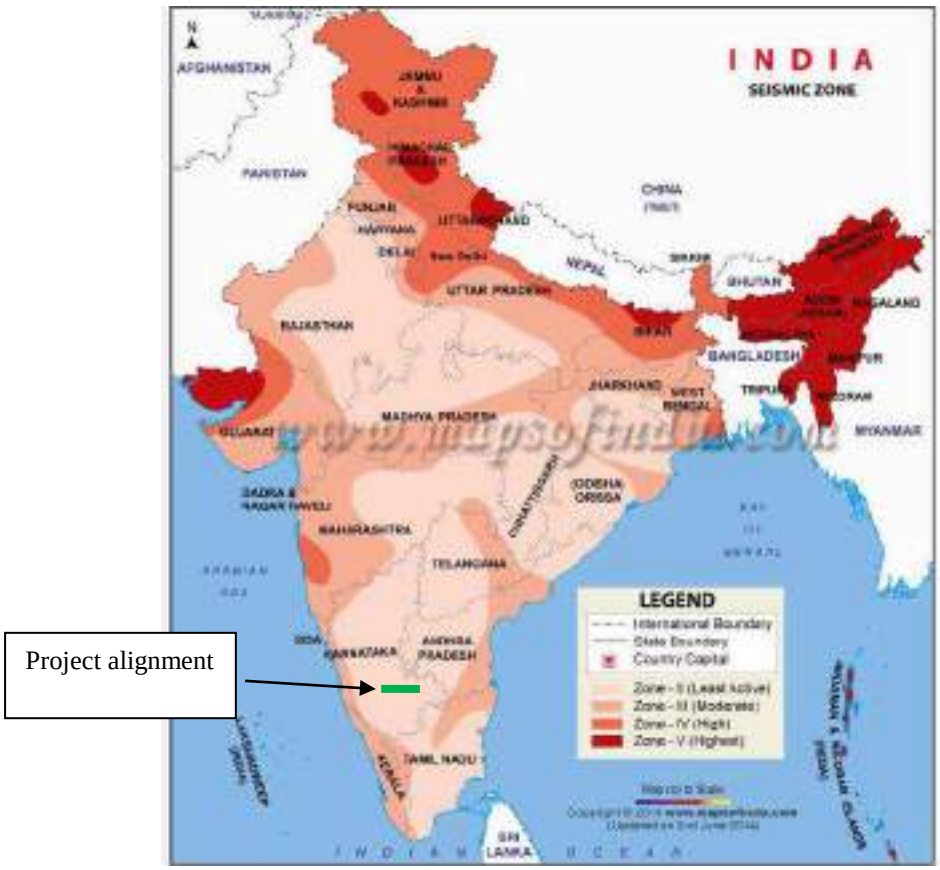


Figure 3-2: Seismic Zones of India

Soil:

Bangalore Rural District

The soils of Bangalore Rural districts are broadly classified in to four categories namely

(i) Loamy soil (ii) Lateritic soil (iii) Lateritic gravelly soil and (iv) Red sandy soil.

Red loamy soils generally occur on hilly to undulating land slope on granite and granite gneisses. Lateritic soil occurs in undulating terrain forming plain to gently sloping topography of peninsular gneiss region. Lateritic gravelly soils occur in upland regions of lateritic soils, Red sandy soil occurs in undulating land slopes. These soils are derived from acidic rocks granites and granitic gneiss.

Kolar District:

The soils of Kolar district occur on different landforms such as hills, ridges, pediments, plains and valleys. The types of soils distributed range from red loamy soil to red sandy soil and lateritic soil. Of the total area, about 73% is suitable for agriculture and horticulture; about 3% for forestry, pasture and the remaining area is suitable for quarrying, mining and as habitat for wildlife.

The soil map of Karnataka is presented in Figure 3.3.

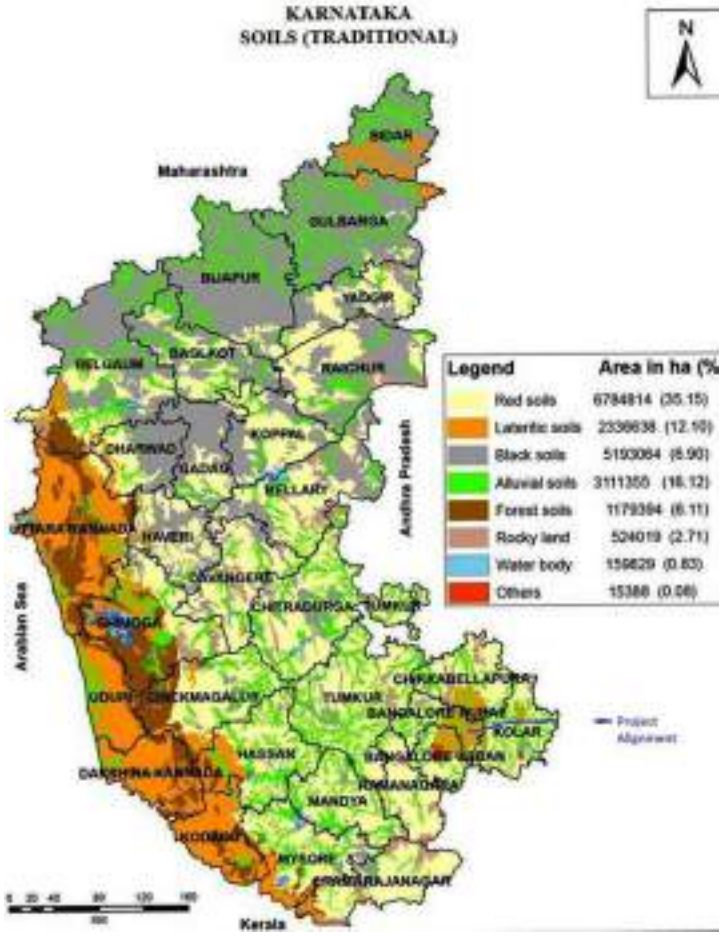


Figure 3-3: Soil Map of Karnataka

3.1.3 Quarry site and Borrow Areas

Quarry areas

Road construction requires earth, stones and sand embankment and pavement construction. These raw materials are to be obtained from surrounding areas, which are suitable from quality point of view. For the required quantity of stone 6 numbers of quarries have been identified for Phase-I project section. Out of 6 quarries 5 belong to private owner whereas the remaining one is a panchayat land. The stone quarries are hill quarries or flat land quarries and are devoid of any significant environmental features. All these quarries are approved quarries and are already operational. Sufficient quantities of metals are available in these quarries. Details of the suitable stone quarries are given Table 3.1 below:

Table 3-1: Details of Identified Aggregate Quarry for the Project

Sl. No.	Name of the Quarry / Address / Location	Ownership of the land and area (Acres)	No. of Crushers available and Output per day	Parties to whom supplied and other details
1.	A1 - M/s.Varalaxmi Stone Crushers, Bellur (via), Narsapur (Post), Kolar Dt. Situated at 20 km from Ch.0+000 on right side towards Chennai. Land mark: IOCL Petrol Bunk	Private Land 10 Acres	02 Nos. & 750 Cum/day	Metal sizes available are 40 mm, 20 mm, 12 mm, 6 mm and Stone dust. Supplying for road works, building works and other maintenance works, etc.,
2.	A2 - M/s. Gayatri Stone Crushers, Byrasandra village, Narsapur (Post), Kolar (District). Situated at 20 km from Ch.0+000 on right side towards Chennai. Land mark: IOCL Petrol Bunk	Private Land 35 Acres	03 Nos. & 1000 Cum/day	Metal sizes available are 40 mm, 20 mm, 12 mm, 6 mm and Stone dust. Supplying for road works, building works and other maintenance works, etc.,
3.	A3 - M/s. Divya Bala Yesu Stone Crushers, Bendapalli village, Hoskote (Taluk), Bangalore (District) Situated at 20 km from Ch.0+000 on right side towards Chennai. Land mark: Near Confident Amon Resorts	Private Land 08 Acres	01 No. & 450 cum/day	Metal sizes available are 40 mm, 20 mm, 12 mm, 6 mm and Stone dust. Supplying for road works, building works and other maintenance works, etc.,
4.	A4 - M/s. Katariya Stone Crushers, Takal village, Malur (Taluk), Kolar (District). Situated at 06 km from Ch.32+000 on right side towards Chennai	Land from Tekal Mandal Panchayat 03 Acres	01 No. & 150 Cum/day	Metal sizes available are 40 mm, 20 mm, 12 mm, 6 mm and Stone dust. Supplying for road works, building works and other maintenance works, etc.,
5.	A5 - M/s. Goundar Stone Crushers, Takal village, Malur (Taluk), Kolar (District). Situated at 6.5 km from Ch.32+000 on right side towards Chennai	Private Land 05 Acres	02 No. & 450 Cum/day	Metal sizes available are 40 mm, 20 mm, 12 mm, 6 mm and Stone dust. Supplying for road works, building works and other maintenance works, etc.,
6.	A6 - M/s. Ranganath Stone	Private Land	02 No. & 250	Metal sizes available are 40

Sl. No.	Name of the Quarry / Address / Location	Ownership of the land and area (Acres)	No. of Crushers available and Output per day	Parties to whom supplied and other details
	Crushers, Takal village, Malur (Taluk), Kolar (District). Situated at 6.5 km from Ch.32+000 on right side towards Chennai	07 Acres	Cum/day	mm, 20 mm, 12 mm, 6 mm and Stone dust. Supplying for road works, building works and other maintenance works, etc.,

For meeting the requirement of sand for construction, riverbed sand quarry has been identified in Kaundinya river which is already operational quarry.

Borrow Areas

The soils to be used, as sub-grade, select sub-grade and shoulder materials need to be hauled from designated borrow areas.

for identification of borrow areas following criteria has been adopted:

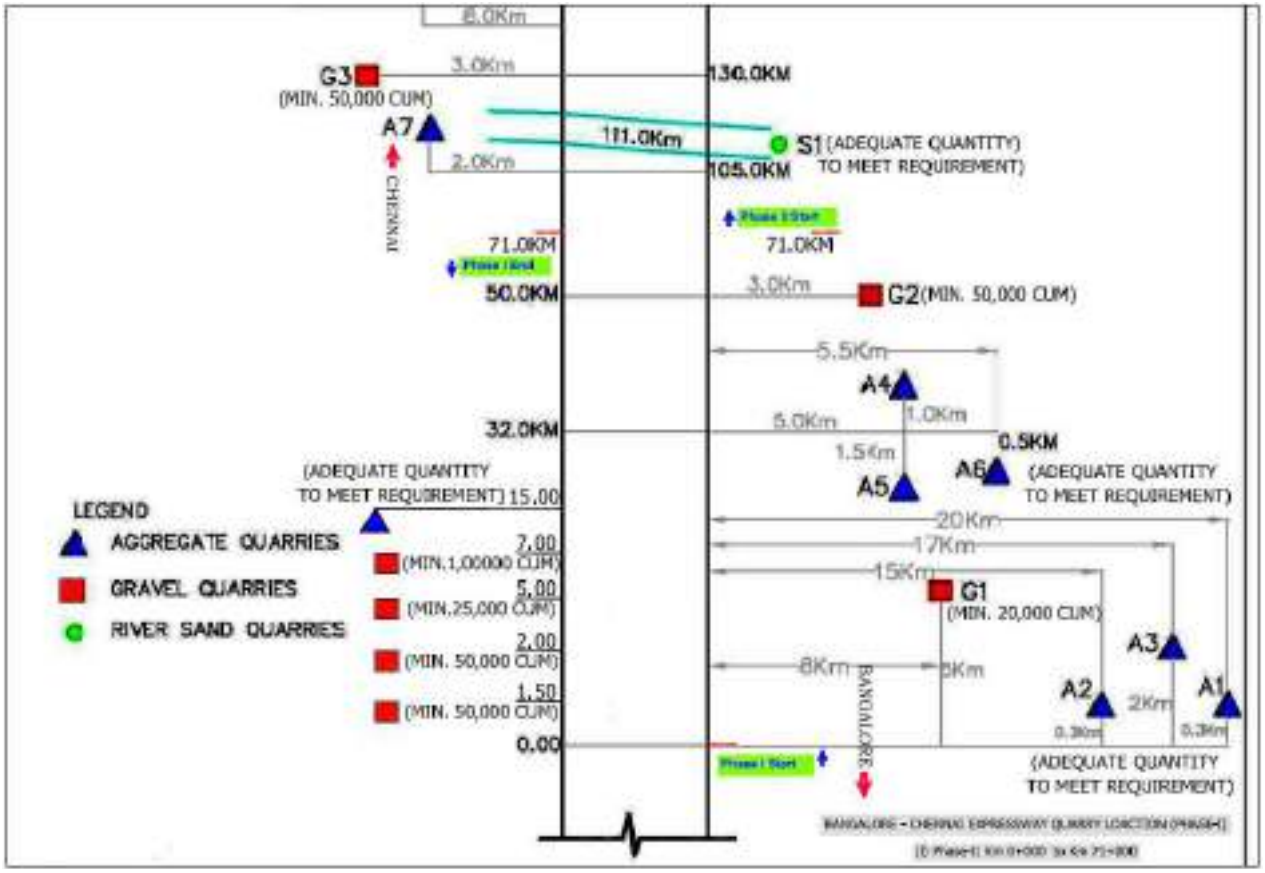
- Sufficient quantity of suitable soil is available from the borrow pit;
- The borrow areas are as close to the project road as far as possible;
- The loss of productive and fertile agricultural soil is minimum; and
- There is minimum loss of vegetation.

For the granular earth two borrow areas have been identified for use in construction of Phase-I project road. The details of identified borrow areas are presented in **Table-3.2**:

Table 3-2: Identifies Borrow Areas for Gravel Material for Granular Sub-base

SL NO	Quarry No, Name & Address	Ownership & Acres	Lead from Chainage (Km)	Remarks
1	G1 - Divya Bala Yesu Diggers, 21/22, Dodda Basavanapura Extn, Battarahalli, K R Puram,Bangalore.	Pvt Land, 200 Acres	15 Km from Ch.0+000, right side towards Chennai	The borrow area is located in Hoskote Village, Shidlaghatta Road, Near Nandini Milk Dairy. The borrow area is devoid of any sensitive environmental features
2	G2 - Doddur- Karpanahalli Panchayat Quarry	Govt. Land 05 Acres	03 Km from Ch.50+000, right side towards Chennai	The borrow area is located in Karpanahalli to BEML road. The borrow arer is devoid of sensitive environmental features and approved Government Borrow Area

These borrow areas are already approved and operations and contain sufficient quantity for construction. Both the borrow areas are devoid of any significant environmental features. Only scattered bushy vegetation can be observed over these areas. The location plan along with lead of the identified quarries and borrow areas are presented in the following **Figure 3.4**.



Source: Primary Survey Data

Figure 3-4: Location Plan of Identified Quarry and Borrow Areas

3.1.4 Land Use Land Pattern:

Land use and land cover classification within 15 Km radius of the project stretch has been carried out with the help of multidate remote sensing data from various satellite platforms to suit the nature of application. The satellite imagery collected from NRSA, Hyderabad to process and analyse the land use within the study area. In context with deriving the land cover & land use, multidate remote sensing data was used to classify the different land cover in the study area. In the present case data for LISS-III satellite imagery data was used to generate the land cover classification. The classification has been performed using unsupervised classification and using the SOI topo sheets and ground truth data obtained from field visits. The land use map generated by using satellite image is presented in **Annexure-3.1.** The result shows that the land use pattern of the project area is mainly agriculture and plantation area followed by settlements, commercial and industrial area. Percentage wise land cover within 15 km radius of the project alignment has been given in **Table 3.3**.

Table 3-3: Area statistics of Different Land Cover within 15 km Radius of the Project Stretch (Phase-I)

Land Use Class	Bangalore Rural (%)	Kolar (%)
Forest	6.0	2.6
Industrial	2.3	2.2

Land Use Class	Bangalore Rural (%)	Kolar (%)
Lake/Pond	1.9	0.8
Plantation	39.7	17.6
River	0.1	0.2
Sub-Urban	2.5	1.8
Urban	0.6	1.5
Waste Land	0.5	5.4
Agriculture	39.6	57.6
Reservoir	4.4	5.6
Fallow-Land	2.5	4.8
Total	**100.0**	**100.0**

3.1.5 Climatic Condition

Both the concern districts fall in Eastern Dry Agro Climatic Zone of Karnataka. They experience a semi-arid climate, characterized by typical monsoon tropical weather with hot summers and mild winters.

Bangalore Rural

The climate in Bangalore rural district is quite solubnous with three different seasons. The pre-monsoon starts from January to May. This period can be divided in to winter January to February and summer (march-may) winter is charaterised by generally clear skies and very little rainfall. From April onwards erratic thunderstorms occur increasing during the month of May temperature is lowest during December and January.

Kolar

Kolar district falls in the Eastern dry agro climatic Zone. It experiences a semi-arid climate, characterized by typical monsoon tropical weather with hot summers and mild winters. The year is normally divided into four seasons. They are; a) dry season during Jan-Feb, b) pre-monsoon season during Mar-May, c) Southwest Monsoon season during Jun-Sep and d) Post or Northeast monsoon season during Oct-Dec.

Temperature

Bangalore Rural district

The monthly maximum temperature varies between 27.2°C to 36.3°C. The average minimum temperature varies between 26.3°C to 13.4°C in Bangalore Rural District

Kolar District

The monthly maximum temperature varies between 25.1°C to 38.3°C. The average minimum temperature varies between 22.2°C to 13.4°C in Kolar District.

Mean monthly maximum and minimum temperature data for the period from 2008 to 2018 collected from the IMD's Bangalore City Station and for Kolar District for the period from 2008 to 2016 from nearest Chintamani IMD Station**.** The mean climatic data has been given Table-3.4. Meteorological data for last 10 year of the study area is given in **Annexure-3.2**.

Table 3-4: Monthly Average Meteorological Data of Bangalore City Station (Bangalore Rural District)

Year	Mean Max Temp (degC)	Mean Min Temp(degC)	Relative Humidity% Morn	Relative Humidity% Even	Average Wind Speed(km/hr)
2008	28.2	19.17	83.85	62.14	5.7
2009	29.8	19.55	78.83	51.83	5.4
2010	29.65	20	81.83	54.33	4.99
2011	29.54	19.17	78.91	52.91	5.27
2012	31.75	18.5	77	45.33	5.43
2013	29.92	19.59	78.25	52.25	3.67
2014	30.2	19.8	77.25	51.75	3.41
2015	29.79	19.68	78.33	56.25	3.03
2016	31.2	20.45	76.33	49.5	3.58
2017	30.28	19.94	76.5	50.33	4.4
2018	31.21	19.76	71	42.66	3.65

Source: IMD

Table 3-5: Monthly Average Meteorological Data of Chintamani Station (Kolar District)

Year	Mean Max Temp (degC)	Mean Min Temp(degC)	Relative Humidity% Morn	Relative Humidity% Even	Average Wind Speed(km/hr)
2009	28.51	19.14	75.71	60.28	NA
2010	29.1	18.5	70.58	51.25	NA
2011	30.46	17.68	63	45.41	NA
2012	30.84	18.55	74.5	47.08	6.26
2013	30.48	18.64	77.08	52.33	6.5
2014	29.98	18.99	78.8	58	6.07
2015	30.51	19.81	70.91	53.91	5.15
2016	33.52	19.65	62.25	49.5	1.55

Source: IMD

Relative Humidity

Bangalore Rural District

Maximum Monthly mean relative Humidity at morning hours is 89% and Minimum is 57%. Maximum Monthly mean relative Humidity at evening hours is 75% and Minimum is 22%.

Kolar

Maximum Monthly mean relative Humidity at morning hours is 91% and Minimum is 57%. Maximum Monthly mean relative Humidity at evening hours is 86% and Minimum is 23%.

Relative Humidity recorded at morning hours and evening hours at IMD's Bangalore City Station and Chintamani Station (Kolar District) for the duration from 2008 to 2017 has been given Annexure-3.7.

Rainfall

Bangalore Rural District

The mean annual rainfall of the district is 1118 mm. Annual rainfall of the district varies from 724 mm to 1696 mm.

Kolar District

The mean annual rainfall of the district is 794 mm. Annual rainfall of the district varies from 507 mm to 1296 mm. Monthly rainfall of the study area is given Table 3-6

Monthly Rainfall data received from IMD's Bangalore City station and Chintamani Station (Kolar District) is given below in Table 3.6

Table 3-6: Monthly Rainfall (mm) Data of the Study Area

Year	Monthly Total Rainfall (mm) – Bangalore Rural District	Monthly Total Rainfall (mm) – Kolar District
2008	158.61	NA
2009	88.15	80.15
2010	82.28	74.77
2011	98.23	56.8
2012	60.38	70.87
2013	98.8	44.68
2014	96.6	50.74
2015	106.6	107.66
2016	66.77	3.55
2017	141.33	NA
2018	72.35	NA

Source: IMD

Wind speed

Average wind speed in Bangalore Rural District varies from 3.3 Km/Hour to 5.5 Km/Hr. The predominant wind directions West to East (41%) and East to West direction. and Westerly which persisted over a period of time from year 1971 to year 2000.

Average wind speed in Kolar District varies from 1.5 Km/Hour to 6 Km/Hr. Detailed data for past 10 years on wind speed is given **Annexure-3.2.** Wind rose diagram has been given in **Annexure-3.3**.

3.1.6 Surface Water Bodies & drainage Pattern

The surface water hydrology in project area is governed by Palar River and its tributaries. The Palar River has part of its basin in project area. Some of these tributaries are being crossed by project road. Project area falls under two river basins namely Palar and South Pennar basin. In addition to that, project alignment intersects a number of local streams and nallah. The project areais drained by the Palar river, which is crossed by the project alignment at Km 61+100. Although Palar river is perennial river, the water availability during the dry period reached to

almost nil. During the study period between March to May, 2018 there was no water in the river. In addition to the Palar River the project alignment is crossed by 4 small streams. The project also encounters a number of local nallah which receive water during rains and discharges the water into different irrigation tanks and streams. The field survey reveals that altogether 74 numbers of local nallah area located in the project vicinity, out of which 69 are in the main alignment and 5 numbers are located in the Spur alignment. These nallah cross the alignment at 66 locations whereas the remaining 8 local nallah run along the project alignment on one side. The location details of the streams and nallah are given in **Annexure 3.4.** All the streams and nallah are seasonal in nature.

In addition to river/streams/nallah, the project area is dotted with a number of water tanks mainly irrigation tanks. A total number of 24 irrigation tanks has been recorded at site within the study area. Out of 24 irrigation tanks 5 water tanks are located in Bangalore Rural District, whereas remaining 19 Irrigation Tanks are located in Kolar District. The analysis of location of these water tanks with respect to the project alignment reflects that the project alignment passes through 14 water tanks out of total 24 water tanks. The location details and total area of the tanks are given in **Table 3.7** whereas the tanks croosed by the proposed alignment is depicted in **Annexure 3.5**:

Table 3-7: Irrigation Tanks along the Project Alignment

S. No.	Project Chainage	Name of Taluk	Name of Village	Name of Tank	Location With respect to Proposed Alignment	Distance from Proposed Alignment
A. BANGALORE RURAL DISTRICT (Km 0+000 to Km 11+682)						
1	0+000	Hoskote	Halluru	Hallur Tank	LHS	800m
2	4+435	Hoskote	Jinnagara	Jinnagara	crossing	-
3	7+370	Hoskote	Vadigehalli	Irrigation Tank	crossing	-
4	8+100	Hoskote	Jadiganahalle	Jadiganahalle Tank	LHS	800 m
5	10+900	Hoskote	Tirtahalli	Irrigation Tank	LHS	200 m
B. KOLAR DISTRICT (Km 11+682 to Km 71+000)						
1	11+895	Malur	Gangapura	Gangapura Tank	Crossing	-
2	17+100	Malur	Abbenhalle	Abbenhalle Tank	LHS	400m
3	17+220	Malur	Kondrahalli	Madivala Tank	Crossing	-

S. No.	Project Chainage	Name of Taluk	Name of Village	Name of Tank	Location With respect to Proposed Alignment	Distance from Proposed Alignment
4	20+860	Malur	Maliyappanahalli	Maliyappanahalli Tank	Crossing	-
5	23+000	Malur	Chikka Sabbenahalli	Irrigation Tank	LHS	200 m
6	23+300	Malur	Agrahara	Irrigation Tank	RHS	280 m
7	30+705	Malur	Kuntanahalli	Kuntanahalli Tank	Crossing	-
8	35+640	Bangarpet	Naganthanapure	Irrigation Tank	Crossing	-
9	40+805	Bangarpet	Kuppanahalli	Irrigation Tank	Crossing	-
10	41+396	Bangarpet	Kuppanahalli	Irrigation Tank	Crossing	-
11	44+250	Bangarpet	Maragal	Irrigation Tank	Crossing	-
12	45+945	Bangarpet	Ithandahalli	Irrigation Tank	Crossing	-
13	47+600	Bangarpet	Kavaranahalli	Irrigation Tank	Crossing	-
14	49+875	Bangarpet	Krishna Rajapura	Irrigation Tank	Crossing	-
15	56+000	Bangarpet	Tammanahalli	Irrigation Tank	RHS	250m
16	60+800	Bangerpet	Dhodhakeri	Irrigation Tank	RHS	500 m
17	61+000	Bangerpet	Dhodhakeri	Irrigation Tank	RHS	500 m
18	61+100	Bangerpet	Bethamangala	Bethamangala Palar Dam	LHS	1400 m
19	64+100	Bangarpet	Kooluru	Irrigation Tank	Crossing	-

Source: Site survey

All these water tanks are located around the project alignment are manmade water tanks and seasonal in nature. These water tanks are used for irrigation purpose. The irrigation tanks are owned by either Minor Irrigation Department, Government of Karnakar or by Panchayati Raj Dept. The line department confirmed the availability of water in these tanks for only 6 to 8 months in a year since onset of the monsoon. None of the water tanks provides habitat for birds, migratory birds or rare and endangered aquatic flora and fauna. When water is available, at that time, local fauna is observed around these tanks.

There is no natural protected wetland located in the project districts. **Figure 3.5** depicts the river basin map of Karnataka.

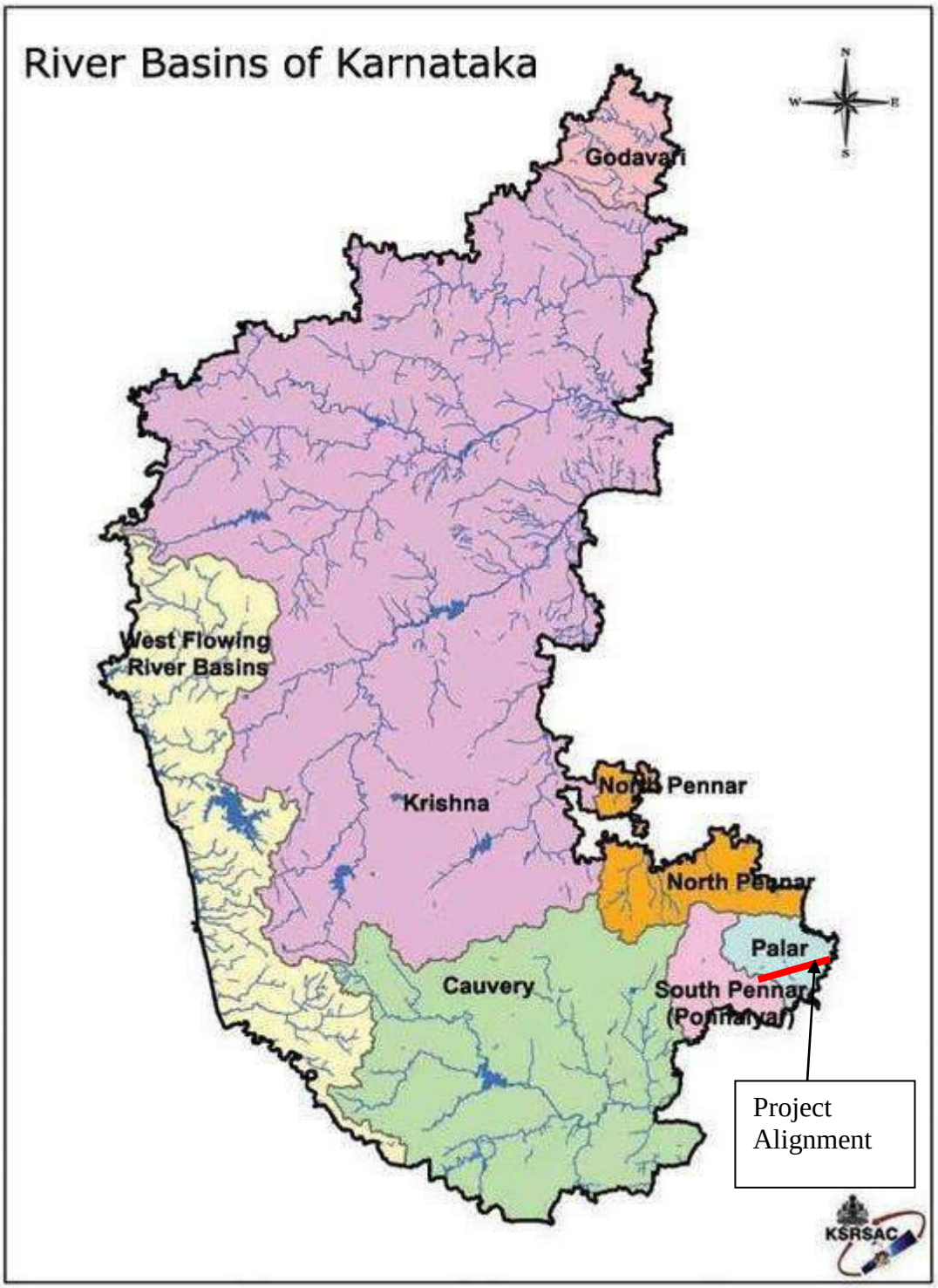
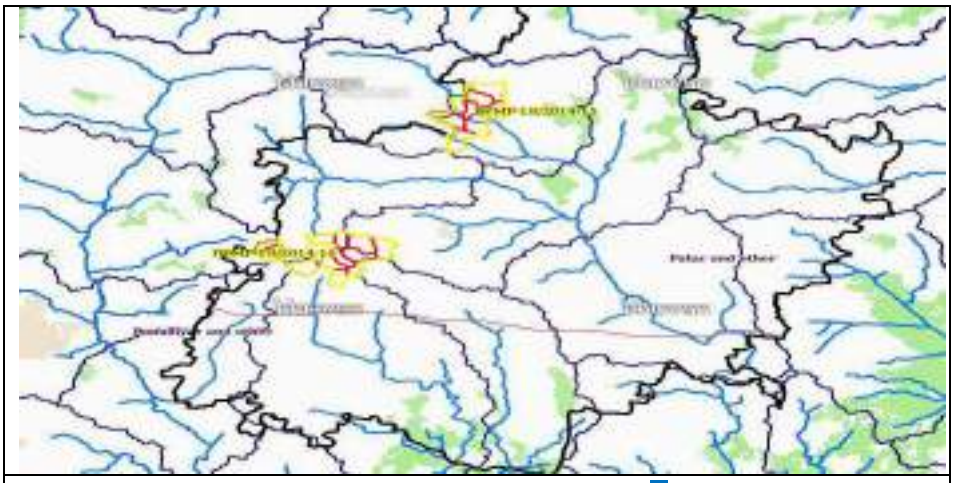


Figure 3-5: River Basin of Karnataka indicating Project alignment

Watershed and Drainage Pattern:

The project alignment passes through five different Watersheds. The Drainage/stream networks are completely separated in micro level. All sets of drainage/stream flows towards west to east direction as a larger drainage system. Ultimately get connected with the Palar, Cheyyar, and Ponnaiyar river. Cheyyar River is tributary of river Palar. All these three rivers are finally drains into the Bay of Bengal.

In the study area predominantly dendritic drainage patter is observed. **Figure- 3.6** presents the watershed and drainage pattern in the project area.



--- Project Alignment,— Water Shed Boundary, D Drainage Network

Figure 3-6: Watershed of Project Area

3.1.7 Ground Water Resources:

The district wise situation of ground water in Karnataka is given in the following sections:

Bangalore Rural

Groundwater in the district occurs in various geological formations. Underground table conditions and the ground water recharge is mainly through precipitation. The water bearing formations include altered and weathered gneisses and laterite. The depth of the unconfined water in the district is related to the altitude of the land surface. Generally, the depth is more where the land surface is high and shallow where the land surface is low. The ground water level depth in Bangalore Rural district ranges from 5 to 10 m gbl. The Yield of the district ranges from 0.10 to 9.13 lps. The net annual groundwater availability of the district is 19,394 ham, total ground water draft for irrigation is 23,202 ham, and total ground water draft for domestic and industrial uses is 2,450 ham and existing gross ground water draft for all uses is 25,653 ham. Thus, draft exceeding the total available ground water resources leaving almost nil ground water resources for future use. The stage of ground water development in all the four taluks of the district is above 100% and are in the over-exploited category. Therefore, both Central Ground Water Authority and Karnataka Ground Water Authority have notified these taluks for regulation and development of ground water resources. The entire project area falls in the area suitable for artificial groundwater recharge. Taluk wise groundwater status along with categorization of based on usage given in table 3.8.

Kolar

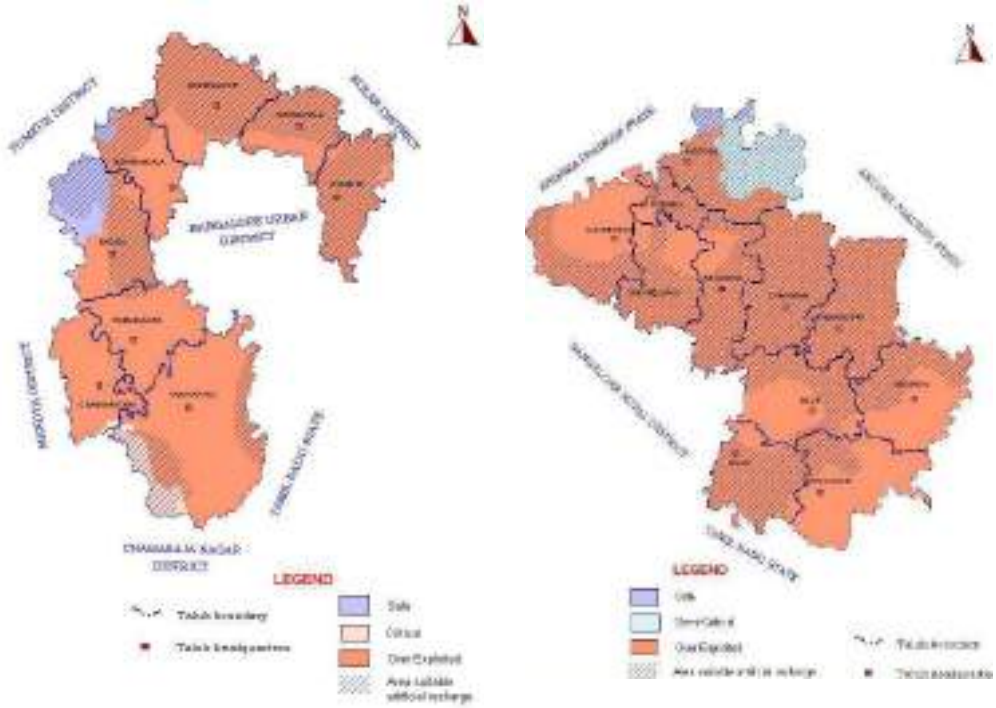
Taluk-wise ground water resources, drafts, balance resources available and the category based on Central Groundwater Board's assessment as on March 2009 is presented in Table 3.8. The net annual ground water availability of the district is 29144 Ham. The draft for all uses is 52635 ham and there are no water resources available for future irrigation development. In all the 5 taluks including the project taluks of the district the ground water utilization has been categorized as over-exploited. The yield dwindling in all 5 taluks, including Bangarpet, Kolar and Malur Taluks through which the project alignment is passing, over exploited with overall 180 % ground water development. There is over draft of 23491 ham annually in the district. The yield of bore wells varies generally from 0.5 to 20 m3/day. The Pre-monsoon depth to water level is 0.47 to 19.89 mgbl and post-monsoon depth to water level is from 0.87 to 1.89. The area in Kolar Taluka is suitable for artificial recharge whereas only partial area of remaining Malur and Bengarpet taluka is suitable for artificial groundwater recharge. Taluk wise resources and categorization are given in Table **3.8**

Ground water utilization of the project district has been given if Figure 3.7.

Table 3-8: Stage of Groundwater Development in Taluka's of the Project districts,

Sl. No.	District/ Taluk	Net Annual Ground water Availability (HAM)	Existing Ground water Draft for all uses (HAM)	Net Ground water Availability for future Irrigation Development (HAM)	Categorization based on Stage of Ground water Development (% area)			
					Safe	Semi-critical	Critical	Over Exploited
A.	**Bangalore Rural District**	**19394**	**25653**	**22**				
	Hoskote	4340	6252	0	-	--		100
B.	**Kolar District**	**29144**	**52635**	**0**				100
1	Bangarpet	4724	9975	0	-	-	-	100
2	Kolar	11053	18210	0	-	-	-	100
3	Malur	3844	7060	0	-	-	-	100

Source: Groundwater Information Booklet, Bangalore Rural District, 2013 and Kolar District, 2012, Central Groundwater Board, Govt. of India



Source: Central Ground Water Board, CGWB, 2009

Figure 3-7: Water Utilization Status of the Project Districts

As mentioned in the earlier section that the project area is devoid of perennial surface water source in the concern districts except Palar River, majority of population are dependent on groundwater source to meet their water requirements for various activities including irrigation and domestic usage. The groundwater is abstracted in the project area through bore wells, open-wells and pump houses. Within the proposed right of way of the proposed expressway alignment in Bangalore Rural District, 1 open well and 31 bore wells have been recorded, which will need to be relocated. Similarly, within the RoW of the proposed alignment in Kolar District, 30n open wells, 169 borewells and 26 pump houses have been recorded which will be required to be relocated. A list of such groundwater resources has been presented in **Annexure-3.6**.

3.1.8 Environmental Quality

3.1.8.1 Ambient Air Quality

To study the baseline ambient air quality scenario within the project corridor the ambient air quality was measured at 4 locations on Bangalore-Chennai Expressway Phase-I. The ambient air quality monitoring was carried out with a frequency of twice a week for one month between March to May 2018 with respect to Particulate Matter (size less than 10µm) or PM_{10}, Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$, Sulphur dioxide (SO_2), Oxides of Nitrogen (NOX), Carbon Monoxide in accordance with Bureau of Indian Standards (BIS), CPCB guidelines and MoEFCC guidelines.

Table 3-9: Location of Ambient Air Quality

S. No	Station Code	Location	Chainage (Km)	Co-ordinates	Distance from proposed Project alignment
1.	AQ-1	Start of BCE , Kolatturu, Near MVJ Medical College	0.000	Latitude-N 13°05'03.98" Longitude-E 77°49'20.39"	At starting point on the Junction with NH-4
2.	AQ-2	Nambiganhalle village Settlement area	25.100	Latitude-N 13°02'14.46" Longitude-E 78°0'43.11"	100 m on LHS
3.	AQ-3	Doddura Karpanahalle Village Settlement	50.200	Latitude-N 13°0'59.36" Longitude-E 78°14'24.08"	75 m on RHS
4.	AQ-4	N.G.Hulkur Village	71.000	Latitude-N 13°0'36.77" Longitude-E 78°25'50.09"	540 m ahead of the end point at KGF road Junction

The monitoring stations were selected considering the spatial relationship of various land uses along the project road, thee assumed regional influences on background air quality, traffic congestion zones and CPCB guidelines. Locations of ambient air quality monitoring stations are given in Table 3.9 and Figure 3.8



Figure 3-8: Air Quality Monitoring Locations along Project corridor

Particulate Matter (size less than 10µm) or PM_{10} and Particulate Matter (size less than 2.5 µm) or $PM_{2.5}$: $PM_{2.5}$ & PM_{10} Fine Dust Sampler was deployed for ambient air quality monitoring during the monitoring period. The Fine Dust Sampler were located at suitable concrete slab roof top in the study area at different locations. The 24 hourly samples from different sampling locations were then collected by following gravimetric method.

Sulphur dioxide: To determine the concentration of Sulphur dioxide in ambient air, Modified West and Gaeke Method as per IS: 5182 Part II was employed. 24 hourly samples were collected during the monitoring period from different sampling locations. SO_2 from air was absorbed in a solution of Potassium Tetrachloromercurate kept in glass impinger by passing the air through gas

sampler attached with the Respirable Dust Sampler. Each sample was estimated by colourimetric method using Para-rosaline and formaldehyde to form the intensely coloured para-rosaniline methylsulphonic acid. The absorption was measured in a spectrophotometer and compared with calibration curve.

Oxides of Nitrogen (NOx): NOx in ambient air was measured by employing the prescribed IS: 5182 Part VI (Jacob and Hochheiser modified method). 24 hourly samples were collected from different sampling locations during the sampling period. Ambient air was bubbled through Sodium Hydroxide and Sodium Arsenite solution to form stable solution of Sodium Nitrite. Nitrite ion produced is reacted with phosphoric acid, sulphanilamide and NEDA reagent to form highly coloured azo dye, the absorbance of which is measured colourimetrically at 540 nm.

Carbon Monoxide (CO): The concentration of Carbon monoxide in the ambient air was

measured as per IS: 5182 Part X. The 1hourly air samples from different sampling locations were collected in a sealed Glass tube. Subsequent analysis was done at laboratory using Gas Chromatographic technique.

The summary of analysis results of the Ambient Air Quality monitoring results at different locations are given in **Table 3.10.**

Table 3-10: Ambient Air Quality Monitoring Results

Monitoring Station	Concentration					
	Concentration Level	PM10 (μgm^{-3})	PM2.5 (μgm^{-3})	SO2 (μgm^{-3})	NOx (μgm^{-3})	CO (mgm^{-3})
AAQ-1	Max	92.0	48.9	18.9	28.3	0.380
	Min	51.6	19.7	10.2	9.8	0.330
	Mean	**75.2**	**39.6**	**14.9**	**22.9**	0.359
	98 Percentile	***90.7***	***48.9***	***18.6***	***28.3***	***0.379***
AAQ-2	Max	80.1	45.3	17.2	27.4	BDL
	Min	63.2	21.6	12.8	11.2	BDL
	Mean	**71.9**	**37.5**	**14.8**	**21.7**	BDL
	98 Percentile	***79.6***	***45***	***17.1***	***27.2***	***BDL***
AAQ-3	Max	82.1	41.9	17.4	24.9	BDL
	Min	53.8	21.7	12.8	10.7	BDL
	Mean	**66.2**	**36.8**	**15.3**	**19.9**	BDL
	98 Percentile	***81.5***	***42***	***17.3***	***24.8***	***BDL***
AAQ-4	Max	85.2	42.4	18.2	26.8	BDL
	Min	55.8	22.3	13.8	11.6	BDL
	Mean	**68.5**	**37.3**	**16.3**	**22.4**	BDL
	98 Percentile	***84.1***	***42.2***	***18.2***	***26.6***	***BDL***
Max Permissible Limits (CPCB, 2009)		**100**	**60**	**80**	**80**	**4 (Hourly)**

Source: Primary Data collected at site

ND: Not Detectable

The important parameters are discussed below:

Particulate Matter 10 (PM10): The 24 hourly PM_{10} concentration at all the measures locations were observed within the standard prescribed limits of National Ambient Air Quality Standards i.e. 100 µgm^{-3}. The mean PM_{10} level in the ambient air varied from minimum 66.2 µgm^{-3} at Doddura Karpanahalle Village Settlement to 75.2 µgm^{-3} at Kolatharu Village near Starting along NH-4.

Particulate Matter 2.5 ($PM_{2.5}$): The concentration of PM2.5 in the air at all 4 monitoring locations were recorded within the prescribed limits of 60 µgm^{-3}. The 24 hourly mean $PM_{2.5}$ concentrations in the sampled air varied between 36.8 µgm^{-3} at Doddura/Karpanahalle Village Settlement to 39.6 µgm^{-3} at starting point at Kolatharu Village on NH-4.

Sulphur Dioxide (SO_2): The SO_2 levels at all monitoring locations were observed well within the prescribed limits i.e. 80 µgm^{-3}. The mean concentration of SO_2 in ambient air ranged between 14.8 µg m^{-3} and 15.3 µgm^{-3}.

Oxides of Nitrogen (NOx): The NOx levels at all monitoring locations are well within the prescribed limits i.e. 80 µgm^{-3}. The mean concentration of NOx in ambient air varies between 19.9 µgm^{-3} to 22.9 µg m^{-3}. Similar to PM10 and PM2.5 maximum concentration was recorded at the starting point at NH-4, which is busy highway.

Carbon Monoxide (CO): The mean concentration of Carbon Monoxide in the air at Kolatturu, Neat starting point of the project at NH-4 recorded to 0.379 mgm^{-3}, which is well within the prescribed limit of 4.00 mgm^{-3}. At other monitoring locations the CO was below detectable level.

3.1.8.2 Ambient Noise Level

To assess the baseline scenario of ambient noise levels at different locations within the study area within the project corridor, equivalent noise levels were monitored at 4 locations.

The predominant activities along the project road stretch are mainly agricultural. To determine the ambient noise level 4 monitoring locations were identified considering the equal distribution of project road length and land use pattern along the project road. The data were collected between. The equivalent noise levels were monitored continuously for 24 hours with one-hour interval by using Data Logger Noise Meter. **Table 3.11** provides the description of the ambient noise monitoring locations along with area/class, while the summary of monitored ambient noise **Table 3.12**. Noise Monitoring Locations are depicted in **Figure-3.9**.

Table 3-11: **Ambient Noise Monitoring Locations**

S. No	Station Code	Location	Chainage (Km)	Co-ordinates
1.	NQ-1	Outdoor area where people spend limited amount of time, Monitoring site is nearby existing road, continuous vehicle movement.	Latitude-N 13°05'03.98" Longitude-E 77°49'20.39"	At starting point on the Junction with NH-4
2.	NQ-2	Monitoring site area is mostly undeveloped low population village area, public activity is comparatively less than other area.	Latitude-N 13°02'14.46" Longitude-E 78°0'43.11"	100 m on LHS

S. No	Station Code	Location	Chainage (Km)	Co-ordinates
3.	NQ-3	Monitoring site area is Rural with some residential area and general people activity noise sources in day time	Latitude-N 13°0'59.36" Longitude-E 78°14'24.08"	75 m on RHS
4.	NQ-4	Monitoring site area is old urban residential area, human activities such as play the children on nearest ground.	Latitude-N 13°0'36.77" Longitude-E 78°25'50.09"	540 m ahead of the end point at KGF road Junction

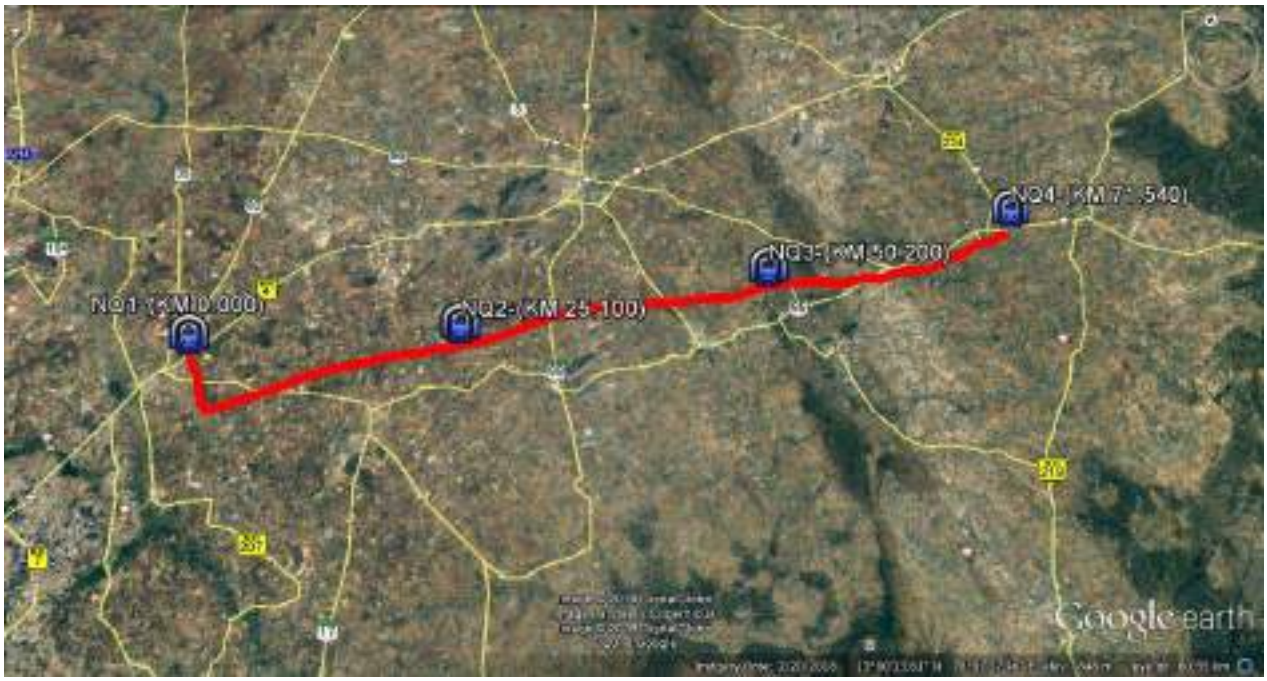


Figure 3-9: Noise Quality Monitoring Stations

Table 3-12: Ambient Noise Levels Monitoring Test Results

S. No.	Station Code	Location and Chainage (Km)	Type of Land use	L_{eq}(Day)		L_{eq} (Night)	
				Value	Standard	Value	Standard
1.	NQ-1	Start of BCE , Kolatturu, Near MVJ Medical College	Industrial & Commercial Area	63.48	75	47.91	70
2.	NQ-2	Nambiganhalle village	Residential	62.84	55	44.18	45
3.	NQ-3	Doddura Karpanahalle	Residential	61.45	55	45.81	45
4.	NQ-4	N.G.Hulkur Village	Residential	61.46	55	47.79	45

Ambient Noise Standards

Area code	Category of Area / Zone	Limits in dB(A) Leq*		Remarks
		Day Time	Night Time	
(A)	Industrial Area	75	70	1. Day time shall mean from 6.00 a.m. to 10.00 p.m. 2. Night time shall mean from 10.00 p.m. to 6.00 a.m. 3. Silence zone is an area comprising not less than 100 metres around hospitals, educational institutions, courts, religious places or any other area which is declared as such by the competent authority .
(B)	Commercial Area	65	55	
(C)	Residential Area	55	45	
(D)	Silence Zone	50	40	

Source: Primary Data collected at site

The Ambient noise levels were recorded at 4 locations and compared with National Ambient Noise Standards.

Among the four sample locations, maximum equivalent noise level was recorded at Kolatturu Village at NH-4 near starting point of the project alignment both during daytime and nighttime. This area falls in industrial and mix category of land use. The mean daytime equivalent noise level was recorded to 63.48 LeqdB(A), which is higher than the maximum permissible limit of was The Leq (Day) and Leq (Night) levels at Doddura Karpanahalle are 61.45 dB(A) and 45.81 dB(A), respectively. The Leq (Day) and Leq (Night) levels near N.G.Hulkur Village were 61.46 dB(A) and 47.79 dB(A) respectively. The Leq (Day) and Leq (Night) levels at Nambiganhalle, Doddura Karpanahalle and N.G.Hulkur Village exceeded the National Ambient Noise Standards for rural and residential land use but within the permissible limit of Commercial area land use.

3.1.8.3 Ground Water Quality:

To assess the ground water quality within the project area, pre-monsoon ground water samples were taken from 5 locations along the proposed alignment in the month of May, 2018. Physico-chemical parameters of each samples were analyzed for determining the water quality. **Table 3.13** provides the description of the ground water sampling locations and their sources and the sampling locations is depicted in Figure 3.10.

Table 3-13: Ground Water Sampling Locations

Sample Code	Chainage of the Sampling Station	Source	Coordinate
GWQ1.	Near MVJ medical college, Kolatturu- Km 0.000	Bore Well	Latitude-N 13°05'4.77" Longitude-E 77°49'20.16"
GWQ2.	Nambiganhalle –Km 25.100	Hand Pump	Latitude-N 13°02'14.30" Longitude-E 78°00'42.69"
GWQ3.	Kavaranahalli Village -47.600	Bore Well	Latitude-N 13°0'56.60"

Sample Code	Chainage of the Sampling Station	Source	Coordinate
			Longitude-E 78°12'59.61"
GWQ4.	Doddura Karapanahalle – Km 50.200	Bore well	Latitude-N 13°0'0.38" Longitude-E 78°14'23.86"
GWQ5.	N.G.Hullur - Km 71.000	Hand Pump	Latitude-N 13°0'33.39" Longitude-E 78°25'32.06"

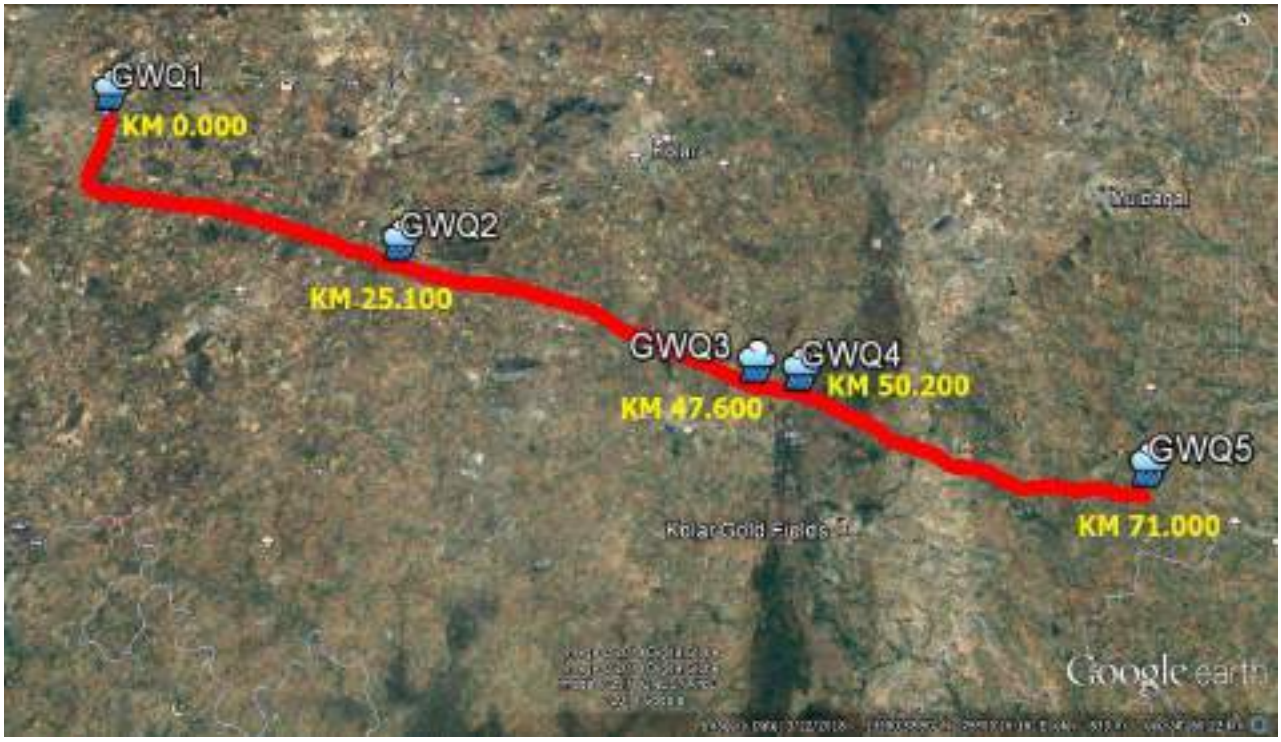


Figure 3-10: Ground Water Quality Monitoring Locations

Table 3-14: Ground Water Quality Test Results

Sl. No.	Parameters	Protocol as per APHA 23nd Edition-2017	Unit	Ground Water Quality					Standard IS 10500-2012	
				GWQ1	GWQ2	GWQ3	GWQ4	GWQ5	Requirement (Acceptable Limits)	Permissible Limits in absence of Alternate Source
1	Temperature in ^0C	2550 B	^0C	25	26	27	27	27	Not Specified	Not Specified
2	pH@ 25^0C	4500 H^+,B	----	6.36	7.89	6.79	7.93	7.85	6.5-8.5	No relaxation
3	Turbidity in NTU	2130 B	NTU	0.1	0.1	0.1	0.1	0.1	1 Max	5 Max
4	Electrical Conductivity @ 25^0C	2510-B	µ-mho/cm	403	880	423	1200	920	Not Specified	Not Specified
5	Colour	2120 B	Hazen	5	5	5	5	5	5 Max	15 Max
6	Total Suspended Solids	2540 B	mg/L	8.22	7.13	7.33	7.26	5.16	Not Specified	Not Specified
7	Total Dissolved Solids (TDS)	2540 C	mg/L	205	447	427	600	453	500 Max	2000 Max
8	Odour	2150 B	---	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable	Agreeable
9	Total kjeldhal Nitrogen as N	4500-Norg,A,B	mg/L	Nil	Nil	7.82	Nil	Nil	Agreeable	Agreeable
10	Total Hardness as $CaCO_3$	2340-C	mg/L	92	272	86	492	72	200 Max	600Max
11	Total Alkalinity as $CaCO_3$	2320B	mg/L	87.12	170.28	109.53	281.16	68.01	200 Max	600 Max
12	Sodium as Na	3500-Na,B	mg/L	21.3	13.13	7.13	7.16	15.1	Not Specified	Not Specified
13	Potassium as K	3500- K,B	mg/L	8.76	2.17	1.36	2.3	5.3	Not Specified	Not Specified
14	Calcium (as Ca)	3500- Ca,B	mg/L	33.6	78.4	22.4	152	16.8	75 max	200 Max
15	Magnesium (as	3500-Mg,B	mg/L	1.94	18.46	7.29	27.26	7.29	30Max	100Max

Sl. No.	Parameters	Protocol as per APHA 23nd Edition-2017	Unit	Ground Water Quality					Standard IS 10500-2012	
				GWQ1	GWQ2	GWQ3	GWQ4	GWQ5	Requirement (Acceptable Limits)	Permissible Limits in absence of Alternate Source
	Mg)									
16	Ammonia as NH_3	4500-NH_3	mg/L	Nil	Nil	Nil	Nil	Nil	No relaxation	No relaxation
17	Chloride (as Cl)	4500-Cl,B	mg/L	76.11	124.17	56.76	195.13	78	250 Max	1000 Max
18	Sulphate (as SO_4)	4500-SO_4^{2}, E	mg/L	63.07	27.26	18.26	61.26	17.26	200 Max	400 Max
19	Total Phosphate as PO_4	4500-P,D	mg/L	<0.02	<0.02	<0.02	0.026	<0.02	Not Specified	Not Specified
20	Nitrate Nitrogen (as NO_3-N)	4500-NO_3,E	mg/L	< 0.1	1.27	1.17	< 0.1	< 0.1	45 Max	No relaxation
21	Fluoride (as F)	4500-F-B,D	mg/L	0.176	0.086	0.176	0.134	0.216	1 Max	1.5 Max
22	Iron As Fe	3500-Fe,B	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	0.3 Max	No relaxation
23	Aluminium as Al	3500 B	mg/L	<0.03	<0.03	<0.03	<0.03	<0.03	0.03 Max	0.2 Max
24	Silver	3500 Ag	mg/L	ND	ND	ND	ND	ND	0.1	No relaxation
25	Copper (as Cu)	3500-Cu,B	mg/L	<0.05	<0.05	<0.05	<0.05	<0.05	0.05 Max	1.5 Max
26	Zinc (as Zn)	3130 B	mg/L	<0.2	<0.2	<0.2	<0.2	<0.2	5 Max	15 Max
27	Manganese (as Mn)	3500 B	mg/L	<01	<01	<01	<01	<01	0.1	0.3
28	Arsenic	3500-As B	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.01 Max	0.05 Max
29	Lead (as Pb)	3500 Pb-B	mg/L	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	No relaxation
30	Mercury (as Hg)	3500-Hg	mg/L	NA	NA	NA	NA	NA	0.001	No relaxation
31	Boron (as B)	4500-B,B	mg/L	<0.5	<0.5	<0.5	<0.5	<0.5	0.5 Max	1 Max
32	Chromium Hexavalent (as Cr^{+6})	3500-Cr,B	mg/L	<0.02	<0.02	<0.02	<0.02	<0.02	Not Specified	Not Specified
33	Phenols	5530C	mg/L	NA	NA	NA	NA	NA	--	--

Sl. No.	Parameters	Protocol as per APHA 23nd Edition-2017	Unit	Ground Water Quality					Standard IS 10500-2012	
				GWQ1	GWQ2	GWQ3	GWQ4	GWQ5	Requirement (Acceptable Limits)	Permissible Limits in absence of Alternate Source
34	Cadmium (as Cd)	3500-Cd	mg/L	<0.003	<0.003	<0.003	<0.003	<0.003	0.003	No relaxation
35	Selenium	3500 se,C	mg/L	ND	ND	ND	ND	ND	0.1	No relaxation
36	Mineral Oil	---	--	NA	NA	NA	NA	NA	--	--
37	Total (MPN) Coliforms/100ml	9221 C	MPN	< 1.8 (Absent)	< 1.8 (Absent)	< 1.8 (Absent)	< 1.8 (Absent)	< 1.8 (Absent)	Shall not be detected in any 100 ml sample	
38	Faecal Coliform	9222 B	CFU/gm	< 1.8 (Absent)	< 1.8 (Absent)	< 1.8 (Absent)	< 1.8 (Absent)	Absent	Shall not be detected in any 100 ml sample	

Source: Primary Data collected at site

The test results of the water samples were compared with water quality standards as per BIS (IS: 10500:2012). The pH of water samples varied from 6.36 to 7.93, which is within the acceptable range for drinking water. The total dissolved solids (TDS) in the water samples varied from 205 mg/l to 600 mg/l. The TDS in all the samples except for the water sample collected from Doddura Karapanahalle village, was within the acceptable limit for drinking water of 500 mg/l. In the water sample of Doddura Karapanahalle village, TDS was found in the range of 600 mg/l which is higher than the acceptable limit of 500 mg/l but within the permissible limit for drinking in absence of alternate source. The Total hardness in different water samples varied between 72 mg/l to 492 mg/l. The total hardness exceeded the acceptable limit of 200 mg/l in the water samples of Nambiganhalle village and Doddura Karapanahalle village, which was recorded to be 272 mg/l and 492 mg/l, respectively. In remaining samples, total hardness was observed within the acceptable limit of 200 mg/l. Although the total hardness exceeded the acceptable limit in the water samples of Nambiganhalle village and Doddura Karapanahalle village, the total hardness was found within the permissible limits as per drinking water standard (IS-10500). Similarly, except for the water sample collected from Doddura Karapanahalle village, total alkalinity was well within the acceptable limit of 200 mg/l. In the water sample of Doddura Karapanahalle village total alkalinity was found in the range of 281.16 mg/l which is higher than the acceptable limit but within permissible limit of 60-0 mg/l. The concentration of calcium in all the water samples were found within the acceptable limit of 75 mg/l except for the water sample collected from Nambiganahalle. showed. The water sample collected from hand pump in Nambiganahalle showed concentration of Ca to 78.4 mg/l which exceeded the acceptable limit but well within the permissible limit of 200 mg/l. The other measured water quality parameters were within the prescribed acceptable limits. All the measured Heavy metals were below detectable limit in all the water sample. None of the water sample showed presence of *Faecal coliform.*

3.1.8.4 Surface Water Quality:

The project road crosses Palar rive river and a number of local streams and nallah/Channels. The Palar river is only perennial river in the project area, but during the sampling period there was no availability of water in this river. All other streams and nallah are seasonal in nature and carry water only during rains for short duration. There are a number of manmade irrigation tanks located in the project area. These irrigation tanks also retain water only for 6-8 months. So pre-monsoon water samples from different tanks were taken depending upon availability of water. The water sample collection was possible only from three tanks, where water was available during the sampling period. The details of surface water sampling locations are provided in **Table 3.15** and in **Figure 3.12.** The test results of the surface water samples are presented in **Table 3.16**.

Surface water bodies along the proposed project road are shown in **Figure 3.11**

Table 3-15: Surface Water Sampling Locations

Monitoring Code	Location	Source	Co-ordinates
SWQ1.	Jinnagara Tank, Jinnagara village - Km 4.435	Tank	Latitude-N 13°02'40.40" Longitude-E 77°49'29.91"
SWQ2.	Vadigehalli – Km 7.370	Tank	Latitude-N 13°02'18.30" Longitude-E 77°50'58.66"

Monitoring Code	Location	Source	Co-ordinates
SWQ3.	Madivala Tank, Kondrahalli village Km 17.220	Tank	Latitude-N 13°02'14.75" Longitude-E 77°56'19.75"



Figure 3-11: Surface Water Quality Monitoring Locations

The pH along the project road for all the locations varies from 7.13 to 7.19. The Total dissolved solids are varying from 106 to 616 mg/l for different locations along the proposed project road. At all locations, the Total Dissolved Solids are within the permissible limits as per IS: 2296:1982. Total hardness (as $CaCO_3$) varies from 180 to 320.00 mg/l. At Jinnagara Tank, total hardness is more than acceptable limit but within permissible limits. The Fluoride (as F) values range from 0.086 to 0.420 mg/l at all locations. The assessment of surface water quality reflects at all the three water bodies from where the water samples were collected conform to the water quality criteria for Class-C, i.e. fit for drinking with conventional treatment followed by disinfection.

Table 3-16: Surface Water Quality Test Results

Sl. No.	Parameters	Protocol as per APHA 23nd Edition-2017	Unit	Surface Water Quality			IS 2296, 1982	
				Jinnagara Tank Km-4.435	Vadagenahalli Tank- Km 7.370	Madivala Tank, Km 17.220	Surface Water Quality Standards, class B	Surface Water Quality Standards, class C
1	Temperature in ^0C	2550 B	^0C	26	26	26	-	-
2	pH@ 25^0C, min 6.5	4500 H^+,B	----	7.19	7.13	7.17	8.5	8.5
3	Turbidity in NTU	2130 B	NTU	0.1	0.1	0.1	-	-
4	Electrical Conductivity @ 25^0C	2510-B	µ-mho/cm	993	20.3	121	-	-
5	Colour	2120 B	Hazen	5	5	5	300	300
6	Total Suspended Solids	2540 B	mg/L	8.16	7.23	8.28	-	-
7	Total Dissolved Solids (TDS)	2540 C	mg/L	506	106	616	-	1500
8	Odour	2150 B	---	Agreeable	Agreeable	Agreeable	-	-
9	Salinity	2520 B	---	504	10.2	60.4	-	-
10	Dissolved Oxygen, min	4500-O,C	mg/L	6.6	6.7	6.5	5	4
11	Biochemical Oxygen Demand (BOD_3) 3 days @ 27^0C	5210 B	mg/L	2.1	Nil	Nil	3	3
12	Chemical Oxygen Demand(COD)	5220 B	mg/L	7.84	Nil	Nil	-	-
13	Total kjeldhal Nitrogen as N	4500-Norg,A,B	mg/L	8.4	7.28	7.84	-	-
14	Total Hardness as $CaCO_3$	2340-C	mg/L	320	200	180	-	-
15	Sodium as Na	3500-Na,B	mg/L	32.16	0.96	1.54	-	-
16	Potassium as K	3500- K,B	mg/L	1.24	0.68	0.35	-	-
17	Calcium (as Ca)	3500- Ca,B	mg/L	120	0.8	2.4	-	-

Sl. No.	Parameters	Protocol as per APHA 23nd Edition-2017	Unit	Surface Water Quality			IS 2296, 1982	
				Jinnagara Tank Km-4.435	Vadagenahalli Tank- Km 7.370	Madivala Tank, Km 17.220	Surface Water Quality Standards, class B	Surface Water Quality Standards, class C
18	Magnesium (as Mg)	3500-Mg,B	mg/L	4.86	Nil	2.91	-	-
19	Ammonia as NH_3	4500-NH_3	mg/L	Nil	Nil	Nil	-	
20	Chloride (as Cl)	4500-Cl,B	mg/L	985.51	1.97	19.14	-	600
21	Sulphate (as SO_4)	4500-SO_4^{2-}, E	mg/L	18.26	<1	2.16	-	400
22	Total Phosphate as PO_4	4500-P,D	mg/L	<0.02	<0.02	<0.02	-	-
23	Nitrate Nitrogen (as NO_3-N)	4500-NO_3,E	mg/L	1.106	0.173	1.014	-	50
24	Nitrite Nitrogen as NO_2-N	4500-NO_2,B	mg/L	<0.1	<0.1	<0.1	-	-
25	Fluoride (as F)	4500-F-B,D	mg/L	0.420	0.114	0.086		1.5
26	Iron As Fe	3500-Fe,B	mg/L	0.012	<0.05	<0.05	1.5	50
27	Aluminium as Al	3500 B	mg/L	ND	<0.03	<0.03	--	-
28	Nickel (as Ni)	3500 Ni	mg/L	ND	ND	ND	--	15
29	Copper (as Cu)	3500-Cu,B	mg/L	<0.05	<0.05	<0.05	--	-
30	Zinc (as Zn)	3130 B	mg/L	<0.2	<0.2	<0.2	--	-
31	Manganese (as Mn)	3500 B	mg/L	<01	<01	<01	--	-
32	Arsenic	3500-As B	mg/L	<0.01	<0.01	<0.01	--	0.2
33	Lead (as Pb)	3500 Pb-B	mg/L	<0.01	<0.01	<0.01	0.2	0.1
34	Cobalt as Co	3500 Co	Mg/L	<0.01	<0.01	<0.01	-	-
35	Mercury (as Hg)	3500-Hg	mg/L	NA	NA	NA	-	-
36	Boron (as B)	4500-B,B	mg/L	<0.5	<0.5	<0.5	-	-
37	Chromium Hexavalent (as Cr^{+6})	3500-Cr,B	mg/L	<0.02	<0.02	<0.02	-	0.05
38	Phenols	5530C	mg/L	NA	NA	NA	0.05	0.005
39	Cadmium (as Cd)	3500-Cd	mg/L	<0.003	<0.003	<0.003	0.005	0.01

Sl. No.	Parameters	Protocol as per APHA 23nd Edition-2017	Unit	Surface Water Quality			IS 2296, 1982	
				Jinnagara Tank Km-4.435	Vadagenahalli Tank- Km 7.370	Madivala Tank, Km 17.220	Surface Water Quality Standards, class B	Surface Water Quality Standards, class C
40	Total (MPN) Coliforms/100ml	9221 C	MPN	< 1.8 (Absent)	< 1.8 (Absent)	< 1.8 (Absent)	--	5000
41	Facial Coliform	9222 B	CFU/gm	Absent	< 1.8 (Absent)	< 1.8 (Absent)	500	

Class B: Outdoor bathing (organised)

Class C: Drinking water source with conventional treatment followed by disinfection.

Source: Primary Data collected at site

3.1.8.5 Soil Quality

Soil analysis has been carried out for different soil samples collected from different locations along the proposed project alignment to understand the zoil characteristics along the project road. Four numbers of composite soil samples were collected from adjacent agricultural land in the month of May 2018. The soil sampling locations with respect to the proposed project road has been presented in **Table 3.17** and **Figure 3.13.** Soil Quality test results are presented in **Table-3.18**. Soil quality monitoring locations are depicted in **Figure-3.13**.

Table 3-17: Soil Sampling Locations

Monitoring Code	Location	Co-Ordinates	Land Use
SQ-1.	Kolatturu (Near Nr. MV Medical College) Km 0.000	Latitude- N 13°05'2.15" Longitude-E 77°49'20.96"	Industrial
SQ-2.	Namiganhalle village (Km 25.100)	Latitude- N 13°02'10.73" Longitude-E 78°00'43.27	Agriculture
SQ-3.	Doddura Karpanahalle village (Km 50.200)	Latitude- N 13°01'5.43" Longitude-E 78°14'24.56"	Agriculture
SQ-4.	N.G.Hulkur (KM 71.000)	Latitude- N 13°00'28.45" Longitude-E 78°25'33.71"	Agriculture

Soil sampling locations are shown in **Figure-3.12** below:



Figure 3-12: Soil Quality Sampling Locations

Table 3-18: Physico-chemical Characteristics of Soil along the proposed Project Alignment

S. No.	Parameters	Unit	Soil Monitoring Locations			
			Near Nr. MV Medical College	Namiganhalle village	Doddura Karpanahalle Village	N.G.Hulkur
			SQ1	SQ2	SQ3	SQ4
1.	pH	-	7.28	7.16	7.29	7.46
2.	Electrical Conductivity (20% Slurry)	µS/ cm	210	235	320	118

S. No.	Parameters	Unit	Soil Monitoring Locations			
			Near Nr. MV Medical College	Namiganhalle village	Doddura Karpanahalle Village	N.G.Hulkur
			SQ1	SQ2	SQ3	SQ4
3.	Sand	%	51.9	55.7	55.8	56
4.	Silt	%	35.1	7.9	5.7	27
5.	Clay	%	13	36.4	38.5	17
6.	Texture	-	Sandy Silty Loam	Sandy Clay Loam	Sandy Clay Loam	Sandy Silty Loam
7.	Moisture Retention Capacity	%	6.08	5.26	4.96	6.21
8.	Infiltration Rate	mm/hr	14.37	19.96	18.25	6.34
9.	Bulk Density	gm/cc	1.29	1.19	1.01	1.33
10.	Porosity	%	33	37	32	35
11.	Organic matter	%(w/w)	0.84	1.72	1.22	0.60
12.	Nitrogen as N	mg/kg	203.5	859	810	245
13.	Potassium as K	mg/kg	147	865	829	277
14.	Phosphorous ,as P	Kg/Ha	71	85	78	50
15.	Lead	Mg/Kg	0.0010	0.0012	0.0013	0.0015
16.	Iron As Fe	%	1.21	3.47	2.46	0.69
17.	Organic Carbon	%	2.09	2.79	2.59	1.12
18.	Sodium as Na	mg/kg	92.6	87.2	72.7	48.1
19.	Sulphates as SO4	%	0.063	0.041	0.052	0.071
20.	Calcium as Ca	%	0.032	0.027	0.024	0.016
21.	Magnesium as Mg	%	0.049	0.017	0.018	0.009

Source: Primary Data.

A NPK ratio of 4:2:1 (N:P2O5:K2O) is generally considered ideal and accepted for macro-level monitoring of consumption of plant nutrients for the country as a whole. However, it is difficult to trace the genesis of this NPK ratio (National Academy of Agricultural Research). The results received from the monitoring of soil quality shows that phosphorous quantity in the soil is very low compared the expected ratio.

The analysis results reflect that pH level the soil in the study area is normal with pH ranging from 7.16 to 7.46. The soil texture mainly varies from Sandy Silty Loam to Sandy clay loam along the proposed project alignment. Organic carbon content in the soil varies between 1.12% to 2.79%. Electrical conductivity is normal and favourable for germination as all the samples have results below 1000 µS/ cm. Out of 4 locations, 3 locations shows that organic carbon content is more than 2%, which is good for sandy Silty Loam. The moisture retention capacity varies from 4.96 to 6.21% among all the soil samples taken along the project road.

3.2 Ecological Resources

3.2.1 Forest Cover

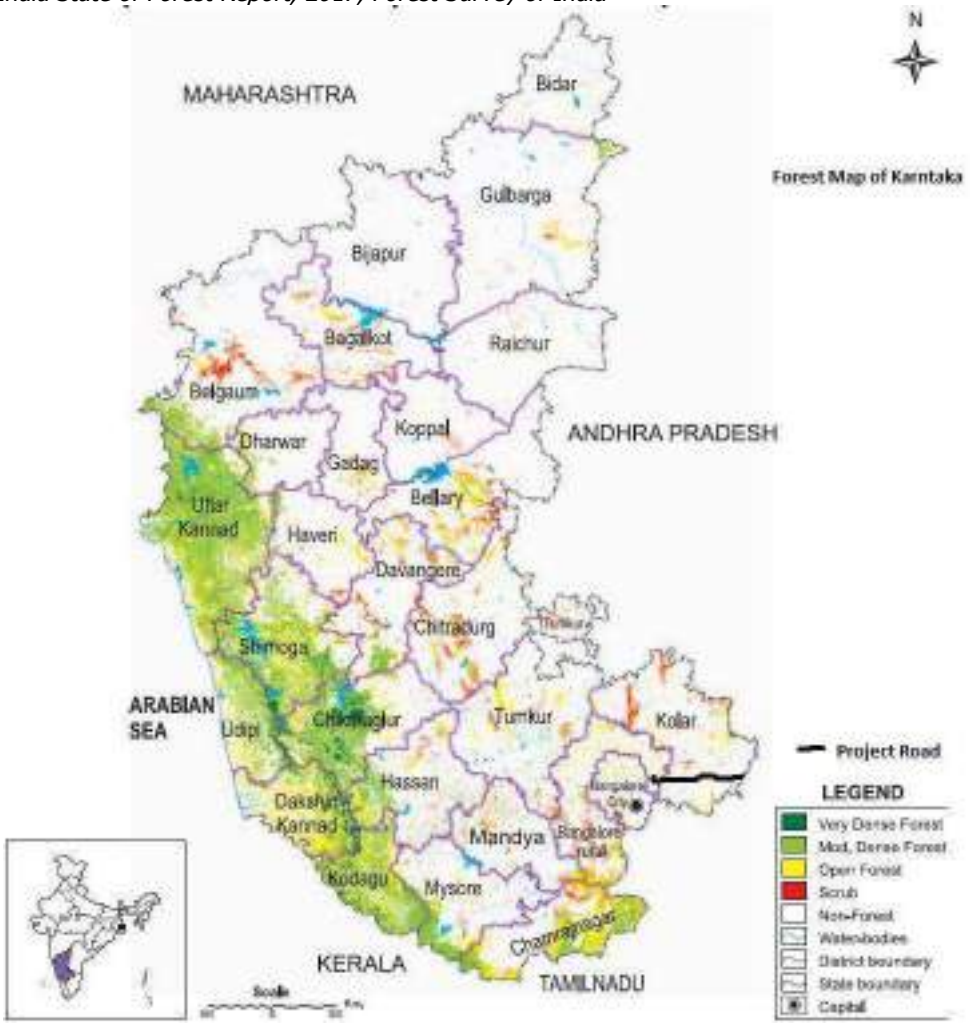
The project area is not located in any significant natural vegetation area. The major land use pattern agriculture. The district is very poor in forests both in terms of area and richness of flora and fauna. As per Indian State of Forest Report 2017, the recorded forest area of the Karnataka is **37,556** km^2 which is 19.58% of the total geographical area of the state. The forest covers constitute 5% of the geographical area of Bangalore Rural district whereas in Kolar district the forest cover area is only 8.04% of the total geographical area of the district. In both the district forest cover is far below than the state's total forest coverage of 19.58%. Forest cover map of the State is shown in **Figure 3.13.**

The forest cover in the concerned project districts as per India State Forest Report 2017 is given in **Table 3.19**.

Table 3-19: District-wise Forest Coverage along Project Road

State/ District	District / State Geographical area (sq.km)	Very Dense Forest (sq.km)	Moderately Dense Forest (sq.km)	Open Forest (sq.km)	Total (sq.km)	Percent of Forest from District Geographical area
Bangalore Rural	2292	0	16	99	115	5.00
Kolar	3979	0	55	265	320	8.04
Karnataka	**191791**	**4502**	**20444**	**12604**	**37556**	**19.58**

Source: India State of Forest Report, 2017, Forest Survey of India



Source: State of Forest, 2017, Forest Survey of India

Figure 3-13: Forest Cover Map of Karnataka

In the project core area, i.e. within the RoW of the proposed alignment is devoid of any forest area, however few forest patches have been recorded around the project alignment, however the project alignment does not involve acquisition of land from these forest areas. The list of Reserved Forest area located along the project alignment is presented in Table No. 3.20

Table 3-20: Reserved forest located around Proposed Alignment

S. No.	Type of Forest	Location			
		Project Chainage (Km)	District	Location wrt Alignment	Distance from Project Alignment
1	Nallal State Plantation RF	Km 0.000	Bangalore Rural	LHS	600m
2	Aralemakanahalle RF	KM 3.000	Bangalore Rural	LHS	10m
3	Mallappanahalli State Plantation RF	KM 18.500	Kolar	RHS	150m
4	Karabele State Plantation RF	KM 42.00	Kolar	RHS	20m

3.2.2 Ecologically Protected Area:

Although there are 5 national parks, 21 Wildlife Sanctuaries, 2 Tiger Reserves and one biosphere reserve located in the state of Karnataka, but there is no such ecologically protected areas located in either Bangalore Rural or Kolar Districts of Karnataka. A list of ecologically protected area in Karnataka is presented in **Table 3.21** and location of different protected area is presented in **Figure 3-14.**

There is no any National Park or Wildlife Sanctuary within 10 km radius of the project alignment. The nearest protected area in Karnataka state is Bannerghatta National Park which is more than 50 km away from the start point of the project stretch towards western side. There is one wildlife sanctuary, namely Kaundinya WLS located in Chittoor District of Andhra Pradesh. This wildlife Sanctuary is located at a distance of 19 Km beyond the end of the project alignment of Phase-I from Km 71+000 towards eastern side.

Table 3-21: Ecological Protected Area located around Proposed Alignment

S.No.	Protected area	District
A. National Park		
1	Anshi National park	Uttar Kannada
2	Bandipur National Park	Bandipur District
3	Bannergatta National Park	Bangalore
4	Kudremukha National Park	Chikkamagaluru
5	Nagarahole National Park	Kodagu
B. Wildlife Sanctuary		
1	Adichuchanagiri Peacock Sanctuary	Mandya
2	Arabithittu Wildlife Sanctuary	Mysore
3	Attiveri Bird Sanctuary	Uttar Kannada
4	BRT Wildlife Sanctuary	South Eastern Karnataka, Chamarajanagar
5	Bhadra Wildlife Sanctuary	Chikkamagaluru
6	Brahmagiri Wildlife Sanctuary	Kodagu
7	Cauvery Wildlife Sanctuary	Mandya, Chamarajanagar and Ramanagar
8	Dandeli Wildlife Sanctuary	Uttara Kannada
9	Doraji Bear Sanctuary	Bellary district
10	Ghataprabha Wildlife Sanctuary	Belgaum

S.No.	Protected area	District
11	Gudavi Bird Sanctuary	Shimoga district
12	Melukote Wildlife Sanctuary	Mandya
13	Mookambika Wildlife Sanctuary	Udupi
14	Nugu Wildlife Sanctuary	Mysore
15	Pushpagiri Wildlife Sanctuary	Kodagu
16	Ranganathittu Bird Sanctuary	Mandya
17	Ranibennur Blackbuck Sanctuary	Haveri
18	Sharavathi Wildlife Sanctuary	Shimoga
19	Shettihalli Wildlife Sanctuary	Shimoga
20	Someshwara Wildlife Sanctuary	Udupi & Shivamogga districts
21	Thalakaveri Wildlife Sanctuary	Kodagu district
C. Tiger Reserve		
1.	Bandipur	Chamarajanagar district
2.	Bhadra	Chikkamagaluru District and Shimoga
D. Biosphere Reserve		
	Nilgiri	Part of Western Ghat in Tamilnadu, Kerala and Karnataka (

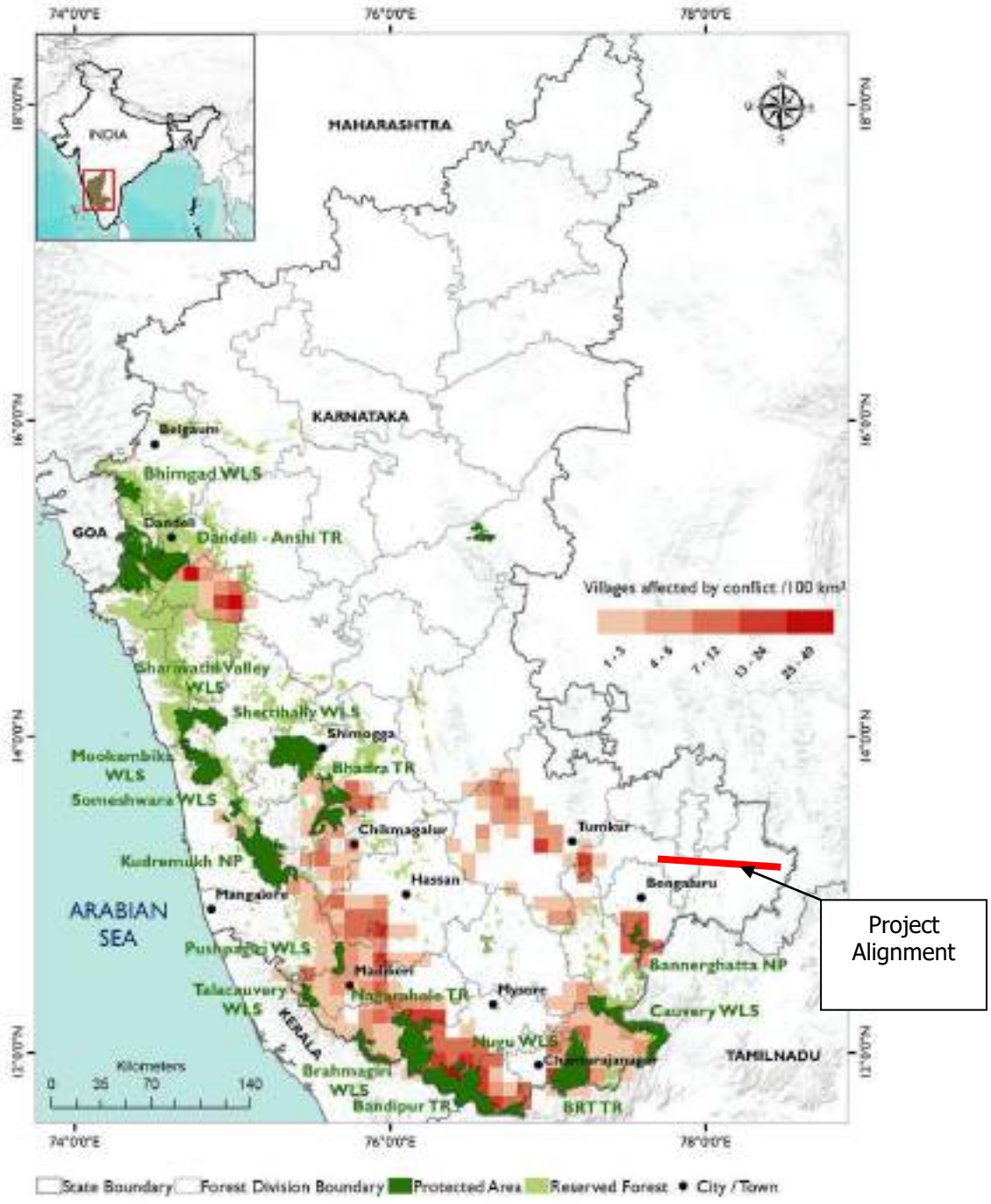


Figure 3-14: Wildlife Protected Area in Karnataka

Tiger /Elephant Reserves: There is not any tiger reserve or elephant reserve located within 10 km radius of the project alignment.

Wild Animal Migratory Route/ Elephant corridor: In the project area there is no any designated migratory route for wild animals neither elephant corridor with the study area.

Mangroves: There is no chance of getting mangroves as the project is far away from coastal area.

3.2.3 Flora and Fauna:

The project area falls in Deccan peninsula biogeographic zone. The natural vegetation in the study area consists mainly of dry scrubs and dry deciduous.

Flora within Proposed RoW:

The field survey was carried out to study trees and other vegetation located within the proposed ROW of the expressway alignment. Altogether a total number of 20748 trees of different species were recorded within the proposed ROW of the project alignment. In Bangalore Rural district section, a total number of 4699 trees has been recorded which includes about 2837 horticultural trees. Similarly, in the project stretch of Kolar District altogether a total number of 16049 trees have been recorded within proposed ROW which includes 9805 horticultural trees. The predominant tree species in the project stretch of Bangalore rural district are Eucalyptus (*Eucalyptus sps.)*, Mango (*Mangifera indica)*, Coconut (*Cocos nucifera)*, Teak (*Tectona grandis)*, Guava tree (*Psidium guajava),* Silver tree (*Leucadendron argenteum)*, Neem (Azadirachta indica), Asoka (*Saraca asoca)*, *etc.* whereas in the project stretch located in Kolar district the predominant tree species recorded is Eucalyptus (*Eucalyptus sps.*), Mango (*Mangifera indica)* , Coconut (*Cocos nucifera)*, Neem (*Azadirachta indica*), Cassia (*Cassia siamea*), Babool (Gobbali) (*Acasia arabica),* Honge *(Pongamia pinnata),* Teak *(Techtona grandis),* Silver tree *(Leucadendron argenteum)*, Nugge (Moringa) (*Moringa Oleifera),* Tamarind (*Tamarindus indica)*, Jangal Wood tree (*Holoptelea integrifolia*), Bevu (Melia) (*Melia azadiracht*), Nerale (Jamun) (*Syzgium cumini)* and Cadamba (Chujjali) (*Neolamarckia cadamba*), etc.

The project area is dotted with a number of private orchards. A number of mango, horticultural trees are mainly planted by the local people as orchards. Predominantly Coconut Orchards, Mango Orchards, Guava Orchards and Sapota Orchards have been recorded within the project corridor. The other orchards have been found are grape orchard, beetle leaves and lemon orchards.

There is no protected, endangered or rare flora species found within the entire project corridor in both Bangalore Rural and Kolar District.

Eucalyptus plantations

Massive eucalyptus plantation has been found within the project corridor. The Eucalyptus is grown as cutting crop by the locals in their private land as agroforestry. In Karnataka the eucalyptus plantation was earlier encouraged under social forestry and agro-forestry for commercial cultivation for production of soft wood, paper industries as well as medicines. However, in February 2017, the Karnataka government has now banned growing of eucalyptus plantations in private land. The project alignment of phase-I passes through eucalyptus plantation area at few locations. The proposed ROW of the project alignment passes through 37.015 Ha of eucalyptus plantation area in Bangalore Rural District and 142.62 Ha in Kolar district.

Table 3-22: General Trees and Horticulture Trees falling within Row of the project alignment

S. No.	District	Trees	Horticulture Trees	Total
1	Bangalore Rural	1862	2837	4699
2	Kolar	6244	9805	16049
	Total	8106	12642	**20748**

Table 3-23: General Trees and Horticulture Trees Species within Row of the project alignment

Sr. No.	Tree Species	Scientific Name
A. BANGALORE RURAL DISTRICT		
1	Acasia	*Acasia sp.*
2	Ala Tree	*Ficus benghalensis*
3	Anjir	*Ficus carica*
4	Arali	*Ficus religiosa*
5	Arecanut	*Areca catachu*
6	Ashoka	*Saraca asoca*
7	Athri Tree	*Ficus carica*
8	Attimara	*Ficus glomerata*
9	Badam	*Terminalia catappa*
10	Bamboo	*Bambusa sp.*
11	Basavaa Pada	*Phanera purpurea*
12	Bevu	*Melia azadiracht*
13	Cassia Javanica	*Java cassia*
14	Casurina	*Casuarina equisetifolia*
15	Cheijjalu	*Neolamarckia cadamba*
16	Coconut	*Cocos nucifara*
17	Eucalyptus	*Eucalyptus sps.*
18	Guava	*Psidium guajava*
19	Gul Mohar	*Royal poinciana*
20	Hippe	*Madhuca longifolia*
21	Honge	*Pongamia pinnata*
22	Jack fruit	*Artocarpus heterophyllus*
23	Jali	*Prosopis juliflora*
24	Jungle Wood	*Holoptelea integrifolia*
25	Mango	*Mangifera indica*
26	Marjim	*Bombax ceiba*
27	Mutuga	*Butea monosperma*
28	Neem	*Azadirachta indica*
29	Nelli	*Phyllanthus emblica*
30	Nerale	*Syzgium cumini*
31	Nugge	*Moringa Oleifera*
32	Peltoforum	*Peltophorum pterocarpum*

Sr. No.	Tree Species	Scientific Name
33	Raintree	*Samanea saman*
34	Seemetangadi	*Cassia Siamea*
35	Siboo	*Dalbergia sissoo*
36	Silver	*Leucadendron argenteum*
37	Singapore Cherry	*Muntingia calabura*
38	Subabul	*Leucaena leucocephala*
39	Tamarind	*Tamarindus indica*
40	Tapala	*Strychnos potatorum*
41	Teak	*Tectona grandis*
42	Tekoma	*Tecoma stans*
43	Tore Mathi	*Terminalia elliptica*
B. KOLAR DISTRICT		
1	Acasia	*Acasia sp.*
2	Ala Tree	*Ficus benghalensis*
3	Ankole	*Alangium salviifolium*
4	Antwala	*Sapindus mukorossi*
5	Arali	*Ficus religiosa*
6	Arecanut/ Adike	*Areca catachu*
7	Ashoka	*Saraca asoca*
8	Athri/ Anjura Tree	*Ficus carica*
9	Bage	*Albizia lebbeck*
10	Bamboo tree	*Bambusa sp.*
11	Basari	*Ficus racemosa*
12	Bela	*Aegle marmelos*
13	Bevu	*Melia azadiracht*
14	Billi Jali	*Acacia leucophloea*
15	Bore Tree	*Ziziphus mauritiana*
16	Casurina	*Casuarina equisetifolia*
17	Chujjali	*Neolamarckia cadamba*
18	Coconut	*Cocos nucifera*
19	Eachal	*Garcinia gummi-gutta*
20	Eucalyptus	*Eucalyptus sps.*
21	Gobbali	*Acacia arabica*
22	Gulmohar/Hatti Tree	*Delonix regia*
23	Hale	*Alstonia Scholaris*
24	Honge	*Pongamia pinnata*
25	Jack fruit	*Artocarpus heterophyllus*
26	Jali	*Prosopis juliflora*
27	Jungle Wood	*Holoptelea integrifolia*
28	Kamara	*Hardwickia binata*
29	Lakota	

Sr. No.	Tree Species	Scientific Name
30	Lavanga	*Syzygium aromaticum*
31	Leechi	*Litchi chinensis*
32	Mahagani	*Swietenia macrophylla*
33	Mango	*Mangifera indica*
35	Moosi	*Lansium parasiticum*
36	Musa melos	
37	Mutuga	*Butea monosperma*
38	Neem	*Azadirachta indica*
39	Nelli	*Phyllanthus emblica*
40	Nerale	*Syzgium cumini*
41	Nugge	*Moringa Oleifera*
42	Peltoform	*Peltophorum pterocarpum*
43	Rain Tree	*Samanea saman*
44	Sampige	*Magnolia champaca*
45	Seemaruba	*Simarouba glauca*
46	Seemetangadi	*Cassia Siamea*
47	Shisam	*Dalbergia Sissoo*
48	Sihe Hunse	*Seeme hunase mara*
49	Silver	*Leucadendron argenteum*
50	Tamarind	*Tamarindus Indica*
51	Tapasi	*Holoptelea integrifolia*
52	Teak	*Tectona grandis*
53	Tore Mathi	*Terminalia elliptica*
54	Untvala	*Sapindus Trifoliatus*





















Figure 3-15: Plantation along the Proposed Expressway

Fauna

The project area is not rich in biodiversity. Both domesticated animals and wild animals constitute the faunal population around the study area. The project alignment doesnot pass through any forest area. There are 4 reserved forest patches located along the project corridor. In these forest, manly eucalyptus plantation has been carried out by the forest department. No significant habitation of wildlife has been reported in these forest areas. The faunal population in the project area is mainly constituted of common domestic animals such as cows, buffalos, Oxes, dogs, cats, goats, ships, etc. In both the project districts do not have any significant ecologically protected area or area of preservation of wildlife.

The data on fauna in the study area was collected from secondary data collected from local forest office, public consultation and observations made at site during field survey. The list of different category of animals found in the study area is presented in **Table 3.24.**

Table 3-24: List of Fauna reported from the Project area

S. No.	Common Name	Scientific Name	IUCN Red List Categorisation	Schedule as per Wildlife Protection Act	Remarks
I.	**Mammals**				
1.	Three-striped Palm Squirrel	Funambulus palmarum	LC	IV	Observed
2.	Indian Grey Mongoose	Herpestes edwardsii	LC	IV	Observed
3.	Jungle cat	Felis chaus	LC	III	Reported
4.	Black-naped Hare	Lepus nigricollis	LC	IV	Observed
5.	Rhesus Macaque	Mucaca mulatta	LC	II	Reported
6.	Indian Fox	Vulpes bengalensis	LC	II	Reported
7.	Field Mouse	Mus booduga	-	IV	Observed
8.	House/Rice-field mouse	*Mus dunni*		IV	Observed
9.	Common house rat	*Rattus rattus*		IV	Observed
10.	Large Bandicoot Rat	Bandicota indica		IV	Observed
II.	**Amphibians**				
1.	Common Indian Toad	Bufo melanostictus		IV	Reported
2.	Skittering Frog	Euphlyctis cyanophlyctis		IV	Reported
3.	Indian Bull Frog	Hoplobatrachus tigerinus		IV	Reported
4.	Common frog	Rana tigrina		IV	Reported
5.	Tree Frog	Hyla *arboria*		IV	Reported
III	**Reptiles**				
(a)	**Snakes**				
1.	Common Krait	Bungarus coeruleus		II	Reported
2.	Cobra	Naja naja	LC	IV	Reported
3	Wolf snake	Oligodon venustus	LC	IV	Reported
4.	Rat snake	Ptyas mucosus	LC	IV	Reported
5.	Indian Python	Python molurus	LR NT	I (Part II)	Reported
6.	Russell's viper	Vipera russeli	LC	II (Part II)	Reported
7.	Green keelback	*Macropisthodon plumbicolor*		IV	Reported
8.	Common Kukri Snake	Oligodon arnensis		IV	Reported
9.	Smooth water snake	Anhydris anhydris		IV	Reported
10.	Trinket snake	*Coelognathus*		IV	Reported

S. No.	Common Name	Scientific Name	IUCN Red List Categorisation	Schedule as per Wildlife Protection Act	Remarks
		helena			
11.	Bronzebacked tree snake	*Dendrelaphis tristis*		IV	Reported
(b.)	**Lizards and Chameleon**				
1.	Common garden Lizard	Calotes versicolor		IV	Observed
2.	Wall lizard	Hemidactylus brooki		IV	Observed
3.	Forest Lizard	Calote rouxi			Reported
4.	Saw-scaled viper	Echis carinatus		II	Reported
5.	Common Skink	Mayuba carinata			Reported
6.	Common Indian monitor	Varanas bengalensi		II	Observed
7.	Indian Chameleon	Chamaeleon zeylanicus		IV	Reported

Source: Data as per observations during study period and from secondary source

Avifauna:

In the study area numbers of birds are recorded during the time of field survey which are listed in the following **Table 3.25**. Although the project area is dotted with a number of irrigation tanks, which are active during the monsoon period and retain water only for 6-8 months in a year. There is no any wetland of ecological importance available in the project district. There is no report of migratory birds within the study area. However common birds are reported from the project area. Many terrestrial birds such as Indian Ring dove, Crows, Sparrows, Parrots, Mynas, Swifts, Doves, Pigeons, Egrets etc are commonly seen in the project area. A list of birds either spotted or reported from the study area is presented in Table 3.25.

None of the bird species other than Peacock (Pavo cristatus) is listed in Schedule I of the Indian Wildlife (Protection) Act 1972, is reported in the study area. Though Peacock is Schedule I, is does not belong to the RET category of the IUCN. All the species except Peacock is listed under Sechedule IV of the Woldlife Protection Act and are listed in Least Concern in IUCN Red List:

Table 3-25: List of Birds reported in the study area

Common Name	Scientific Name	IUCN Red List Categorisation	Schedule as per Wildlife Protection Act
Black drongo	*Dicrurus macrocercus*	LC	IV
Black kite	*Milvus migrants*	LC	IV
Barn Swallow	*Hirundo rustica*	LC	IV
Common babbler	*Turdoides candatus*	LC	IV
Common gray quail	*Coturnix*	LC	IV

Common Name	Scientific Name	IUCN Red List Categorisation	Schedule as per Wildlife Protection Act
Common hawk	*Cuculus varius*	LC	IV
Common quail	*Coturnix*	LC	IV
Coots	*Fulica atra*	LC	IV
Crow pheasant	*Centropus sinensis*	LC	IV
Eastern Cattle Egret	*Bubulcus ibis*	LC	IV
Golden headed woodpecker	*Dinopium benghalense*	LC	IV
Green bee eater	*Merops orientalis*	LC	IV
Indian pond Heron	*Ardeola grayii*	LC	IV
Grey Heron	*Ardea cinerea*	LC	IV
Grey wagtail	*Motacilla caspica*	LC	IV
House crow	*Corvus spledens*	LC	IV
House sparrow	*Passer domesticus*	LC	IV
Indian great horned owl	*Bubo owl*	LC	IV
Indian myna	*Acrodontherus tristis*	LC	IV
Indian Peafowl/ Peacock	*Pavo cristatus*	LC	I
Indian pipits	*Anthus novaeseelan-diae*	LC	IV
Indian robin	*Saxicoloides fulicatus*	LC	IV
Indian Roller	*Caracias benghalensis*	LC	IV
Indian Silver bill	*Euodice malabarica*	LC	IV
Indian small sky lark	*Alaunda gulgula*	LC	IV
Jungle crow	*Corvus macrorhynchus*	LC	IV
Koel	*Eudynamys scolopacea*	LC	IV
Large Indian parakeet	*Psiltacula eupatria*	NT	IV
Laughing dove	*Spilopelia senegalensis*	LC	IV
Little cormorant	*Microcarbo niger*	LC	IV
Little egret	*Egretta garzetta*	LC	IV
Magpie robin	*Copsychus saularis*	LC	IV
Pariah kite	*Milvus migrans*	LC	IV
Pigeon	*Columba livia*	LC	IV
Pied king fisher	*Ceryle rudius*	LC	IV
Pond heron	*Ardeola grayii*	LC	IV
Purple moor hen	*Porphyrio*	LC	IV
Rain quail	*Coturnix coromandelica*	LC	IV

Common Name	Scientific Name	IUCN Red List Categorisation	Schedule as per Wildlife Protection Act
Red headed bunting	*Emberiza melanocephala*	LC	IV
Red munia	*Estrilda amandave*	LC	IV
Red vented bulbul	*Picnonotus cater*	LC	IV
Ring dove	*Streptopelia decaocto*	LC	IV
River tern	*Sterna aurantia*	NT	IV
Rose ringed parakeet	*Psiltacula krameri*	LC	IV
Rock Dove	*Columba ibis*	LC	IV
Shikra	*Accipitar badius*	LC	IV
Small minivet	*Pericrocotus cinnanomus*	LC	IV
Spot billed Duck	*Anas poecilorhyncha*	LC	IV
Spotted dove	*Streptopela chinensis*	LC	IV
Tailor bird	*Orthotonus sutorias*	LC	IV
Tawny Eagle	*Aquila rapax*	LC	IV
White breasted water hen	*Amaurornis phoenicurus*	LC	IV
White throated munia	*Lonchuro malabarica*	LC	IV
Yellow wagtail	*Motacilla flava*	LC	IV
Yellow wattle lapwing	*Vanellus malabaricus*	LC	IV

3.2.4 Critically Polluted Areas

The project doenot pass through critically Polluted area neither is located within 10 Km radius of the proposed project area.

3.3 Socio – Economic Environment

The project alignment is located in Bangalore Rural and Kolar District. The project area falls in the administrative jurisdiction of Hoskote Taluk of Bangalore Rural District, and Kolar, Malur and Bangarpet Taluk of Kolar District. The alignment of Phase-I passes through 72 village area 14 lies in Bangalore Rural District and remaining 58 villages lie in Kolar District. The list of villages through which the project alignment if passing, is listed in **Annexure 3.7**

3.3.1 Demographic Profile

The Population of Karnataka according to the 2011 census stands at about 61 million, making it the 9th most populated state in India. The state is spread over an area of about 190000 sq. km. making it the 8th largest state in the country in terms of area. The density of population per sq. Km. is 319 and a lot below the national average. The state has a growth rate of about 15% percent which is the 22nd highest growth rate in the country. The population of the state is rising considerably due to rapid efforts towards development and progress. The sex ratio in Karnataka

stands about 20 points higher than the national average i.e. 973 per 1000 male. The statistics in the Karnataka Census 2011 reveal facts that can be taken into consideration by the government in a bid to further its development. The state is moving towards development at a rapid rate and has emerged as one of the prime economical contributors to the revenue of India as a whole.

Bangalore Rural District: In 2011, Bangalore Rural had population of 990923 of which male and female were 509172 and 481751 respectively as per 2011 census, Bangalore rural.

The total geographical area of Bangalore rural district comprises of 2298 sq. km and as per 2011 census, it shows that the population density is 431 people per sq. km., which is far less than State's average. The sex ratio is 946 per 1000 male.

Kolar District: Kolar had population of 1536401 of which male and female were 776396 and 760005 respectively as per 2011 census.

The density of Kolar district as per census of India 2011 is 386 people per sq. km. The sex ratio is 979 per 1000 male.

The demographic features of the project districts as per 2011 Census are provided in **Table 3.26**.

Table 3-26: District wise Demographic profile of the project Area

State/ District	Geographical Area (Sq Km)	Population			Female per thousand males	Population Density/ Sq Km
		Total	Male	Female		
Bangalore Rural	2298	9,90,923	509,172	481,751	946	431
Kolar	3979	1,536,401	776,396	760,005	979	386
Karnataka	**191,791**	**61,095,297**	**30,966,657**	**30,128,640**	**973**	**319**

Source: Census of India, 2011

3.3.2 Literacy rate

Literacy rate in Karnataka has seen upward trend and is 75.36 percent as per 2011 population census. Of that, male literacy stands at 82.47 percent while female literacy is at 66.01 percent. In 2001, literacy rate in Karnataka stood at 66.64 percent of which male and female were 76.06 percent and 57.80 percent literate respectively.

In actual numbers, total literates in Karnataka stands at 40,647,322 of which males were 22,508,471 and females were 18,138,851.

Table 3.27 represent literacy rate in concerned district of project area. Significant rise in literacy rate in all the districts and state has been recorded in 2011 compared to the year 2001.

Table 3-27: District wise Literacy rate of the project area

State / District	Literacy Rate (Population)		
	Male	Female	Total
Bangalore Rural	607,188 (81.37%)	480,204 (65.88%)	1,087,392 (73.71%)
Kolar	720,637 (82.40%)	587,903 (68.91%)	1,308,540 (75.74%)
Karnataka	**20,508,471 (66.01%)**	**18,138,451 (82.47%)**	**40,647,322 (75.36%)**

Source: Census of India, 2011

3.3.3 Growth Rate

The total population growth in this decade (2001-2011) was 15.60% while in previous decade it was 17.25% (1991-2001) in the State of Karnataka, which shows that it is less growth rate than the previous decade. The project districts i.e., Bangalore Rural and Kolar registered the growth rates of 10.80% and 11.09% respectively during this decade. It is noted all the districts has less growth rates than the previous decade. **Table 3.28** indicates percentage of decadal growth rates in the state of Karnataka and the districts Bangalore Rural and Kolar during the last two decades.

Table 3.28: Percentage Decadal Growth rates

District / State	Percentage Decadal Growth Rates	
	1991-2001	2001-2011
Bangalore Rural	12.61	10.80
Kolar	13.41	11.09
Karnataka	**17.25**	**15.67**

Source: Census of India, 2011

3.3.4 Scheduled Castes / Tribes

Table 3.29 depicts the population details of Scheduled Castes (SC) Scheduled Tribes (ST) in the concerned districts. All the concerned districts have higher population of Scheduled Castes (SC) than those of Scheduled Tribes (ST).

Table 3.29: SC and ST Population in the Concerned Project District

District/ State	Population					
	SC			ST		
	Total	Male	Female	Total	Male	Female
Bangalore Rural	213700	107424	106276	52903	27147	25756
Kolar	312565	157628	154937	156487	79156	77331

Source: Census of India, 2011

3.3.5 Work Participation

The occupational classification as per 2011 Census shows that the total workers in the Bangalore Rural and Kolar districts. It has been noted from the **Table 3.30**, that both project districts have more than half of the total population are non-workers.

Table 3.30: Proportion of workers and non-workers in Bangalore Rural and Kolar Districts

Description	Bangalore Rural			Kolar		
	Total	Male	Female	Total	Male	Female
Total Workers	459891	315499	144392	639778	384452	255326
Main Workers	389989	282416	107573	535565	341335	194230
Marginal Workers	69902	33083	36819	104213	43117	61096
Non Workers	531032	193673	337359	615326	251985	363341

Source: Census of India, 2011

3.3.6 Occupation Profile

The occupation classification showed that of the total number of workers, the main workers comprise of cultivators **Table 3.31** gives the district wise details of the occupation across gender of main worker and marginal worker.

Table 3.31: Occupation profile of Bangalore Rural and Kolar Districts

Occupation (Proportion to total workers)	Bangalore Rural			Kolar		
	Total	Male	Female	Total	Male	Female
MAIN & MARGINALWORKER						
Cultivators	127770	92771	34999	212226	136546	75680
Agricultural labourers	84108	40018	44090	206939	95588	111351
Household Industries	19457	12111	7346	20276	10836	9440
Other workers	228556	170599	57957	200337	141482	58855

Source: Census of India, 2011

Agriculture

Agriculture remains the main occupation of the people of all the project districts. But all the agricultural activities depend on the monsoon rain. Erratic monsoon brings misery to the people.

In the study area, paddy, ragi and maize are the major crops grown. Groundnut, sunflower, Niger seed and rape & mustard are the other oil seeds crop grown in the study area Sufficient and considerable amount of land is put under plantation and horticultural crops. The chief crops grown are potato, cabbage, banana, onion, tomato, cashew nut, grapes, etc. The other condiments and spices produced in the district are dry chilies and coriander.

Although the project alignment passes through the area of 72 villages, all the settlement area has been avoided by carefully designing the alignment. Few of the residential and residential cum commercial structures located near roads and highways are falling in the proposed ROW, which are impacted due to the project. The details of Socio-economic features located in Corridor of Impact (Within proposed ROW) has been discussed separately in Chapter-7 under SIA and R&R plan, so this is not discussed here.

4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The present chapter assesses the anticipated environmental impacts on various environmental components due to the proposed Bangalore-Chennai Expressway Phase-I project, which is a green field alignment. The environmental impacts have been analysed for physical, ecologolical and socio-economic environment in terms of the direct and indirect nature of the impact, extent, duration and significance. The level of assessment of each potential impact was based on the important environmental issues identified in baseline environmental studies and the proposed improvement and activities of the project.

The impacts of major infrastructure projects can be divided into two principal categories. First direct impacts which result from physical presence of the facilities and the way they are designed built and operated. Second, indirect impacts, which stem from the construction and economic activities surrounding construction and the induced development resulting from improved access. These impacts occur in two main phases- Construction and operation. Direct environmental impacts are those that are directly caused by Expressway construction or operation. During construction these impacts primarily occur within the road formation area or immediately adjacent to it, and at ancillary sites such as quarries and workforce camp. Direct construction impacts can include the loss of agricultural land damage to ecological features such as land resources and water bodies, damage to manmade structures and resettlement. During road operation direct impacts may include a reduction in air and water quality.

The potential negative impacts are generally envisaged for Expressway construction project can be 'design out' at an early stage through proper engineering designs, and during construction stage the construction related impacts can be minimized by following good construction practices and followed by environmentally friendly construction methodology.

The construction activities will mainly be restricted to the proposed 90 m Right of Way. However, some of the associated activities will be located beyond the proposed ROW. These activities are temporary camp sites, quarry and borrow areas, sites of hot mix plant, stone crusher unit, WMM Plants, Batching Plant etc., stockyards, vehicles and equipment parking sites and their maintenance center, etc. establishment and operation of such sites will also have impacts on environment. All the proposed construction activities will follow the current Indian and International standards for Expressway engineering design. The potential environmental impacts are studied as direct, indirect or cumulative effects on various environmental components.

The proposed Bangalore Chennai Expressways is intended to use for industrial corridor. This will have positive influence by virtue of better connectivity and accessibility, low vehicle operating cost, quick access to marketing centers, release of pressure on existing highway thereby enhancement of safety for the road users. as well as the population living in the vicinity these highways expressway, etc. and thus provide tremendous opportunities of socio-economic development of the region. Besides these, the potential adverse environmental impacts due to the expressway development works can be correlated to the loss of land and properties, deterioration of environmental quality (air, water, soil and noise) and ecological degradation

during various constructional works as well as during operational phase due to increase in traffic volume, change in land use pattern, landscape deterioration, etc.

The potential impacts due to location of the projects and proposed project activities have been analysed for different stages of the projects, viz

- Design and Preconstruction stage,
- Construction Stage
- Operational Stage.

The likely impacts on various environmental components in each stage have been described as follows.

4.1 Impacts During Design / Pre-Construction Phases

The major impact associated with the design or pre-construction phase deals with the loss of land, properties and livelihood due to acquisition of properties. The design of alignment also decides the acquiring or impacting water bodies, cultural sites, etc. Based on the baseline environmental conditions, the effort has been made to offset the design related impacts by making suitable adjustment in project the alignment. The project alignment passes through physical area of 72 villages, but all the settlement areas have been avoided in order to avoid large scale population displacement. Similarly, all the sensitive environmental features have been avoided. Wherever it was not possible and adequate design measures have been provided to minimize the impact. The following sections discuss about the potential environmental impacts and mitigation measures:

4.1.1 Impact on Topography:

The proposed alignment passes through plain terrain. It is proposed to construct the Expressway with average embankment height of 2.5 m in general except at bridge locations and interchanges. So there will be localized change in the topography of the area falling in the ROW. This will in turn have localized impact on drainage patter. However, adequate design measures have been provided in the form of cross water drainage structures (Culverts and bridges). A total number of 15 major bridges, 45 minor bridges, 123 box culverts have been proposed. In addition, a total number of 55 vehicular/cattle underpasses have been proposed in the project. So, the impact on drainage pattern due to the proposed project will be minimal and insignificant.

4.1.2 Impact on Land Resources

The proposed project of Expressway is a new alignment and will have 90 m of ROW. Like any other project the project require land. The selection of alignment has been done in such a manner that the acquisition of land is restricted to minimum and the loss of residential and commercial structures are minimum. Although the project alignment will pass through 72 village area all the village settlements have been avoided in order to mass displacement of people. The Phase-I alignment of the Expressway altogether acquisition of 764.08 Ha of land area required, out of which 717.35 Ha land is private land, whereas the remaining4 6.73 Ha belongs to Government land. The project alignment is passing through 72 revenue villages out of which 14 affected villages are in Bangalore Rural District and remaining 58 affected villages are from Kolar District. Out of total affected land area of 764.08 Ha, 151.31 Ha land will be required for the

project stretch falling in Bangalore rural District and balance 612.77 Ha from Kolar district. The area for acquisition has already verified by concern Revenue departments of respective districts who after joint verification estimated the total affected area of the land and the status of ownership. **Table 4.1** represents the district wise land requirement for acquisition for the project. Most of the land belong to private land. The detailed village wise break-up of lands required for acquisition has been given in **Annexure 7.1** in Chapter 7 of Social Impact Assessment.

Table 4-1: District wise Land Requirement for Proposed Project

Sl. No.	District	Total Area required (Ha)	Area by Ownership (Ha)	
			Private	Government
1	Bangalore Rural	151.31	138.22	13.09
2	Kolar	612.77	579.13	33.64
Grand Total		**764.08**	**717.35**	**46.73**

4.1.3 Impact on People due to Land acquisition and Properties

Impact of another issue after land acquisition envisaged during the pre-construction phase is related to acquisition of various commercial and residential structures and displacement of people. As stated in the previous section, the alignment selection has been made in such a manner to avoid the settlement areas of all the affected 72 villages. However, few structures are still required to be displaced due to the project which will result into displacement of 344 households is due to the project. The details of impacts on social features including household, structures and other assets and R& R Plan are described in details under Resettlement and Rehabilitation Report (Chapter 7).

The project will have three broad categories of social and economic impacts due the proposed project, which require mitigation measures. These are loss of assets, including lands and houses; loss of livelihood or income opportunities and collective impacts on groups, such as loss of common property resources.

The total number of structures to be affected completely or partially is about 345 structures including 1 number of common property resource. 344 affected structures belong to private owners, whereas 1 number is temple belonging to local community. The details of affected properties including residential, commercial structures and other assets is presented separately in details in Chapter 7: SIA & R&R Plan. The acquisition of structures directly leads into displacement of people, families and business from their existing locations. Since livelihood is also associated with such establishments at a particular location, the shifting from the current location may affect their sustenance.

Mitigation Measures:

- A separate R&R policy has been framed after identified different category of entitlement and benefits to each category to address the issues pertaining to the Project Affected People and their rehabilitation & resettlement depending upon the Entitlement.
- The acquisition of land and private properties will be carried out in accordance with the RAP and entitlement framework for the project.

- Early identification of entitlement for Compensation and Advance planning of Resettlement and Rehabilitation Action Plan to Compensate the Losses.
- All the affected people will be compensated as per LA & R&R ACT 2013 before commencement of Construction works and the cost of compensation will be finalized by the Competent Authority and the Project Proponent will pay the compensation at all the entitles persons through the Competent Authority.
- It will be ensured that all R & R activities including implementation of Environment Management Plan are completed before the start of work.
- PIU has to ascertain that any additional environmental impacts resulting from acquisition of land are addressed and integrated into the EMP and other relevant documents.

The NHAI has already appointed Competent Authority in each affected districts. The Competent Authority is from District Revenue Department, State Government. The Competent Authority assess the cost of the losses after verification and then decides the compensation for each properties and assets as well as identifies the affected persons as per records. The NHAI accordingly will pay the compensation to the affected persons through the competent authority.

In Phase-I the acquisition of lands and properties is already in advance stage.

4.1.4 Impacts on Other Assets

In addition to the above listed properties the other private assets which are falling within the proposed ROW, are also likely to be affected. These assets include open well, bore well, water tanks and small arches etc. As per survey a total number of 20 Open Wells/Pump Houses, 129 Bore wells and pump sheds, 17 water storage tank will require to be shifted outside the proposed ROW from the present location. The list of such assets is given in Table 4.4.

Table 4-2: Impact on other Assets

Sl. No.	Usage	No.	% to total	Bangalore Rural	Kolar
1	Open well	20	12.05	9	11
2	Bore wells	129	77.71	59	70
3	Water Tanks	17	10.24	7	10
Total		**166**	**100.00**	**75**	**91**

Mitigation Measures

The owner of the above properties will be compensated for the loss before commencement of construction activities and necessary assistance will be provided in shifting their assets.

4.1.5 Land use Change

Like any other project, the proposed Bangalore-Chennai expressway Phase-I alignment also requires land within the proposed ROW. The baseline study indicates that the predominant landuse in the project alignment is agriculture and plantation area. This will cause diversion of land to Expressway from current use. The change in landuse will be for the Expressway and is permanent in nature. Acquisitions of agricultural, commercial and barren land will be needed for the construction of proposed expressway to meet the design specification. The Right of way

would involve most of the sections of agricultural land and thus the anticipated loss of productive agricultural land to the extent.

4.1.6 Impact on Water bodies and Drainage Pattern:

Baseline study of the project area reflects that the project alignment will cross one major river called Palar river and 73 local streams/nallah. All these water bodies are ephemeral in nature and active only during rainy season. In general, the proposed embankment height is 2.5 m. The high embankment of Expressway may have minor localized impact on drainage pattern at local level. The depressed median will also act as drain and will carry runoff water, which can have impact on the local drainage pattern. The obstruction in local water ways and drainage may lead to flooding of area around the expressway. However, to avoid any alternation of river or streams a total number of 117 box culverts, 13 major bridges and 18 minor bridges has been provided across all such features to allow free flow of water on either sides. In addition to these cross water structures longitudinal toe drains will also be provided which will regulate the runoff water. Further, this anticipated impacts on local drainage pattern following mitigation measures have been proposed as design measures:

- Providing proper slopes in the cross section.
- Providing drainage inside the Underpass/ Culverts
- Provision of lined drains.
- Connecting the drainage spouts of underpasses to road drains.
- Provision of portable pumps in the underpasses

In the first phase of construction, it has been proposed to construction 4-lane dual carriage way with depressed median of 21 m. The depressed median will act as drain during the rainy season. The continuity of the structure will be maintained by providing protection walls. Stone boulders are proposed in the depressed median portion to reduce the velocity of the water and as protection measures against erosion. The drains of the depressed median is connected to the CD structure to regulate the runoff water. Also proper longitudinal and camber slope are provided on the carriage way. Storm water drain provided will carry these water which are connected to nearest culvert.

In addition to the nallah and rivers, the area along the ROW is dotted with a number of water tanks/ponds. These store rainwater during rainy season and mainly used for irrigation purpose. A total number of 14 water tanks are coming within the proposed ROW hence partial acquisition of the tank would be required to accommodate the required construction of Expressway. These ponds/ tanks are unavoidable due to engineering constraints. All these water tanks are minor irrigation tanks maintained by the Irrigation Department, Karnataka state government. The proposed expressway will partially affect these tanks. Across all the affected irrigation tanks elevated structures have been provided this will help in to retaining the total water capacity of the tanks will remain unaltered as suitable structures have already been proposed across these tanks.

In addition to elevated structures over the affected tanks, shifting of bunds, bund protection measures, etc. shall be carried out in consultation with line department, i.e. Irrigation Department and in accordance with the standard specifications. The NHAI has already initiated application for NOC from the respective owner of the tank for the project. The Irrigation Department usually takes the responsibility for doing necessary shifting, rehabilitation and protection works and the cost is required to be borne by the Project Proponent. All precautionary measures as stipulated by the irrigation department will be complied by the during construction as well as operation stage. All the expenditure for shifting the tank bunds and required protection measures will be

borne by the NHAI as per the estimate of the Irrigation Department while according the permission as per statutory rule. Necessary assistance will be provided to the Irrigation department as and when required. All the formalities for acquisition of Tank's land will be completed before commencement of construction activities in this stretch. The details of affected tanks with mitigation measures and proposed structures given in **Annexure -4.1.**

4.1.7 Religious, Common and Government Properties Affected

During finalization of alignment all the settlement areas and sensitive social and ecoplogical features have is avoided to the possible extent. However, 1 religious structure will be affected due to the proposed project alignment.

Mitigation Measures: Required mitigation measures for land acquisition will be followed for acquisition. The PIU will ensure that the religious structures are relocated before start of construction of road and the idols/artifacts are relocated in the new structure before demolishing the structures falling in Corridor of Impact. The relocation site for all these features will be finalized after discussion with the user community and accordingly compensatory measures will be taken.

Table 4-3: Religious Structure within the Proposed ROW

Sl. No.	Name of Village	Name of Taluka	Name of District	Ownership	Type of Structure
1	Kulathur	Hoskote	Bangalore Rural	Community	Temple

4.1.8 Impact on Utilities

Several types of utilities serving local and regional needs are falling under COI will need to be relocated from their present position due to the proposed widening alignment. These services are mainly electric poles, transformers, OFC lines, wells and bore wells and water supply pipelines which may be required to be relocated at some locations. Such type of impacts due to the construction of proposed Expressway is inevitable.

Mitigation Measures:

All the utilities will be restored in advance prior to the start of construction works. The required mitigation measures would be to instruct in advance the relevant owners of these utilities to shift those before construction starts to avoid disruption of local services. The Concessionaire will submit the details of such features falling within the alignment and inform the PIU. It will be judicious for the PIU to assist the owners to get land for new locations.

4.1.9 Impact on Trees within Right of Way

The present project will have varying levels of impact on the plantations within Right of Way (RoW) throughout the entire stretch of the Expressway. This impact is viewed critical due to long duration required for its reversal and sometimes it is irreversible. Existing plantations in the green field provide a healthy aesthetics and natural greenery but also provide shade to the passerby's/users.

20748 trees of varying girth are located within the corridor of impact and are likely to be felled due to the project. Out of these, Bangalore Rural District covers 14.19%, Kolar district covers 85.81%. Cutting of trees are inevitable in the proposed project.

The baseline studies showed that there is no any endangered or protected tree species located within the project area. The predominant tree species to be felled include Nilgiri (*Eucalyptus sps.*), Mango (Mangifera indica L.), Coconut (*Cocos nucifera*), Neem (*Azadirachta indica*), and *Acacia auriculiformis*, and rest are having mainly ornamental value. These are all ubiquitous species. The land owner will be compensated along with the compensation of land and assests. The valuation of the trees within private land has been accrued out by the district Revenue Department (Competent Authority) and accordingly compensation has been finalized.

The eucalyptus plantation area is required to be cleared from where the alignment if passing through. The Baseline study reflects that the eucalyptus plantation has been undertaken by the local people under agroforestry and the cultivation of Eucalyptus plantation if done as cutting crop for commercial utilization of soft timbers for production of soft wood, paper industries as well as medicines. The ROW of this expressway will impact 37.015 Ha of eucalyptus plantation area in Bangalore Rural District and 142.62 Ha in Kolar district. The Government of Karnataka has banned cultivation of Eucalyptus plantation in private land from year 2017 and allowed the owner to clear all the eucalyptus plantation. The competent authority has already done valuation of these affected eucalyptus plantation area and considered under compensation plan.

Mitigation Measures

- Permission of cutting of trees will be obtained from the line department, i.e. Forest Department.
- All efforts will be made to preserve trees by restricting tree cutting within the formation width. Special attention will be given for protecting giant trees, and locally important trees (having cultural importance)
- Compensatory plantation will be carried out along the space available within the proposed project in the ratio of 10 times as much the trees are proposed to be cut.
- A general guideline for tree plantation will be followed as per IRC: SP: 21:2009 and as per Tree Plantation Strategy given in **Annexure-9.1** of Environmental Management Plan (Chapter-9).
- Plantation of shrubs in Median has been proposed. 666 shrubs/Km to be planted throughout the project stretch. The plantation will not only compensate the loss but at the same time will enhance the aesthetic along the expressway and enhance the pollution alleviation capacity of the area.
- The avenue plantation programme will be promptly adopted to restore and further enrich the loss of vegetation.

4.1.10 Impact on Forest Land:

The selected alignment of proposed Expressway does not encroach upon any forest area, so any impact on forest land is not envisaged due to the project.

4.1.11 Impact on Ecologically Protected area:

The baseline study clearly reflects that there is no any ecologically protected area, such as Wildlife Sanctuary, National Park, Tiger Reserve, elephant corridor, biosphere reserves, mangrove areas, etc. within 10 Km radius of the project alignment of Phase-I. So any chance of impacts on such areas is not envisaged and therefore no mitigation measures are required.

4.1.12 Impact on Protected Monument and Archaeological Site

The baseline study revealed that there is no historical monuments or site of archaeological importance located within 10 Km radius of the proposed project alignment of Phase-I, so any impact on such features are not anticipated due to the project.

4.2 Impacts During Construction Phase

The construction phase, in general, has adverse influence on all the components of environment. Most of these impacts are primarily due to negligent practices but are short lived and reversible in nature. A proper care is essential to minimize the adverse impacts to the possible extent to facilitate the restoration of the environment and can be discussed under following sub-heads.

The standard Expressway construction works involve are site clearance, excavation, filling of earth materials and sub grade materials, laying of bituminous mixtures, handling of hazardous materials like bitumen, diesel, etc, dumping of unusable debris materials, transportation of materials from production site to construction site, and other constructional activities and associated works like mobilization of constructional equipments, setting up of different construction plants, setting up of workforce camps, quarrying, transportation of materials, material storage etc. These activities have certain impacts of various magnitudes on different components of environment. The anticipated impacts due to all these activities have been described below.

4.2.1 Impact on Land Resources

Clearing and grubbing and excavation of the land within the extent of formation width of the proposed alignment are the primary activity to prepare the bed for road construction. The excavation activity will lead into generation of excavated materials which would mainly soil mixed with pebbles and rocks in the project area. Most of these materials will be re-used as fill materials, aggregates and for construction of retaining walls.

Table 4.6 indicates the quantity of materials required for construction. From the table it can be inferred that Substantial amount of land would also be required for extraction of borrow materials. A total quantity requirement of soil is 1,16,83,500 cum, sand is 4,52,000 cum and 40,85,000 MT aggregates. For fulfilling of requirement of soil and aggregates certain land acquisition will be required followed by excavation of materials from that land area. Such type of activity can lead into disfiguration of topography of the area to minor extent. Water stagnation in the borrow pit provides ideal breeding sites for mosquitoes and thereby can spread malaria and dengue if borrow pit is not properly managed. Pits near settlements can pose health risk

Table 4-4: Material requirement for Construction

S. No.	Type of Material	Required Quantity	Source
1	Soil (Cum)	1,95,07,688	Nearby Borrow Areas
2	Sand (Cum)	5,01,300	Sand Quarry
3	Cement (MT)	4,28,000	Authorized vender at Local level
4	Aggregates (Cum)	22,17,500	Approved Quarry sites
5	Bitumen(MT)	45,600	Authorised Venders
6	Steel(MT)	69,287	Authorised vender at Local level
7	Bricks (Pcs)	19070000	Local Venders

In Phase-I of BCE for altogether about 38,82,315 Cum of cutting materials, including soil and ordinary rock boulders, will be generated due to excavation for preparation of road bed. Out of 38,82,315 cum, the estimated quantity of soil generation will be about 31,04,889 Cum whereas the remaining quantity of 7,77,462 Cum will be ordinary rock boulders. As per estimation total requirement of soil for construction will be 1,95,07,688 cum. This will be taken from borrow areas. Huge area of land would be required to meet this quantity of soil requirement. It is proposed to reuse the cutting materials for construction purpose. As per estimation around 70% of excavated soil can be suitable for construction so about 27,17,621 cum of excavated soil can be reused for road construction purpose and remaining 11,64,695 Cum soil will require to be disposed off. This quantity can further be utilised for landscaping and restoration of borrow area and levelling of ground within the proposed ROW. The reuse of material will reduce the pressure on land for material extraction. It is also proposed to reuse the rock boulders generated due to excavation for road bed to meet the requirement of aggregates, in the crusher plant of the contractors. The Boulders can be utilized further for stone pitching of slopes, landscaping and filling material for wayside amenities to reduce the disposable quantity.

In addition to borrow areas and quarries, some land would be needed to establish site offices and construction camps, worker/labour camps. These will require temporary land acquisition although for a short period.

A total number of 6 operational Stone quarries are located around the project area at a distance ranging from 6 Km to 20 Kms from the project stretch detail are given in **Chapter 3**. Sufficient number of gravel quarries is situated near the project stretch within a distance of 3 to 15 kms. Thus the lead from source to site shall not be much. Riverbed sand quarries are situated near the project area in Kaundinya River, further haphazard cutting near water courses will result into soil erosion and siltation to the nearby water bodies.

Mitigation Measures:

- The excavated materials generated for preparation of roadbed construction to be reused to the maximum extent to minimize the disposable quantity.
- All the debris to be disposed off at disposal site approved by the engineer in a manner not to disturb any water way, waterbody or land. The material can be used for restoration of borrow areas, landscaping, restoration of temporary sites etc.
- The Construction camps will be located preferably on barren land and sufficiently away from settlements and water bodies.
- The Construction camp will be provided with necessary sanitation arrangements and basic facilities.
- After dismantling of Camp the natural condition of the land will be restored.

- No scare will be left unattended after excavation activity.
- The Borrow area will be located preferably on barren land or unirrigated land.
- The Borrow pits will not be dug within 800 m of town or village settlement or within ROW
- After excavation is over, the borrow area will be suitably rehabilitated either by backfilling it of by dressing the sides of the borrow pit to create slope consistent to the adjoining land.
- As and when necessary pit can be developed as water recharging pond depending upon the terrain of the area
- Proper reclamation of pits will be done
- Cut face of the pit will be merged with the slope of the adjoining terrain
- Bottom of the pits will be graded towards natural outfalls to prevent water accumulation
- The reclaimed area will be seeded to provide grass coverage.
- Quarrying of metal will be done only at licensed quarry and the area will be suitable rehabilitated after quarrying is over.
- The borrow areas and stone quarry site can be operated and managed as per guidelines provided in **Annexure 9.2** & **Annexure 9.3** of Environmental Management Plan (**Chapter-9**), respectively.
- The materials should be transported in covered vehicles to avoid dust generation due to transportation of materials as well as to avoid spillage of materials causing accidents.

4.2.2 Impact on Soil

The site clearance process includes excavation and vegetation clearance which ultimately induces vegetation loss as well as loss of top soil. Since vegetation clearance shall be confined to the minimum area required for widening activities beyond the ROW the area affected would be very less. The activities associated with the site preparation and excavation plus movement of vehicles and equipments can disturb the surrounding lands.

4.2.2.1 Contamination of Soil

Contamination of soil during construction stage is primarily due to construction and allied activities. The sites where construction vehicles are parked and serviced are likely to be contaminated because of leakage or spillage of fuel and lubricants. Pollution of soil can also occur in hot-mix plants from leakage or spillage of asphalt or bitumen. Refuse and solid waste from labour camps can also contaminate the soil. Contamination of soil during construction might be a major long-term residual negative impact. Unwarranted disposal of construction spoil and debris will add to soil contamination. This contamination is likely to be carried over to water bodies in case of dumping being done near water body locations. However, by following mitigative measures such as maintenance of vehicles and machines and fuel refilling is carried out in a confined area can avoid contamination of soil to a great extent. The provision for oil interception chamber is suggested in EMP for treating the waste water generated from vehicle washing, refilling and maintenance areas. Fuel storage and refilling sites should be kept away from cross drainage structures and important water bodies. All spoils shall be disposed off as desired and the site shall be fully cleaned before handing over. These measures are expected to minimize the impact on soil contamination.

4.2.2.2 Compaction of Soil

Compaction of soil may be anticipated due to the movement of construction vehicles and heavy machines. Thus regulation of movement of heavy equipment and vehicles shall be essential to prevent this.

Mitigation Measure:

- The excavation activities and vegetation clearance will strictly be limited to formation width only.
- All the usable excavated materials will be re-used as fill materials and aggregates.
- Fill materials for the embankments are to be arranged from places located outside ROW.
- The movement of construction vehicles and equipment will be restricted to only designated route.
- Designated storage site for fill materials and adequate stockpiling to prevent erosion and runoff related problem.
- Construction of temporary berms, sediment basins, slope drains and use of temporary mulches fabrics or other control measures necessary to control soil erosion and sedimentation will be done at site.

4.2.3 Impact on Water Resources

4.2.3.1 Contamination of Surface Water from Construction and Allied Activities:

Activities near the water body may result into contamination of water if proper care is not taken. The waste water from construction sites, campsites, vehicles/equipments servicing centers, stockyards may carry different types of contaminants and may get way into nearby water bodies thereby contaminating water. Staking of construction materials like earth, stones, cement, etc or spoils near water bodies or along waterways may result into siltation problem of the water ponds/water tank. Such impacts however can be minimized through proper site management and work plan. Following mitigation measures will minimize the impacts on impact on surface water bodies:

Mitigation Measures

- All necessary precautions will be taken to construct temporary or permanent devices to prevent water pollution due to increased siltation and turbidity.
- The precautionary measures to prevent the wastewater generated during construction from entering into canals, water bodies or the irrigation system and avoid construction works close to canals or water bodies during monsoon.
- All wastes arising from the project will be disposed off, as per SPCB norms, so as not to block the flow of water.
- No construction materials/ spoils will be stored along the water bodies and adequate provision will be made for preventing spillage of materials into these water bodies.
- Wastes must be collected, stored and taken to approved disposal site.
- Water quality to be monitored periodically.

4.2.3.2 Impact on Ground water

Construction of proposed project will result in increased impervious surface, thus, increase in surface run-off. It will have adverse impact on ground water recharging if measures are not taken during the design and construction of longitudinal drainages. Rain water harvesting structures shall be proposed on the drains.

The geological studies of the project area show water table varies in Bangalore Rural and Kolar district varies between 5 to 10 m in May 2015 (CGWB). As the depth of the ground water table is very high no adverse impact is anticipated on quality of ground water due to construction activities. Laying of pavement within the formation width may lead to reduction in the ground water recharge capacity. But as the area involved in the road construction is very less, the chances of this influence will be non-significant.

Mitigation Measures

- Longitudinal drains of sufficient capacity will be provided on both sides of the proposed road to accommodate increased run-off.
- In urban stretches, the lined drains will be provided with cut in between to facilitate ground water recharging. The cut will be made of granular coarse material, which will increase the infiltration rate.
- In rural stretches the unlined drains will be connected with ponds. New small ponds will be dug if necessary. It will help in rainwater harvesting.
- Rainwater Harvesting and ground water recharge pits has been proposed and to be installed in consultation with Ground Water Boards at an average interval of 500 m in a staggered way covering the entire project stretch depending upon the water table status (The recharge pit can only be provided at those locations where the water table is greater than 5 m deep). The schematic plan of rainwater harvesting is presented in **Annexure 9.5** of Environmental Management Plan (Chapter-9). The Concessionaire will have to collect the information about the water table and then construct the rainwater harvesting pits which will be approved by the Engineer and PIU-NHAI. The Concessionaire will submit completion after construction of rainwater harvesting pits along with their details duly certified by the Independent Engineer and PIU-NHAI.

4.2.3.3 Water Requirement for Construction:

As per assessment water requirement for construction and other purposes during peak period would be about 15000 KL/day. The detailed break up of water requirement is given in **Table 4.5.**

Table 4-5: Water Requirement for Construction

S. No	Purpose	Water requirement (cum/day)
1	Road making	11000
2	Bridge/Curing	1600
3	Plant sites/ Dust Suppression	1000
4	Drinking	200
5	Domestic & Other uses at Camp sites/laboratory/construction sites/ labour camps etc.	1200

S. No	Purpose	Water requirement (cum/day)
Total		15000

The water demands for the construction work may pose severe stress on the public water supply if the water for construction and allied activities are taken from the same source as the project area is a water stressed area and water supply sources are limited.

The main source of water for construction and other related activities will be a mixture of surface water source and ground water source. Most of the rivers and water tanks along the project corridor are rainfed and contain water only for a brief period. Surface water may be used to meet the water requirement for the project. However, groundwater may be used by installing bore wells at different locations such at camp sites and plant sites. Separate water supply arrangement for construction and allied works will be made in from ground water/surface water source away from public water supply source so that there is no interference with the normal public water supply.

The water for the construction will be taken after taking prior permission from Competent Authority and comply with all the requirements of State Ground Water Authority/ Irrigation Department. The Contractor will take all the measures in order to minimize wastage of water during the construction.

The baseline study indicates that the area along the project falls under overexploited zone in terms of ground water availability, usage and water balance and recharging capacity, The estimated water requirement is for the entire project length and the abstraction of water will not be confined to a single location but will be extended at different locations, therefore pressure on a single aquifer will not be significant. The overexploited zone will be avoided for abstraction of water for construction purpose.

The Source of water for construction shall be identified by the Contractor depending upon the location of construction sites, construction camp and plant site locations in consultation with line department and NHAI and will obtain all necessary statutory permits for usage of water before start of abstraction of water.

4.2.4 Impact on Water Quality

No permanent impact is anticipated on water quality due to the project. Construction activity may temporarily deteriorate surface water quality near the alignment through increase in turbidity as well as in oil and grease. These impacts are temporary in nature and will be handled through the proposed mitigation measures:

- All water and liquid wastes arising from construction activities will be properly disposed off and will not be discharged into any water body without adequate treatment.
- Littering or unauthorized discharge will not be permitted.
- Permission of the engineer and the concern regulatory authorities will be obtained for disposal of the waste as the designated disposal point.
- The stream course and drain will be kept free from dumping of solid wastes and earth materials.

- The construction materials and debris will be stored away from water bodies or water ways and only on the designated sites along the construction zones.

4.2.5 Impact on Ambient Air Quality

The air quality parameter is the most common environmental feature, which is being affected by any road construction projects at different stages i.e. during constructional as well as operational phase. The major indicators of Ambient Air Quality relevant to the road project are the concentration Particulate matters of size less than 10 µ (PM_{10}), particulate matters of size less than 2.5µ ($PM_{2.5}$), sulphur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO) in the atmosphere. As this is a Green Field Project, there will not be any existing major sources of pollutions particularly vehicular pollution. The result of the measurement of these parameters in the atmosphere along the project alignment showed that the concentration of air pollutants all are well below the safe limit as prescribed for the National Ambient Air Quality laid by Ministry of Environment and Forests, Government of India at all the places.

Significant amount of dust would be generated due to site clearance and excavation activities, exhaust of mobile and stationary construction equipment, stone crushing plant, batching plant, HMP, demolition, embankment and grading activities, transportation of earth materials and dumping of spoils, which have potential deterioration of air quality during the process. This can increase the localized concentration of fugitive dust during construction phase. During asphalt preparation, operation of hot mixing plants needs burning of fuels that result into release of significant amount of gaseous pollutants into the atmosphere like oxides of sulfur, hydrocarbons and particulate matters. These are likely to deteriorate the air quality in general and also cause occupational exposure in particular. These impacts are, however, temporary one that will remain only upto the period of clearance and excavation processes. Besides this, air quality deterioration is also expected at deposits and borrows sites, materials treatment areas, quarries, access roads and the site where facilities provided for project workers due to dust generation and gaseous pollutant emission. Additional vehicular emission is expected during the mobilization of construction equipments, transportation of materials, etc. due to the increased vehicular number at the project sites but that will be minor in extent as there will not be significant increase in vehicle numbers.

The improper sanitation at work camps and waste disposal usually lead to odour problem. Foul odour may also be caused during laying of pavement. The above mentioned problems related to the deterioration of air quality, however, will temporal in nature till the construction period only. Further, the activities will not be confined to any one place rather, it will progressively move along the ROW, so prolonged deterioration in air quality will not occur at any one site. The minor volume of dust generated will cause a short-term localized problem through settlements.

Mitigation measures:

Generation of Dust

- Water will be sprayed during construction phase, in earth handling sites, asphalt mixing sites and other excavation areas for suppressing fugitive dust.
- Water sprinkling and transporting construction materials with tarpaulin coverage during the construction stage.

- During the sub-grade construction, sprinkling of water will be carried out on regular basis during the entire construction period especially in the winter and summer seasons.
- In case fly ash is used, dust emission during its loading and unloading, storage at open place and handling for road construction shall be suppressed by regular water sprinkling.
- Dust emission from stock piles of excavated material will be controlled either by covering the stockpiled materials or water spraying over it.
- Special attention will be given when working near educational institutions and health centers and settlement areas.
- As soon as construction is over all the surplus earth will be utilized properly all loose earth will be removed from the site.

Mitigation measures for Plants & Equipments:

- The Stone crusher plant, Hot mix plant and Wet Mix Plant will be located sufficiently away from settlement towards downwind direction and will conform to the siting and operation requirements under Environmental (Protection) Rules, 1986.
- Proper management of all Plant sites having stone crusher unit, Hot mix plants, Batch mix plant, stockyards.
- All the vehicles used during the construction stage to have valid PUC certificate
- Provision of effective air pollution control systems in stone crushers, Hot mix Plant, Batch mix plants such as Dust containment cum suppression system for the equipment, Construction of wind breaking walls along periphery of plant sites, construction of the metaled roads within the premises, regular cleaning and wetting of the ground within the premises, etc.

Gaseous Pollution

- All the Construction vehicles and machineries will be regularly maintained to conform to the emission standards stipulated under Environment (Protection) Rules, 1986.
- Asphalt mixing / Stone Crusher plans should be located at list 800 m away from any habitation or sensitive environmental site and at least 250 m away from highway towards downwind direction.
- All the DG sets will conform to the emission standards as stipulated under Environment (Protection) Rules, 1986.
- The workers working at asphalt mixing and subsequent application of asphalt mix on road surface will be provided with heat resistant shoes and masks.

4.2.6 Impacts of Noise Level

Operation of heavy machineries; movement of heavy vehicles, stone crushing aggregate mixing activities generates high noise increasing the ambient noise level in the surrounding. The behavior of truck drivers also plays roles in increasing the noise level by the injudicious frequent use of blow horns. Especially in the settlement area this can pose a problem.

Workers working near the noise generating equipment and plants are likely to be exposed to high noise level. The acceptable limits (for 8-hour duration) of the equivalent noise level exposure

during one shift is 90 dB(A). Hence, noise generated due to various activities in the construction camps may affect health of the workers if they are continuously exposed to high noise level. For reasons of occupational safety, exposure to impulses or impact noise should not exceed 140 dB (A) (peak acoustic pressure). Exposure to 10,000 impulses of 120 dB (A) are permissible in one day. The noise likely to be generated during excavation, loading and transportation of material will be in the range of 90 to 105 dB (A) and this will occur only when all the equipment operates together and simultaneously. This is however, is a remote possibility. The workers in general are likely to be exposed to an equivalent noise level of 80 to 90 dB (A) in an 8-hour shift, for which all statutory precautions should be taken into consideration. However, careful planning of machinery selection, operations and scheduling of operations can reduce these levels. A typical Noise generation due to different activities has been given in the **Table 4.6.**

Table 4-6: Typical Noise Levels of Principal Construction Equipment during major construction activity (Noise Level in dB (A) at 50 Feet)

Activities and Equipment	Noise Levels in dB(A)
CLEARING	
Bulldozer	80
Front end loader	72 - 84
Dump truck	83 - 94
Jack hammer	81 - 98
Crane with ball	75 - 87
EXCAVATION AND EARTH MOVING	
Bulldozer	80
Backhoe	72 - 93
Front end loader	72 - 84
Dump truck	83 - 94
Jack hammer	81 - 98
Scraper	80 - 93
STRUCTURE CONSTRUCTION	
Crane	75 - 77
Welding generator	71 - 82
Concrete mixer	74 - 88
Concrete pump	81 - 84
Concrete vibrator	76
Air compressor	74 - 87
Pneumatic tools	81 - 98
Bulldozer	80
Cement and dump trucks	83 - 94
Front end loader	72 - 84
Dump truck	83 - 94
Paver	86 - 88
GRAND AND COMPACTING	
Grader	80 -93
Roller	73 - 75
4.2.6.1 PAVING	
Paver	86 - 88
Truck	83 - 94
Tamper	74 - 77
LANDSCAPING AND CLEAN UP	

Bulldozer	80
Backhoe	72 - 93
Truck	83 - 94
Front end Loader	72 - 84
Dump Truck	83 - 94
Paver	86 - 88

Source: *CPCB, Govt. of India*

It is evident from the above table that the operation of construction machinery e.g. hot-mixer, bulldozer, loader, backhoes, concrete mixer, etc will lead to rise in noise level to the range between 80-95 dB (A). Vehicles carrying construction materials will also act as the noise sources. The magnitude of impact from noise will depend upon types of equipment to be used, construction methods and also on work scheduling. However, the noise pollution generated due to different construction activities is a temporary affair. Each type of activity can generate different type and levels of noise that continue for a short period during the operations of those activities.

Implementing proper mitigation measures can reduce a lot of problem associated with noise pollution due to construction activities.

Mitigation Measures:

- All noise generating equipments will be installed sufficiently away from settlement areas.
- Provision for stationary machines and equipment with acoustic enclosures and silencers,
- Provision of mandatory acoustic enclosure /acoustic treatment of room for stationary DG sets (5KVA and above). The acoustic enclosure/acoustic treatment of the room should be designed for minimum 25 dB (A) insertion loss for meeting the ambient noise standards, whichever is on the higher side. The DG set should be provided with proper exhaust muffler with insertion loss of minimum 25 dB (A)
- The plants and equipment used for construction will strictly conform to CPCB noise standards.
- Vehicles and equipments used will be fitted with silencer and maintained accordingly.
- Noise to be monitored as per monitoring plan and if the noise level at any time found to be higher than immediate measure to reduce noise in that area will be ensured.
- Noise standards of industrial enterprises will be strictly enforced to protect construction workers from severe noise impacts. All the workers working very close to the noise generating machinery shall be provided Earplugs to avoid any ill impacts on their health.
- An awareness programme will be organized for drivers and equipment operators to make them aware of the consequences of noise and to act properly at site.

4.2.7 Impact on Ecological Resources

The baseline study of the biological environmental within the project area did not show any endangered or significant flora or fauna and within the corridor of impact and there is no wildlife migration route reported, therefore, any potential direct impact on biological environmental characteristics such as, loss of rare or endangered species, habitat fragmentation and wild life migrations is not envisaged. The area is not characterized by any significant ecosystem so loss of habitat is not there. Moreover, the proposed alignment has avoided forest areas. The temporary impact may be in the visual appearance of the trees and shrubs as construction activity may lead

to deposition of dust cover over the leaves and foliage. This is limited to construction period and gets washed away with the first monsoon shower.

4.2.8 Impact on Social Environment

4.2.8.1 Impairment of access to the properties

During construction of expressway, cross water and side drain temporary blockage of access or interference with the access to the properties located along the right of way may occur, causing inconvenience to the road users and other general public and enhances the accident risk if not managed properly. Such impact can be avoided through proper planning of works and good engineering practices. Safe and convenient passage for vehicles, pedestrians and livestock to and from roadsides and property accesses connecting the proposed expressway shall be ensured by providing temporary access. Adequate signages and barricades shall be raised at the expected bottlenecks for safe movement of people. The Concessionaire shall provide early information to the affected people. On completion of the works, all-temporary obstructions to access shall be cleared away, all rubbish and piles of debris that obstruct access should be cleared.

4.2.8.2 Aesthetics

Disturbance of landscape aesthetics due to excavation of borrow pits, extensive quarrying, disposal site of spoils, is expected during the constructional phase. However, it is only temporary one and it can be restored with proper management plans within a short period such as roadside plantation, etc. During operational phase this will be enhanced with the activities associated with the maintenance of landscape such as plantation programme, by providing road side amenities, parks etc.

Mitigation Measures:

- The site will be cleaned immediately after the construction activity is over.
- The debris materials will be disposed off only at identified area for disposal and proper leveling will be done after disposing the materials and shall be covered with top soil and some plantation will be done at the disposal site
- The borrow area will be rehabilitated as per site condition. It can either be developed as ponds, backfilled and leveled machine with the surrounding terrain.

4.2.8.3 Public Health and Safety

Health and safety are of major concern during the construction as well as operational phases. The impact on health and safety can be envisaged for both workers at site and road users as well as inhabitants of nearby areas.

Emission of gaseous pollutants and dusts are major result of various processes like material treatment, operation of hot mix plant, stone crushing, and asphalt preparation. This emission effect is only for short term till the construction work is over but the effect may be significant from the point of view that the workers are directly exposed to these emissions. Apart from this, safety risks to construction workers, primarily in the areas of storage and handling of dangerous materials, and in operation of heavy machinery close to traffic, slopes, power line and water courses, are also involved during the construction works.

The dust and gaseous pollutant generation within the congested area during the construction works will adversely affect the health of people residing in the close proximity of the expressway. Excavation of borrow pits on both the sides of Expressway within and outside the existing ROW can create unhealthy aesthetics and also enhance the risk of malaria. These areas provide ideal breeding zones for flies and insects. Stagnancy of water in borrow pits located nearby settlements during rains may enhance the possibility of spreading of diseases. The vehicles and equipment operation increase the chances of collision with vehicles, pedestrians and livestock. The poor sanitation and poorly manages dispose off the waste may cause increase in communicable diseases.

Mitigation Measures:

- The plants and equipments will be installed sufficiently away from the settlement.
- All the construction equipments and vehicles will conform with the emission standards stipulated by the CPCB.
- Safe working techniques will be followed up and all the workers will be trained
- All the workers will be provided with proper personal safety equipments at construction as well as plant site
- Proper caution signage, barricading, delineators etc. will be installed at Construction zone and temporary diversions
- Proper traffic management will be ensured at the Construction zone as per IRC.
- An Emergency Response system in case of any incidence will be developed and implemented
- Periodical health check facility will be provided at camp sites.

4.2.9 Other Environmental Concerns of Construction Phase:

Various other environmental impacts during construction stage include:

4.2.9.1 Diversion of Traffic

Short term impact associated with the project will be traffic diversion and management during construction phase. Construction activities will cause hindrance to some extent to the existing traffic flow. There is possibility of accident hazards during construction phase of the proposed expressway project. So there will be requirement for diversion of existing traffic at some of the construction sites during construction phase. It needs to be mentioned that though there are no direct impacts on the natural environment due to disruption/diversion of such services, but diversion can also lead to adverse impacts if not planned properly. Rapid restoration of diverted services can help in minimizing the severity of impacts arising out due to diversions of existing services.

Mitigation Measures:

- Proper preventive measures will be taken during the construction activities at the construction sites
- Reduce speed through construction zones.
- Construction of bridges/culverts will be carried out prior to construction of new carriageway at the first stage.

- Proper warning signs will be displayed at construction sites.

4.2.9.2 Equipment Servicing and Fuelling

On large Expressway projects, thousands of liters of diesel and many other petroleum products are transported and used throughout the work site every day. Construction equipment generates large amount of waste oil, and its proper handling is critical, since improper storage and leakage can result in the contamination of land and water bodies. Even the spillage can affect surface water bodies by the road sector project.

Mitigation Measures:

- The vehicle and equipment service centers will be established away from any water body or agricultural land.
- Proper binding with appropriate Containment will be provided at the equipment and vehicle servicing centers. The spent wash from the service center will be put in separate soak pits and sand pits
- All the fuel and chemical storage will be sited on an impervious base within an embankment and secured by fencing. The storage area will be located away from water course or wetland.

4.2.9.3 Construction Camps

Workers' Camp

Construction workers are a much neglected group in the country. Unless the workers are provided proper amenities to live at the construction site the environmental issues of road construction cannot be properly met. Apart from labour camps, separate construction Camps will also be established where various plants and equipments as well as offices and residential units for technical and non-technical staff are located and often labour camps are also provided in the same premises. Location of the Construction camp also has certain impacts on surrounding environment if not properly managed.

At labour and construction camps lot of wastes are generated. These wastes are refuge from the plants, and equipments, waste water and other domestic waste. These wastes are solid as well as liquid waste mainly refuse water and kitchen waste. The disposal of such waste material to the surrounding land can potentially damage the land and would generate health risk to not only surrounding area but within the premises itself. Improper drainages system within the premises also creates insanitation condition thereby enhancing health risk.

Mitigation Measures:

- The Construction/labour camps will be established only on area approved by NHAI.
- The worker's/labour camp will be located away from water bodies, schools and residential areas. The camp will be constructed with proper accommodation facilities.
- The workers camp will be provided with drinking water supply system so that local water sources are not disturbed.
- The camp should be provided with fuel for cooking like kerosene and /or LPG to avoid any cutting of trees for fuel wood.

- All camps will be provided with proper sanitation facilities, separate toilets and bathrooms for female and male workers, septic tanks with soak pits of sufficient size, dust bins etc.
- Waste water from domestic uses and solid wastes will be disposed of without violating environmental norms. The measures will be site specific.
- The labour camps will be provided with crèche, first aid facilities, etc as required under Factory Act.
- After completion of construction, the contractor will dismantle the camp and restore it to the original condition of the area before handing over the site to the land owner.

4.2.9.4 Disruption of Services

Local services, including water supply lines, irrigation line, drainage, ditches, streets are commonly cut during road earthworks. These activities are required by the local people for crop production, drinking water supply and access, and have the potential to damage road work too. These services are often either inadequately reconnected or not reins led at all.

Mitigation Measures:

- The Contractor will arrange their own source to cater for their water requirement for construction and other activities and will not interfere with the local water supply system
- All irrigation canals, water supply lines and stand pipes, drainage and streets will be maintained during construction or if necessary, temporary services shall be arranged of the owner/ user's permission for temporary cessation will be gained.
- All the Services will be progressively reinstalled as soon as road excavation has been completed.

4.3 Impacts During Operational Phase

During operation stage, the main sources of environmental impacts are the increased traffic volume and speeds. The increase in traffic volume and speed may enhance the safety risk. A sudden change in the traffic volume is expected due to this proposed expressway as it opened to Public Traffic as there was no road earlier. The project also provides the opportunities of the restoration of vegetation around the vicinity of the worksite and by expressway by implementing the compensatory plantation programme, which will not only enhance the aesthetic view but can also help in reclamation of soil. During operational phase this will be enhanced with the activities associated with the maintenance of landscape such as plantation programme, by providing roadside amenities, parks etc.

During the operational phase when the plantation works will be adequately implemented which will enhance the aesthetic as well as hygienic environment thereby reducing the chances of diseases due to vehicular emission. Access controlled Expressway will ensure smooth plying of the vehicles. Various impacts during operation phase are discussed below:

4.3.1 Impacts on Water Quality and Resources

During the operation phase, the possibility of degradation of water quality is very remote. The impact on the surface water quality during operation can be expected due to accidental spillage. However the probability of such accidents is minimal since utmost care has been taken for the

enhancement of road safety measures and other safety related facilities are taken care of in the design stage.

4.3.2 Impact on Air Quality

The baseline data shows that all pollutants are well within permissible limit at all monitoring locations. The impact on air quality due to the project operation has been assessed through prediction modeling CALINE 4.

The California Line Source Dispersion Model, CALINE4 (1989), uses traffic emissions, site geometry and meteorology to predict air pollutant concentrations within 500 meters of the roadways. Predictions can be made for carbon monoxide, nitrogen dioxide and suspended particles. Options for modeling near intersections, parking lots, elevated or depressed freeways, and within canyons are given. CALINE4 is based on Gaussian diffusion equation and employs mixing zone concept to characterize pollutant dispersion over the roadway. CALINE4 divides an individual link into series of elements from which incremental concentrations are computed and summed. Each element is modeled as an "equivalent" finite line source (FLS) positioned normal to the wind direction and centered at the element midpoint. Element size increases with distance from the receptor to improve computational efficiency. Incremental downwind concentrations are computed using the crosswind Gaussian formulation for a line source of finite length:

$$C = \frac{Q}{\pi \sigma_z u} \cdot \int_{y1-y}^{y2-y} exp\left[-\frac{1}{2}\left(\frac{y}{\sigma_y}\right)^2\right] dy.$$

Where q is the linear source strength, u is the wind speed, σ_y and σ_z, is the horizontal and vertical Gaussian dispersion parameters, and y_1 and y_2 are the FLS endpoint y-coordinates. CALINE 4 treats the region directly over the highway as a zone of uniform emissions and turbulence called mixing zone. This "mixing zone" is defined as the region over the traveled way plus 3m (approximately two vehicle widths) on either side. The additional width accounts for the initial horizontal dispersion imparted to pollutants by the vehicle wake. Within the mixing zone, the mechanical turbulence created by moving vehicles and the thermal turbulence created by hot vehicle exhaust are treated as significant dispersive mechanisms.

CALINE-4 model can be run for Standard and Worst case conditions to predict the increment in pollutants concentration due to the proposed activity.

- **Standard Run** – The model calculates average CO concentrations at the receptors. The user must input a prevailing wind direction in meteorology data.
- **Worst-Case Run** – Calculates average CO concentrations at the receptors. The model selects the wind angles that produce the highest CO concentrations at each of the receptors.

Traffic Data

The CALINE4 model uses the existing and projected traffic volumes to predict the pollutant concentration. Traffic data is also used to calculate emission factors for all class of vehicles. The proposed Bangalore-Chennai Expressway Phase-I, comprising of 4 homogeneous sections, starts at km 0+000 and ends at km 71+000. Traffic forecast for each homogeneous section was made for design period (2021-2051).

For 1-hour worst case prediction modeling, peak hour traffic volumes were estimated using annual average daily traffic (AADT) estimated for design period of 2021-2051 and peak hour factors (PHF). The traffic study for the project reported total 5 vehicle classes including car, bus, LCV, trucks and MAV. These vehicle classes were reclassified into 3 broad categories wiz. Cars, LCVs and HCVs, as per the scheme given in Table 1. The peak hour factors used for traffic estimation and homogenous section wise reclassified hourly traffic volumes used for modeling are given in **Table 4.7**.

Table 4-7: Classification of Traffic

New Category / Class of Vehicle	**Old Category of Vehicles**		
Cars	All Cars		
LCVs	All LCVs		
HCVs	All Buses, Trucks and MAVs		
Peak Hour Factor	**Cars**	**LCVs**	**HCVs**
	7%	6%	6%
Estimated Peak Hour Traffic			
Homogeneous Sections	**Cars**	**LCVs**	**HCVs**
	2021		
Section-1	1205	236	327
Section-2	1205	236	327
Section-3	1254	235	352
Section-4	1255	237	365
	2031		
Section-1	1922	393	541
Section-2	1922	393	540
Section-3	1990	396	563
Section-4	1990	397	567
	2041		
Section-1	3472	740	1033
Section-2	3473	740	1032
Section-3	3827	826	1126
Section-4	3827	825	1127
	2051		
Section-1	7065	1663	2292
Section-2	7068	1664	2293
Section-3	7327	1766	2359
Section-4	7644	1845	2459

Road Geometry

The Proposed Right of Way (PROW) of Bangalore-Chennai Expressway will be 90m. The project shall be developed into 8-lane expressway. A representative link near each ambient air baseline monitoring station was selected for air quality modeling.

Surface Roughness Length

Surface roughness length equal to 10 cm (rural setting) is used for modeling.

Weighted Emission Factor

In the present study, the emission factors specified by the Central Pollution Control Board (CPCB Report, 2015) have been used for calculation of weighted emission factors. The CPCB emission factors for different pollutants are presented in **Table 4.8**.

Table 4-8: CPCB Emission Factor of CO, PM_{10} and NO_2 for different Category of Vehicles

Year	Passenger Cars		LCVs	HCVs
	Petrol	Diesel		
A. Emission Factor (gm/km) of CO				
BS-I	3.01	0.72	3.66	6
BS-II	3.01	0.3	3.66	6
BS-III	1.945	0.06	3.66	6
BS-IV	1.294	0.047	2.65	4.345
B. Emission Factor (gm/km) of PM10				
BS-I	0.006	0.19	0.475	1.24
BS-II	0.006	0.06	0.475	1.24
BS-III	0.002	0.015	0.475	0.42
BS-IV	0.002	0.008	0.081	0.071
C. Emission Factor (gm/km) of NO_2				
BS-I	0.21	0.84	2.12	9.3
BS-II	0.21	0.49	2.12	9.3
BS-III	0.09	0.28	2.12	8.63
BS-IV	0.048	0.14	1.484	6.041

Emission Factor for Particulate Matter <2.5µ (PM2.5)

In the absence of specific Emission Factors for particulate matter with size less than 2.5 microns, the incremental emissions of PM2.5 are estimated at 60% of that of PM10.

Based on the CPCB emission factors, a single Weighted Emission Factor (WEF) equivalent to emission factors for all the vehicle classes is calculated. The WEF expressed in g/mile. The calculated WEFs for projected traffic volumes for different years and project nodes are presented in **Table 4.9**.

Table 4-9: Weighted Emission Factor (WEF)

Nodes	Year	Total Vehicle	CO	PM_{10}	NO_2	Applicable to Monitoring Location
Section-1	2021	1768	3.41	0.14	2.62	Phase-1 AQ1
	2031	2856	3.46	0.14	2.68	
	2041	5245	3.53	0.15	2.77	
	2051	11020	3.65	0.15	2.92	
Section-2	2021	1768	3.41	0.14	2.62	Phase-1 AQ2, AQ3
	2031	2855	3.45	0.14	2.67	
	2041	5245	3.53	0.15	2.77	
	2051	11025	3.65	0.15	2.92	

Nodes	Year	Total Vehicle	CO	PM_{10}	NO_2	Applicable to Monitoring Location
Section-3	2021	1841	3.43	0.14	2.67	-
	2031	2949	3.45	0.14	2.68	
	2041	5779	3.52	0.15	2.75	
	2051	11452	3.65	0.15	2.90	
Section-4	2021	1857	3.47	0.14	2.73	Phase-1 AQ4
	2031	2954	3.46	0.14	2.70	
	2041	5779	3.52	0.15	2.75	
	2051	11948	3.65	0.15	2.90	

Receptors

Receptors were placed at ambient air quality monitoring station as per baseline study. Also, a receptor network was established in grid formation outside PROW for prediction of pollutant level in a wider area.

Meteorological Data

The worst case meteorological conditions used for prediction of incremental concentration of pollutants are presented in **Table 4.10**.

Table 4-10: Meteorological Data

Season	Wind Speed	Wind Angle	Mixing Height	Pasquill Stability Class	Temp.
Winter	1 m/s	Predicted by Model	200 m	E	25°C

4.3.2.1 Prediction of Air Pollution Levels

The pollution predictions are made for peak hour traffic conditions near each ambient air quality monitoring station. Average baseline concentration values recorded during baseline monitoring study have been used for calculation of cumulative concentration values. Prediction modeling has been performed for 2021, 2031, 2041 and 2051.

The following assumptions are made in prediction of pollution levels.

1. No significant change in the vehicle characteristics is anticipated during the design period;
2. There are no major grade differences in the project area and terrain is plain;
3. Contribution to pollution levels from any other future activities have not been considered in the modeling.

Results

The year wise predicted worst-case incremental concentrations and cumulative concentrations of pollutants are presented in the following **Table 4.11**:

Table 4-11: Projected Air Pollutant Concentrations at different locations along project corridor

S. No.	Location Name	Carbon Monooxide (CO) (1-hour mg/m³)			Particulate Matter <10µm (PM10) (24-hours µg/m³)			Particulate Matter <2.5µm (PM2.5) (24-hours µg/m³)			Nitrogen dioxide (NO_2) (24-hours µg/m³)		
		Baseline Conc. (Avg.)	Predicted Incremental Conc.	Predicted Cummulative Conc.	Baseline Conc. (Avg.)	Predicted Incremental Conc.	Predicted Cummulative Conc.	Baseline Conc. (Avg.)	Predicted Incremental Conc.	Predicted Cummulative Conc.	Baseline Conc. (Avg.)	Predicted Incremental Conc.	Predicted Cummulative Conc.
A. Predicted Pollutant Concentrations in 2021													
1	AQ1	0.359	0.35	0.709	75.2	6.38	81.58	39.6	3.83	43.43	22.9	0.02	22.92
2	AQ2	0	0.23	0.23	71.9	5.74	77.64	37.5	3.45	40.95	21.7	0.02	21.72
3	AQ3	0	0.12	0.12	66.2	3.42	69.62	36.8	2.05	38.85	19.9	0.01	19.91
4	AQ4	0	0.12	0.12	68.5	3.36	71.86	37.3	2.02	39.32	22.0	0.04	22.04
B. Predicted Pollutant Concentrations in 2031													
1	AQ1	0.359	0.46	0.819	75.2	9.63	84.83	39.6	5.78	45.38	22.9	0.03	22.93
2	AQ2	0	0.46	0.46	71.9	8.64	80.54	37.5	5.19	42.69	21.7	0.02	21.72
3	AQ3	0	0.23	0.23	66.2	5.16	71.36	36.8	3.1	39.90	19.9	0.01	19.91
4	AQ4	0	0.23	0.23	68.5	5.05	73.55	37.3	3.03	40.33	22.0	0.05	22.05
C. Predicted Pollutant Concentrations in 2031													
1	AQ1	0.359	0.69	1.049	75.2	16.94	92.14	39.6	10.16	49.76	22.9	0.04	22.94
2	AQ2	0	0.69	0.69	71.9	15.14	87.04	37.5	9.08	46.58	21.7	0.03	21.73
3	AQ3	0	0.46	0.46	66.2	9.11	75.31	36.8	5.46	42.26	19.9	0.02	19.92
4	AQ4	0	0.46	0.46	68.5	9.11	77.61	37.3	5.46	42.76	22.0	0.1	22.10
D. Predicted Pollutant Concentrations in 2051													
1	AQ1	0.359	1.15	1.509	75.2	26.97	102.17	39.6	16.18	55.78	22.9	0.05	22.95
2	AQ2	0	1.04	1.04	71.9	23.72	95.62	37.5	14.23	51.73	21.7	0.04	21.74
3	AQ3	0	0.69	0.69	66.2	14.5	80.7	36.8	8.7	45.5	19.9	0.02	19.92
4	AQ4	0	0.69	0.69	68.5	14.21	82.71	37.3	8.53	45.83	22.0	0.14	22.14
NAAQ Standards		**4 mg/m³**			**100 µg/m³**			**60 µg/m³**			**80 µg/m³**		

4.3.2.2 Interpretation of Results

The results are calculated under worst-case conditions of traffic, emission rates, meteorology and baseline monitoring data. The actual incremental concentrations, under actual conditions, shall be lower than the predicted concentrations levels as the proposed alignment is green filed alignment passing through open area.

The worst-case cumulative concentration for CO and NO_2 for all years (up to 2051) at all monitoring locations are within the prescribed NAAQ standards. However, the PM10 concentration is likely to exceed the prescribed standard limit of 100 µg/m3, based on present scenario by 2051 at one location, i.e. at starting point at NH-4. The other parameters are predicted to be within the prescribed limit.

Contribution of other future activities to pollution levels have not been considered in the modeling. However, with newer technologies, better engines, better fuel availability and by imposing stringent emission norms, the lower incremental concentration levels may be achieved.

4.3.2.3 Recommendations

It is further recommended that –

1. No new settlement of people, sensitive receptors or recreational areas should be established / planned in close proximity of project alignment. Land use planning shall be carried out such that all new settlements are at least 500m distance from project alignment. The alignment should be finalised keeping at a distance of at least 500 m from settlement.

2. Special pollution protection mask shall be provided to workers working close to the project corridor during operation phase. Necessary arrangements for medical attention should be in place for emergencies.

3. Dense plantation along the corridor will act as filter for the pollutants.

4. Vehicle speed limits shall be enforced strictly.

5. Stringent vehicular emission norms shall be applied on all categories of vehicles, especially heavy vehicles to contain emission from vehicle exhausts.

6. Regular maintenance of vehicle shall be carried and periodically checked for violation emission norms.

4.3.3 Impact on Noise Quality

To understand the impact on noise environment due to the proposed project at different locations along the project alignment, future prediction has been made with the application of mathematical modeling.

4.3.3.1 Prediction of Traffic Noise levels:

For future predicting the noise levels The Federal Highway Administration Traffic Noise Model (FHWA TNM) has been used.

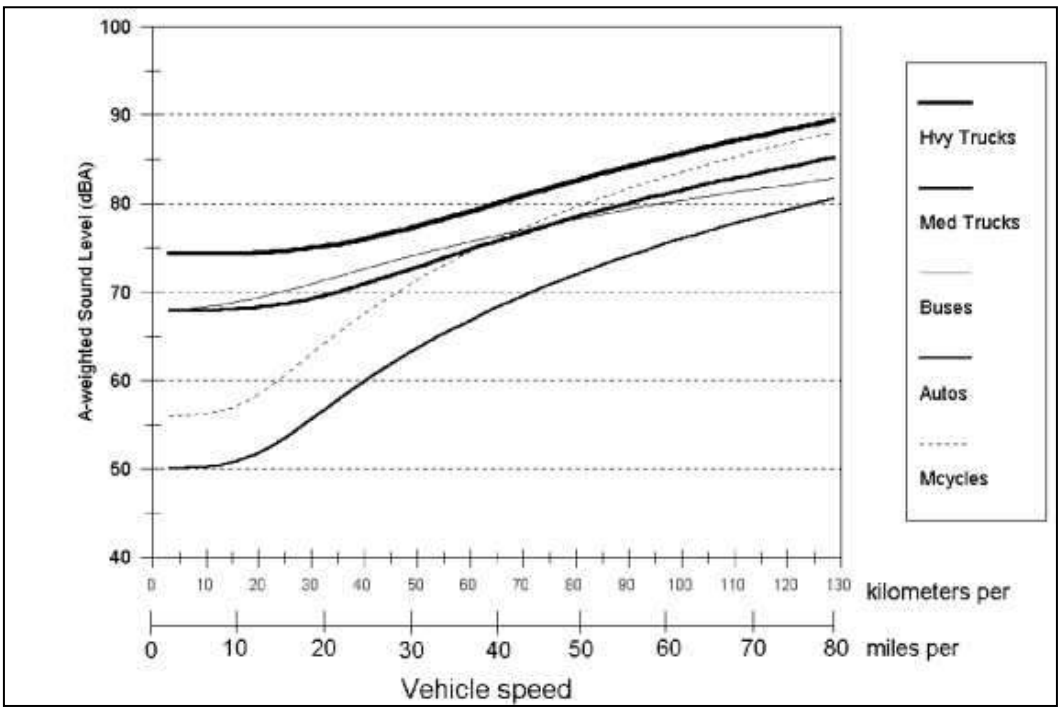
The Federal Highway Administration Traffic Noise Model (FHWA TNM) computes a predicted noise level through a series of adjustments to a reference sound level. In the TNM, the reference level is the Vehicle Noise Emission Level, which refers to the maximum sound level emitted by a vehicle passing by at a reference distance of 15 meters (50 feet). Adjustments are then made to the emission level to account for traffic flow, distance, and shielding. The vehicular noise emission levels vary significantly with vehicle speed. The A-weighted noise emission levels as a function of speed for autos (cars), medium trucks (LCV), heavy trucks (HCV) and buses under cruise conditions and traveling over average pavement.

The vehicular noise emission levels vary significantly with vehicle speed. **Figure 4.1** shows the A-weighted noise emission levels as a function of speed for autos (cars), medium trucks (LCV), heavy trucks (HCV) and buses under cruise conditions and traveling over average pavement.

For prediction of noise levels due to traffic on proposed project, the vehicular speeds used for different class of vehicles are given in **Table 4.12** and are taken in accordance to the design speed.

Table 4-12: Vehicular speed and noise emission levels used for modelling

Vehicle Type	Cars	LCVs	HCVs	Buses
Vehicular Speed	100 km/hr	80 km/hr	80 km/hr	80 km/hr



(Source – FHWA Traffic Noise Model ®, Version 1.0 Technical Manual)

Figure 4-1: A-Weighted Vehicle Noise Emission Levels

4.4 Traffic Data

Peak (highest) hour traffic and non-peak (lowest) hour traffic volume for both day time and night time (day and night time are as per Ambient Noise Quality Standards) were estimated based on

AADT. The peak hour and non-peak hour factors used for day and night times are presented in **Table 4.13**.

Table 4-13: Peak Hour and Non-Peak Hour Traffic Factors (%)

Duration	Peak				Non-Peak			
	Cars	LCVs	HCVs	Buses	Cars	LCVs	HCVs	Buses
Day	7%	5%	5%	7%	2%	3%	3%	2%
Night	3%	5%	5%	3%	1%	2%	2%	1%

The one side (up or down) peak/non-peak hour day and night time traffic at project nodes are presented in **Table 4.14** and **Table 4.15**

Table 4-14: Day Time Projected Traffic Data during Peak and Non-Peak hours

Project Nodes	Day Peak				Day Non-Peak			
	Cars	LCVs	HCVs	Buses	Cars	LCVs	HCVs	Buses
	2021							
Section-1	603	98	34	144	172	59	20	41
Section-2	602	98	34	144	172	59	20	41
Section-3	627	98	39	151	179	59	23	43
Section-4	627	99	39	158	179	59	23	45
	2031							
Section-1	961	164	57	235	275	98	34	67
Section-2	961	164	57	235	275	98	34	67
Section-3	995	165	60	244	284	99	36	70
Section-4	995	165	60	247	284	99	36	70
	2041							
Section-1	1736	309	116	440	496	185	70	126
Section-2	1736	308	116	440	496	185	69	126
Section-3	1914	344	120	490	547	206	72	140
Section-4	1913	344	120	490	547	206	72	140
	2051							
Section-1	3532	693	277	950	1009	416	166	271
Section-2	3534	694	277	950	1010	416	166	271
Section-3	3663	736	272	995	1047	442	163	284
Section-4	3822	769	284	1037	1092	461	170	296

Table 4-15: Night Time Projected Traffic Data during Peak and Non-Peak hours

Project Nodes	Night Peak				Night Non-Peak			
	Cars	LCVs	HCVs	Buses	Cars	LCVs	HCVs	Buses
	2021							
Section-1	258	98	34	62	86	39	13	21
Section-2	258	98	34	62	86	39	13	21
Section-3	269	98	39	65	90	39	16	22
Section-4	269	99	39	68	90	39	16	23
	2031							
Section-1	412	164	57	101	137	66	23	34
Section-2	412	164	57	101	137	65	23	34
Section-3	426	165	60	105	142	66	24	35

Project Nodes	Night Peak				Night Non-Peak			
	Cars	LCVs	HCVs	Buses	Cars	LCVs	HCVs	Buses
Section-4	426	165	60	106	142	66	24	35
	2041							
Section-1	744	309	116	189	248	123	46	63
Section-2	744	308	116	189	248	123	46	63
Section-3	820	344	120	210	273	138	48	70
Section-4	820	344	120	210	273	138	48	70
	2051							
Section-1	1514	693	277	407	505	277	111	136
Section-2	1515	694	277	407	505	277	111	136
Section-3	1570	736	272	427	523	294	109	142
Section-4	1638	769	284	444	546	307	113	148

Road Geometry

The Right of Way (RoW) of proposed project is 90m. The project shall be developed into 8-lane expressway. For prediction of noise levels, a representative straight section of one-kilometer length having RoW width of 90m, 4+4 lane carriageway (15 m width both sides) was taken in FHWA-TNM.

Receptors

The FHWA-TNM predicts A-weighted hourly equivalent noise levels (Leq1h) at receptor points along the road. The distance of receptor point (representing ambient noise monitoring station) from expressway is taken at 45m from centerline i.e. on the edge of RoW.

Assumptions used for Modeling

- Noise modelling has been done in worst case scenario i.e. with zero shielding from any other obstacle / trees / barrier / walls etc.
- No significant change in the vehicle characteristics is considered during the design period;
- The representative section is considered as straight with zero gradient;
- The traffic along the road sections is assumed to flow simultaneously in both the carriageways in opposite directions;
- Both carriageways are assumed to carry equal traffic;
- There is no major grade difference in the project area. All the receptors are located at same ground level as the road section;
- Noise from other new sources apart from traffic on proposed highway is not accounted for in the model; and
- The default ground type is considered as hard soil.

4.4.1 Predicted Noise Levels

The predicted hourly equivalent noise levels are logarithmically combined to calculate L_{DAY} and L_{NIGHT} noise. The results noise modeling superimposed on baseline noise levels at ambient noise monitoring locations for day and night times are presented in **Table 4.16** and **Table 4.17** below.

Table 4-16: L_{DAY} Results of Noise Modelling

S. No.	Location Code	Km	Land Use	Noise Standard	Baseline	2021			2031			2041			2051		
						Predicted Value	Resultant Value	Increas over Baseline Level	Predicted Value	Resultant Value	Increas over Baseline Level	Predicted Value	Resultant Value	Increas over Baseline Level	Predicted Value	Resultant Value	Increas over Baseline Level
1	NQ-1	0	Industrial & Mixed	75	63.48	69.2	70.2	6.72	71.3	72	8.52	74	74.4	10.92	77.3	**77.5**	14.02
2	NQ-2	25.1	Industrial	75	62.84	69.2	70.1	7.26	71.3	71.9	9.06	74	74.3	11.46	77.3	**77.5**	14.66
3	NQ-3	50.2	Residential	55	61.45	69.2	**69.9**	8.45	71.3	**71.7**	10.25	74	**74.2**	12.75	77.3	**77.4**	15.95
4	NQ-4	71	Residential	55	61.46	69.4	**70**	8.54	71.4	**71.8**	10.34	74.4	**74.6**	13.14	77.7	**77.8**	16.34

Table 4-17: L_{NIGHT} Results of Noise Modelling

S. No.	Location Code	Km	Land Use	Noise Standard	Baseline	2021			2031			2041			2051		
						Predicted Value	Resultant Value	Increas over Baseline Level	Predicted Value	Resultant Value	Increas over Baseline Level	Predicted Value	Resultant Value	Increas over Baseline Level	Predicted Value	Resultant Value	Increas over Baseline Level
PHASE-I																	
1	NQ-1	0	Industrial	70	47.91	66.5	66.6	18.69	68.7	68.7	20.79	71.4	**71.4**	23.49	74.9	**74.9**	26.99
2	NQ-2	25.1	Industrial	70	44.18	66.5	66.5	22.32	68.7	68.7	24.52	71.4	**71.4**	27.22	74.9	**74.9**	30.72
3	NQ-3	50.2	Residential	45	45.81	66.5	**66.5**	20.69	68.7	**68.7**	22.89	71.4	**71.4**	25.59	74.9	**74.9**	29.09
4	NQ-4	71	Residential	45	47.79	66.8	**66.9**	19.11	68.8	**68.8**	21.01	71.8	**71.8**	24.01	75.2	**75.2**	27.41

4.4.2 Interpretation of Results

- Noise modeling has been performed in worst case scenario i.e. with zero shielding from any other obstacle / trees / barrier / walls etc. Hence, under actual site conditions, the actual noise level increase from proposed project shall be lower than the model predicted values.
- The magnitude of increase in noise levels over baseline levels is greater in night time than in day time. The magnitude of increase is higher as this is a Greenfield project.
- The predicted maximum resultant noise levels are 70.2 db(A) L_{day} and 66.9 db(A) L_{night} levels in year 2021 at the edge of RoW; whereas, the maximum L_{day} and L_{night} levels predicted in year 2051 are 77.8 db(A) L_{day} and 75.2 db(A) L_{night}, respectively. The noise level increase in over 30 years' design period is not significant in comparison to more than 500% increase in traffic volume.
- In industrial stretches (NQ-1, NQ-2), the L_{DAY} and L_{NIGHT} levels even up to year 2041 (day time) and 2031 (night time) shall remain compliant to the ambient noise quality levels. However, wherever the road corridor is passing through settlement areas (NQ-3, NQ-4), the noise level will exceed the noise standards from 2021 at commencement of usage of proposed road. Hence, mitigation measures should be carefully designed for both day and night time exposure.

Mitigation Measures:

Provision of Noise Barrier:

Although all the settlement area has been avoided by adjusting the project alignment away from settlement area, few of the village settlements are located within 500 m from the edge of the proposed ROW. The list of villages located within 500 m of the proposed alignment is presented in ANNEXURE-4.2. Keeping in view the predicted high noise levels along the project alignment, noise barriers will be proposed to be provided along the expressway in order to minimize the impacts on high noise levels due to the traffic movement on the Expressway**.** It has been proposed to provide noise barriers along the village settlements located within 500 m from the proposed expressway. The list of such settlement areas and proposed length of noise barriers is given in the following **Table 4.18**:

Table 4-18: List of Proposed Noise Barriers

S. No.	Name of the Settlement	Chainage (Km)	Distance from ROW Edge (m)	Side	Length (m)
1	Kolathur	1+000	107	L.H.S	350
2	Karibeerana hosahalli	8+700	173	R.H.S	350
3	Thaggali hosahalli	10+900	206	L.H.S	450
4	Bellavi	14+800	87	R.H.S	200
5	Abbenahalli	17+700	167	L.H.S	300
6	Kanivana halli	19+800	197	R.H.S	350
7	Vardenahalli	21+100	25	R.H.S	200
8	Dodda Shivara	22+200	136	R.H.S	300
9	Nambigana halli	25+100	95	L.H.S	350

S. No.	Name of the Settlement	Chainage (Km)	Distance from ROW Edge (m)	Side	Length (m)
10	Hijuvanahalli	27+700	126	L.H.S	160
11	Anepura	28+400	86	L.H.S	290
12	Mugalabele	36+800	90	L.H.S	450
		37+200	333	L.H.S	
13	Siddanahalli	39+800	194	L.H.S	350
14	Karabele	43+700	103	L.H.S.	360
15	Doddurkarpanhalli	50+200	43	R.H.S	350
16	Ghattakamadenahalli	55+300	308	R.H.S	350
17	Bethamangala	60+500	206	L.H.S	800
18	Doddakari	62+000	35	L.H.S	200
19	Koolur	65+500	40	R.H.S	150
20	Gopenahalli	69+500	120	R.H.S	250
21	N.G Hulkur	71+000	150-380	R.H.S & L.H.S	360 L.H.S 350 R.H.S.
	Total length of Proposed Noise Barrier				**7270**

4.4.3 Human Use Values

Both land use and aesthetics are in fact, likely to improve due to afforestation and proper landscaping. Proper engineering design like raising of embankment, provision of sufficient number of culverts will ensure the reduction of the chances frequent road damages due to water logging and runoff water during rains and landslide. The provision of parking space, way side amenities, rest area, toilets and drinking water will also help in smooth and comfortable flow of traffic and better acceptability of the project by the community.

4.4.4 Road Safety

The Expressway project is new 8-laned Expressway with speed design up to 120 Km/hr. The road safety aspect has to be addressed adequately. As the road is fully access controlled, there is no access throughout the project length so there will not be any exposing of the road to accident hazards due to intermingling and obstruction to the Expressway traffic and also proper segregation of the traffic with the provision of VUP, PUP, and CUP in those crossing areas. However careful thoughts have been given for pedestrians, cattle, vehicles, at cross roads with the Expressway. With the provision of systematic pedestrian and cattle crossings, traffic lighting system, bus shelters, wayside amenities which have been integrated with the project, the safety of road users as well as local public will definitely be enhanced to a great extent. The general objectives are for the concessionaire to make the BC Expressway as safe as possible for all users. The concessionaire shall follow all relevant Indian publications on road safety, especially The Manual for Safety in Road Design (A guide for Highway Engineers) prepared in September 1998 for MORTH.

A formalized safety audit procedure must be followed by the concessionaire during the detailed design and during the Construction and post construction periods.

From the above discussions it can be clear that the project does not conflict with any significant issues except for acquisition of land and properties, partial acquisition of water Tanks and tree cutting within Row. These issues can be successfully resolved/mitigate through proper planning and management. The adverse impacts envisaged due to the project during construction stage are mostly increase in air pollution levels, dust generations, noise pollution and to some extent interference with traffic movement due to diversions but are localised of short duration during the construction period and are manageable with proper Mitigation Plan. The project, on the other hand, shall yield positive impacts by virtue of better accessibility, better safety for road users and local population, more economic opportunity, better health and education facility, etc.

4.5 Cumulative Impact due to BCE and other Anticipated Developments

Cumulative impacts are contextual and encompass a broad spectrum of impacts at different spatial and temporal scales. In this case, cumulative impacts is assessed based on a series of projects which are existing, planned, anticipated development in the region. The identification of environmental components is on the basis of scientific concern and concern of affected communities. Zones for which cumulative assessment is carried out are identified based on hotspot on the basis of outputs of desktop study, baseline study and stakeholder consultation. Final hotspot for which CIA study has been carried out is given in section below.

4.5.1 Finalization of Hotspots for Cumulative Impact Assessment

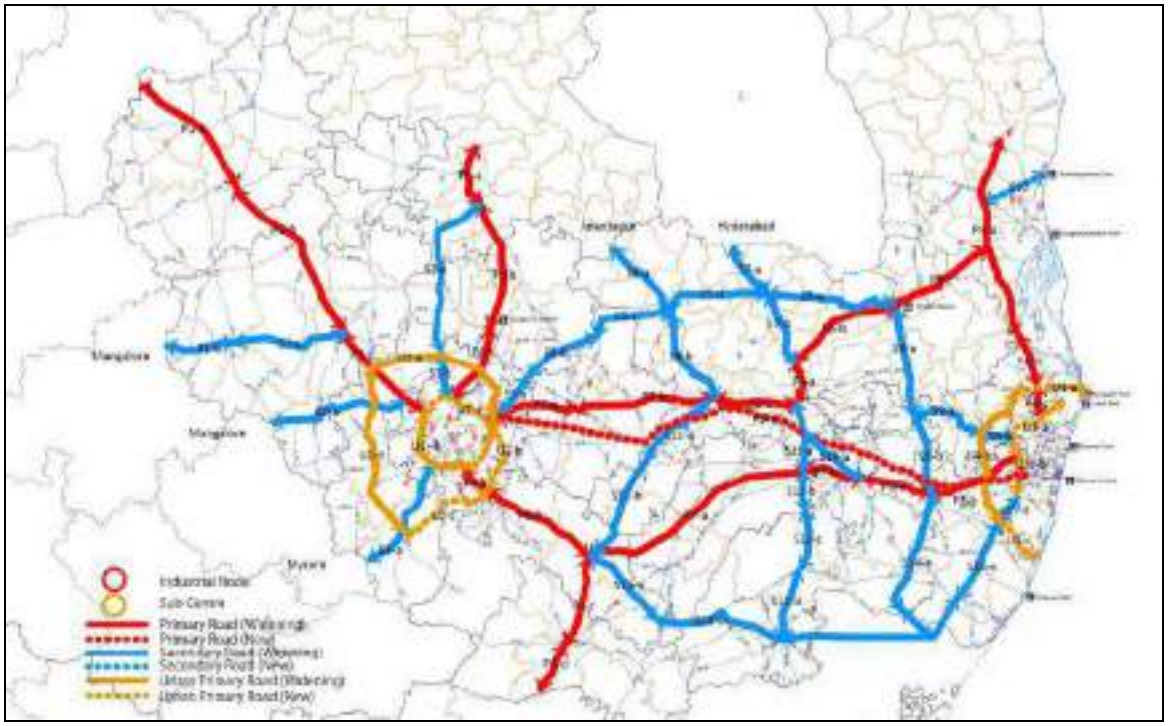
Hotspot identification is based on literature review, stakeholder consultation and baseline study independently. It has been found that the identified hotspot is first among the others planned development in this rural region. The project will not only help in inducing the improved condition the quality of life but also help in enriching the environmental condition by effectively following the mitigation and enhancement measure proposed under project. The final hotspot along with the reasons for selection of these zones is given in **Table 4.19** The hotspot is also marked on the maps and are given in **Figure 4.1.** Details of existing developments and condition of VECs in these zones and the proposed/planned & anticipated developments which can further affect the conditions of VECs are briefed in **Table 4.19**

Table 4-19: Finalized Hotspots Selected for CIA Study

BCE (Hot Spot) will improve the connectivity between Bangalore-Chennai and will act as a key link between major commercial, industrial and corporate centers of Karnataka, AP and TN and rest of the South through connectivity.

Table 4-20: Zones within Study Area Having Potential to be impacted

Hotspots	Major Existing Development with in the Study Area	Baseline Information	Identified Affected VECs as per Baseline Data	Proposed Planned Development		Induced/Anticipated Development
				BCE Induced Developments	Independently Planned Development	
Bangalore Chennai Expressway	National Highway-4 connecting Bangalore and Chennai And other rural developments	**Air:** PM10 and PM2.5 concentrations are will within Permissible limit due to low industrialization **Water:** Palar River Crosses the project/ GW & SW quality are in permissible limit **Ecology:** Ecological resources are among the most important resources which are likely to be impacted by the proposed BCE project. Around 20748 Trees likely to cut. **Population:** Population and the Density both are high in region (B Rural 431 and Kolar 386) **Agriculture:** Agriculture remains the main occupation of the people of all the project districts. But all the agricultural activities depend on the monsoon rain.	Air Quality Water Quality Water Resources Noise levels Bio-diversity Soil Quality Existing Resources Health	• Development of BCE • Logistic Parks • Thermal Power Plants • Economic Zones • Narsapur Industrial Area in Kolar District is getting connected to the Bangalore Chennai Expressway at Km 24.125	• Chennai-Bangalore Industrial Corridor (CBIC)- one of the largest Infrastructure Projects of Government of India • Container Terminal -2 project at the Ennore Port • National Investment and Manufacturing Zones (NIMZ) in Chittoor and Mulbagal • Improvement of a linkage between Chennai and Bengaluru by highway or high speed railway could be considered as one of the priority projects.	• IT/ITES parks • Townships • Commercial areas • Logistic parks • SEZ • Roads & highways (new & expansion)



Source: Regional Comprehensive Plan, JICA Study

Figure 4-2: Map Showing Road Project & Logistic Corridors in B-C Region

From the **Table 4.20** above it can be said that already majorly impacted VECs includes air quality, water resources, water quality, existing resources, bio-diversity, soil quality, land resources. So it is anticipated, the above identified proposed/planned/anticipated development may further impact these identified VECs until proper mitigation and enhancement measures by the concerning agencies.

4.5.2 Impact Identification Due to Proposed and Anticipated Developments

From the above table, it is identified that major proposed/planned/anticipated development includes the following:

1. Construction of Bangalore-Chennai Expressway
2. Improvement/Construction of new roads/highways
3. Expansion/construction of new industrial areas
4. New townships
5. New Growth centre/logistic parks/warehouses
6. IT/ITES Parks
7. Loading & unloading yards
8. Expansion/Construction of new TPP
9. Expansion of existing towns (urban sprawling)
10. Urbanization of rural areas

All above developments are further broadly classified into 4 major heads which includes all above developments and they are listed below:

1. Roads Developments
2. Industrial development

3. Infrastructural development
4. Urbanization

CIA study involved quantitative and qualitative assessment of the impacts of these developments independently on the VECs. It has been observed that the anticipated negative impacts on identified VECs are localized, short term and transient in nature particularly in construction phase, which could be mitigated by implementation of environment management plan.

Overall, it is anticipated that positive impacts like development of new infrastructure, creation of new employment opportunities, livelihood improvement leading to improved quality of life, socio-economic parameters, improved access to goods and services to be provided by the project will outweigh the anticipated negative impacts (which can be mitigated) and contribute to realization of project objectives and intended benefits.

4.5.3 Interaction of the VECs and the Proposed Developments

Interactions of VECs are studied for the proposed Bangalore-Chennai Expressway project with the existing development and future anticipated development. Diagram depicting the interaction between the VECs and Development is given in Figure 6.1. From this figure it can be interpreted that each of the development identified within study area have their own zone of impact which overlaps with the impact zone of Bangalore-Chennai Expressway (10 km on either side). Thus the areas where overlapping of impact zones is expected, will experience cumulative impacts. Matrix detailing interactio (in terms of impacts) and cumulative impact of these inter



Figure 4.2: Diagram Depicting Overlapping Impacts Due to Interaction of Various Developments with BCE in Region

Table 4-21: Interaction Matrix of Developments and Identified VECs

Value Environmental Component	Small Scale Impact					Large Scale Impact
	Existing	Development of BCE	Urbanization	Development of Industries	Development of Infra. Development	Cumulative Impacts
Air Quality	AQ is fine and within permissible limit	Due to improved road facility and reduced decongestion. AQ will improve.	Air Quality Will Deteriorate	Air Quality will deteriorate significantly but can be controlled with adequate Air pollution control equipment	Air Quality Will Deteriorate	Air Quality will deteriorate significantly
Water Quality	SW & GW Quality within permissible Limit	Water quality will be deteriorated but no such direct activities after construction	Water Quality Will Deteriorate Water quality But can be controlled with provision of CSTPs, and their regular monitoring	Water quality will be deteriorated but can be controlled by keeping provision of adequate ETPS/STPs/CE TPs	Water quality will be deteriorated	Water Quality will deteriorate
Water Resources	Ground Water Declining Trend	No Impact on Water Resource	More Depletion of Water Resources but can be controlled with water conservation measures	More depletion of ground water resources but can be controlled using techniques with minimum water consumption and least water wastage	More depletion of ground water resources	Water Resources will further be depleted
Noise Level	Noise levels with in permissible limit.	Noise levels shall remain compliant even upto 2041 (day time) and 20131 (Night time) in commercial, residential and industrial areas However, wherever the road corridor is passing through settlement areas (NQ-3, NQ-4), the noise level will exceed the noise standards from 2021 at commencement of usage of proposed road. At many locations, the noise level increase in over 30 years design period is not significant in comparison to more than 500% increase in traffic volume.	Noise Level Will Increase due to urban activities.	Noise level will increase but can be controlled using noise control technologies	Noise level will increase	Noise level will significantly increase
Biodiversity	Large scale deforestation and	Ecological resources are among the most important resources	Will disturb flora & fauna. The Trees will significantly be cut	High Impact on terrestrial flora. Green belt will be	High Impact on terrestrial flora.	Flora & Fauna both terrestrial

Value Environmental Component	Small Scale Impact					Large Scale Impact
	Existing	Development of BCE	Urbanization	Development of Industries	Development of Infra. Development	Cumulative Impacts
	destruction of vegetation for carrying out the proposed project.	which are likely to be impacted by the proposed BCE project. 20748 Trees Likely to cut.	for construction activities.	developed as per mandate of MoEFCC and compensatory afforestation for tree cutting in ratio of 1:2 may balance the negative impact		& aquatic will be significantly impacted
Soil Quality	The soil texture mainly varies from Sandy Silty Loam to Sandy clay loam along the proposed project alignment. Phosphorous quantity in the soil is very low.	Large amount of soil excavation Involved construction of embankment	Soil pollution, soil compaction etc. may increase	Soil pollution may occur, if Appropriate measures for material & waste handling not taken.	Soil pollution may occur	Soil quality, & Fertility further deteriorate
Soil Erosion	Soil erosion noticed along bank of rivers	Excavation of soil from borrow area will lead to significant soil erosion	Soil erosion will increase due to further tree cuttings	Soil quality may be polluted but can be taken care by taking adequate waste	Soil erosion will increase due to further tree cuttings	Increase the Soil Erosion
Land Use	Agriculture & forest land being diverted for non-agriculture / non forest use	Land use diversion for BCE construction. Soil from agricultural land being used for development of borrow areas	Developed as per master plan but may also be developed by diverting the land use	LU may change significantly	LU may change significantly	More change of land use. Diversion of More agricultural and forest land for other uses
Quality of Life	High level of unemployment & high poverty	Increase employment opportunities thus will improve quality of life	Increase employment opportunities thus will improve quality of life	Increase employment opportunities thus will improve quality of life	Will improve quality of life	Significant improvement in quality of life
Pressure on Existing Resources	High population and limited resources & infrastructure	Will reduce pressure on Indian Railway Tracks and other roads but may pressurize the feeder routes and nearby settlements/industrial towns due to induced growth options	Will further increase pressure on all the resources	Significant increase of the existing resources.	Significant increase of the existing resources.	Pressure on existing resources will increase significantly, if new sources not provided to cater pressure from upcoming developments

Value Environmental Component	Small Scale Impact					Large Scale Impact
	Existing	Development of BCE	Urbanization	Development of Industries	Development of Infra. Development	Cumulative Impacts
Infrastructure	Insufficient in Terms of Road, Railways, Electricity etc.	Will Improve Infrastructure Significantly	Will improve infrastructure significantly	Will improve infrastructure significantly	Will improve infrastructure significantly	Will improve infrastructure significantly
Micro Climate	Experience a semi-arid climate, characterized by typical monsoon tropical weather with hot summers and mild winters.	Will reduce GHG emissions ultimately thus positive impacts	Will enhance GHG emission will impact negatively	Will enhance GHG emission will impact negatively	Will enhance GHG emission will impact negatively	GHG emissions will Increasesignificantly if too many polluting industries will come and no proper APC measures are taken
Natural Drainage Pattern	Drainage pattern has been altered due to construction of various structures	Natural drainage pattern will be disturbed as alignment crosses various streams, nallahs & rivers but effect can be minimized by providing cross drainage structures	Increased sealed surfaces and thus Disturbs natural drainage pattern resulting into urban flooding and water lodging during monsoons	Effects the natural drainage pattern but impact is insignificant as storm water drainage system is provided to divert the storm water with each such development	Affects the natural drainage pattern is significant	Natural Pattern will be altered significantly but impact can be minimized by providing adequate cross drainage structures and storm water drains of adequate capacity

Conclusion:

- Bangalore-Chennai Expressway is one among the many other anticipated development plans to improve the condition of this region.
- VECs in surrounding of Bangalore-Chennai Expressway will experience the cumulative impacts by interaction of the surrounded areas i.e. existing, planned, proposed and anticipated development. The VECs of each development activities will interact with each other, resulting into cumulative impact.
- Project will have few anticipated irreversible changes such as Land-use change due to permanent road, cutting of trees, air quality, and noise impacts on identified VECs which are localized, short term and transient in nature. However, the other direct and induced positive impacts like enhanced environment, development of new infrastructure, creation of new employment opportunities, livelihood improvement, and compensatory plantation will outweigh the anticipated negative impacts and contribute to realization of project objectives and intended benefits.
- BCE is proposed with an effective environmental management plan with regularity check to ensure minimum damage to environment and society at all the stages of project. The project will act as a benchmark for other proposed development towards the environmental safeguards.
- It is recommended that the sectoral specific environmental management plan (as provided under BCE) to be developed for the anticipated future development by concerning agencies so that interaction of VECs will further enhance the environment of the region.

5 ANALYSIS OF ALTERNATIVES

5.1 Alignment Option Study

The proposed Phase-I is a new alignment and is a part of Bangalore-Chennai expressway which will connect the Karnataka state capital Bangalore with the Tamil Nadu state capital Chennai. The selection of the final proposed Phase-I expressway alignment was carried out based on the extensive desk study coupled with the site appreciations, investigations and field surveys. The selection of the best possible alignment is very important as it is a green field project with considerable impact on the environment.

Based on site investigations and surveys, the following alternative alignment options were reviewed and the details are given in the **Table 5.1**.

Table 5.1: Proposed Alternate Alignments

Sl. No	Description	Start Point	End Point	Length (km)
1	Alternate 1	Proposed Peripheral Ring Road 900m North-East of Chendnahalli, 1.5 Km North from the existing NH 7	Balamandakottam Village,Chittor District	90.01
2	Alternate 2	Proposed Peripheral Ring Road about 450m North-East of Chansandra, 1 Km South of the Southern Railway Main Line and 7 km South of existing NH 4	Kuppampalya Village, Kolar District	80.86
3	Alternate 3	Proposed Peripheral Ring Road about 1.3 km South-East of NH 4.	Anehalle Village,Kolar District	79.050
4	Alternate 4	NH-207, 4 km South of NH-4, 300m North of Dodda Gatiganabbe Village.	Vengasandra Village,Kolar District	78.00
5	**Alternate 5**	**4 Km North-East of Hoskote on NH-4 and proposed NH-207 joining with NH-4 and Km 301.200 of NH-4**	**Km 71.000 near N.G.Hulkur Village, Kolar District**	**71.00**

5.2 Brief Details of Alternates

Alternate 1

Chendnahalli (near Electronic City South-East of Bangalore) – Tanks – Muttanallur – Madhalli-Kottapalli-Mallasandiram- Tanks-Timmasohorram- Tanks-Tulukanhalli-Agrahar-Reserved Forest-Gittar-Kamsandra R.F.-Kongarhalli- Tanks-Railway Crossings at two locations- Balamandakottam

Alternate 2

Channasandra (near Whitefield, North-East of Bangalore) – Tanks-Tindlu Reserved Forest-Kodaginabele-Reserved Forest-Tanks-Ramanayakkanhalle-Hannenhalli-Karabele Reserved Forest-Tanks-Deverhalli-Sandarapalle- Kuppampalya.

Alternate 3

Proposed Peripheral Ring Road about 1.3 km South-East of NH 4-Nallal-Reserved Forest-Tanks-Bhimapura-Reserved Forest-Tank-Chaudenhalli-Tanks-Nuglapura—Tanks-Yelachipura-Palar River-Tank-Majeri-Tank-Bonahelli-Tanks-Siddaghatta-Anehalle

Alternate 4

North of Dodda Gatiganabbe - South of Hoskote –Arlemakanahalle Reserved Forest (Forest Research Area) – Chimandhalle-Ganakanhalle-Tank-Mallapranara Reserved Forest-Tank Nakkanhalli-Chikka Ankandahalle- Karabarahalli- Tanks- Kuddakally- Tanks- Deverhalli- Tanks- Krishnadurg- Vengasandra

Alternate 5

South of Hoskote on NH-4 - Hulluru amanikere- Tank-Jinnagara – Thaggalihosahalli- Bellavi-Obalapura- Hijuvanahalli- Karabele-Tank- Doddurukarapanahalli- Thammenahalli- Parisepalli-Bethamangala- Doddakari- Vadrahalli- Vengasandra- N.G.hulkur

The studied alignment options are shown in **Annexure-5.1** and **Annexure-5.2**

5.3 Evaluation of Alternative Alignments

Evaluation of the above Alternative alignments revealed that a completely new Phase-I of the fully access controlled expressway is possible with the least environmental impacts.

The various Phase-I alternative alignments have extensive Reserved Forests, hilly terrain, numerous tanks, village habitations. Due to design requirements, terrain and other site constraints the alignments pass through some of the unavoidable built-up areas and tanks.

Alternate-1 -This alternative alignment is the longest one measuring length as 90.01 Km. It is passing through two states namely Karnataka and Andhra Pradesh. It passes through Reserved Forests, Tanks and railway crossings. This alignment is ending near UNESCO world heritage site near Balamandakottam.

Alternate-2- The length of the Alternate-2 option is 80.86 Km. This alignment is passing through the Reserved Forests, Tanks and the village habitations. There are some problems of the geometric design of this alignment.

Alternate-3-The length of this option is 79.050 Km. This alignment option is passing through the reserved Forest areas, Tanks and village habitations. It is also cutting across the Palar River to a larger extent. It crosses the railway crossings at three places across its length.

Alternate-4-The length of this option is 78.000 Km. This alignment is passing through the centre of the Arlemakanahalle Reserved Forest (Forest Research Area).It also passes through some more Reserved Forest areas, tanks, Village habitations. It impacts plantations to a greater extent. It crosses the major Railway lines. This option also has some sections in high cuts.

Alternate-5-The length of this alternative is 71.000 Km. It passes through the tanks and at some locations through the vegetation. This alignment is not passing through any of the Reserved Forest area or environmentally sensitive areas or any of the protected area. It passes near to some of the habitations but without impacting the village habitations considerably. It is the one of

the shortest of the studied alternatives and the most feasible alternative with least environmental impact.

Out of the various alternatives suggested above, Alternative-5, has been selected as it was shortest length with least impact on the environment. It was further decided to carry out detailed site investigations along this proposed alignment.

Alternate-5 alignment does not pass through any reserved forest areas or any environmental sensitive places. The length of Phase-I alignment is 71.0 Km in length and is the shortest one. It is passing through Bangalore Rural and Kolar districts in the state of Karnataka. The various alternative alignments are shown in **Annexure-5.1**.

5.4 Administrative Jurisdiction of Final Phase-I Alignment

The Final Phase-I alignment out of the various studied alignments, passes through the state of Karnataka and traverse through two districts as indicated in **Table 5.2**

Table 5.2: List of Administrative Districts along BCE

Sl. No.	District	State
1	Bangalore (Rural)	Karnataka
2	Kolar	

5.5 Description of the Selected Phase-I Alignment

The Final Phase-I alignment for Bangalore-Chennai Expressway (BCE) takes off from NH-4 at 4 Km North-East of Hoskote town and passes through the Bangalore Rural and Kolar districts of Karnataka and ends near N.G.Hulkur. One spur alignment has also been proposed to provide connectivity to the Kolar Gold Fields with BCE. The spur alignment starts at Ch.52.085 of proposed Bangalore-Chennai Expressway and traverses towards the Kolar Gold Field and ends on existing SH-95 connecting Kolar Gold Field and Betamangala Town. The length of the Phase-I alignment is given in **Table 5.3** and **Table 5.4**.

Table 5.3: Length of Phase-I Alignment (District-wise)

Sl. No	District	Chainage (Km)		Length (km)
		From	To	
KARNATAKA				
1	Bangalore Rural	Km 0.000	Km 11.682	11.682
2	Kolar	Km 11.682	Km 71.000	59.318
Total				**71.000**

Table 5.4: Length of Spur Alignment

Sl. No	Description	From	To	Length (km)	State
1	Spur Alignment - 1	Km 52.085 of BCE	Kolar Gold Fields	2.05	Karnataka
Total				**2.05**	

6 ENVIRONMENTAL MONITORING PROGRAMME

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

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

6.1 Performance Indicators (PIS)

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

- Soil contamination & Erosion indices
- Air quality
- Water quality
- Noise levels around sensitive locations.
- Replantation success / survival rate
- Restoration of borrow pits
- Sedimentation rate in the downstream where ponds/tanks & Reservoirs are located in close vicinity

6.2 Selection of Indicators for Monitoring

The environmental parameters that may be qualitatively and quantitatively measured and compared over a period of time, due to their importance and the availability of standardized procedures and expertise, have been selected as Performance Indicators (PIs).

- Ambient Air Quality
- Noise levels
- Water Quality
- Soil Quality
- Flora

6.3 Monitoring of Performance Indicators

6.3.1 Ambient Air Quality (AAQ) Monitoring

Ambient air quality parameters which are recommended for monitoring of construction of the Expressways projects are Particulate Matter (Size less than 10m or PM_{10} μg /m^3), Particulate Matter (Size less than 2.5m or $PM_{2.5}$ μg/m^3), Sulphur Dioxide (SO_2), Oxides of Nitrogen (NOx) and Carbon Monoxide (CO) and Hydro Carbon (HC). These parameters are to be monitored at selected locations such as plant and machinery sites, crusher sites, excavation works, etc. starting from the commencement of construction activity. Data should be generated once in a season at the selected monitoring locations in accordance with National Ambient Air Quality (NAAQ) Standards 2009 (**Annexure-6.1)**.

6.3.2 Ambient Noise Monitoring

The measurement for monitoring the noise levels to be carried out at sensitive locations and at construction sites along the proposed RoW in accordance to the Ambient Noise Standards formulated by Central Pollution Control Board (CPCB) (**Annexure 6.2)**. Sound pressure level would be monitored on 24hour basis. Noise shall be recorded at "A" weighted frequency using digitized noise monitoring instrument.

6.3.3 Water Quality

Water quality of local water resources that is used by local community shall be monitored. The physical and chemical parameters recommended for analysis of water quality relevant to road project are pH, total solids, total suspended solids, total dissolved solids, COD, BOD, DO, Oil and Grease, Chloride, Iron, etc. The monitoring of the water quality will be carried out at all locations identified along the project road during construction and operation phase. Monitoring parameters will be as per IS-10500 (**Annexure-6.3**) for ground water quality and for surface water quality as per CPCB Guidelines for used based surface water classification (**Annexure-6.4**).

6.3.4 Soil Quality

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

6.3.5 Tree Survival Rate

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

The construction of New Bangalore-Chennai Expressway project requires felling of trees within Right of Way. These lost trees will be compensated by plantation programme proposed for the project. Three sapling shall be planted for each tree cut.

To ensure the proper maintenance and monitoring of the compensatory plantation, a regular maintenance and monitoring of the survival rate of the planted trees is being proposed up to a period of 5 years from the operation of the project. This will be monitored by implementing agency with the help of Forest Department.

6.4 Environmental Monitoring Action Plan

The monitoring action plan covering various performance indicators, frequency and institutional arrangements of the project in the construction and operation stages is given in **Table 6.1**.

6.5 Environmental Reporting System

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

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

The compliance monitoring and the progress reports on environmental components may be clubbed together and submitted to the PIU regularly during the implementation period. The operation stage monitoring reports may be annual or biannual provided the project Environmental Completion Report will show the status of effectiveness of implementation of environmental mitigation measures. Otherwise, the operation stage monitoring reports will have to be prepared as specified in the said project Environmental Completion Report.

6.6 ENVIRONMENTAL MONITORING COST

A separate budgetary provision has been made for implementation of Environmental Monitoring Plan. The environmental monitoring cost is estimated on the basis of the length, monitoring of environmental attributes, number of environmental monitoring stations etc. and existing environmental scenario of the project road. A budget allocation of Rs. 1,21,56,000 has been made against environmental monitoring during construction and operation stages. The details are provided in Table 9.3 in the Chapter Environmental Management Plan.

Table 6.1: Environmental Monitoring Plan

Environment Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	**Standards**	**Locations**	**Frequency**	**Duration**	**Action Plan in case criteria exceeds**	**Implementation**	**Supervision**
Air	**Construction**	PM_{10} µg /m^3, $PM_{2.5}$ µg/m^3, SO_2, NOx, CO	National Ambient Air Quality Standard (**CPCB, 18th Nov, 2009**)	Batching Plant site, HMP and Stone Crusher	Once in a month for 3 Years at 3 - locations	Continuous 24 hours	Check and modify control device like bag filter/cyclones of hot mix plant	Concessionaire through approved monitoring agency	IE & PIU-NHAI
		PM_{10} µg /m^3, $PM_{2.5}$ µg /m^3, SO_2, NOx, CO		Along the project alignment at locations of baseline monitoring in consultation with IE	Once in three months for 3 Years at 4 locations	Continuous 24 hours	-	Concessionaire through approved monitoring agency	IE & PIU-NHAI
	Operation	PM_{10} µg /m^3, $PM_{2.5}$ µg /m^3, SO_2, NOx, CO		Along the project alignment at locations of baseline monitoring in consultation with IE	Once in 3 months for 3 years	Continuous 24 hours	-	Concessionaire through approved monitoring agency	IE & PIU-NHAI
Surface Water Quality	**Construction**	pH, temperature, DO, BOD, COD, Oil & Grease, Total Suspended Solid, turbidity, Total Hardness, Chlorine, Iron, Total Coliform.	Surface Water Quality Standard as per use based classification for Surface Water as per CPCB	At identified locations	Once in three months excluding the Monsoon for 3 Years at 7 locations	Grab Sampling	Check and modify oil interceptors, silt fencing devices	Concessionaire through approved monitoring agency	IE & PIU-NHAI

Environment Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	**Standards**	**Locations**	**Frequency**	**Duration**	**Action Plan in case criteria exceeds**	**Implementation**	**Supervision**
	Operation	pH, temperature, DO, BOD, COD, Oil & Grease, Total Suspended Solid, turbidity, Total Hardness, Chlorine, Iron, Total Coliform	Guidelines.	At identified locations	Once in 3 months for 3 Years at 4 locations	Grab Sampling	Check and modify oil interceptors, silt fencing devices	Concessionaire through approved monitoring agency	IE & PIU-NHAI
	Construction	pH, Temperature, Total hardness, TDS, Iron, Sulphate, Nitrate, Bacteriological, Heavy metals such as Cr, Ni, Pb, Hg, etc.	Ground Water Quality Standard as per **IS: 10500:2012**	Plant site and Camp site	Once in a month for 3 Years at 5 locations				
Ground Water Quality	**Construction**	pH, Temperature, Total hardness, TDS, Iron, Sulphate, Nitrate, Bacteriological, Heavy metals such as Cr, Ni, Pb, Hg, etc.	Ground Water Quality Standard as per **IS: 10500:2012**	Plant site	Once in 3 months for 3 Years at 4 locations	Grab Sampling	Check and modify oil interceptors, silt fencing devices	Concessionaire through approved monitoring agency	IE & PIU-NHAI

Environment Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	**Standards**	**Locations**	**Frequency**	**Duration**	**Action Plan in case criteria exceeds**	**Implementation**	**Supervision**
	Operation	pH, Temperature, Total hardness, TDS, Iron, Sulphate, Nitrate, Bacteriological, Heavy metals such as Cr, Ni, Pb, Hg, etc.		At identified locations	Once in 3 month for 3 Years at 4 locations	Grab Sampling	Check and modify oil interceptors, silt fencing devices	Concessionaire through approved monitoring agency	IE & PIU-NHAI
Noise Level	**Construction**	Leq dB (A) (Day and Night) Average and Peak values	Ambient Noise Standard (CPCB, 2000)	At Plant Sites equipment yards and locations as identified by IE	Once in a months - for 3 Years at 8 locations	Readings to be taken at 60 seconds interval for every hour and then Leq are to be obtained for Day time and Night time	Check and modify equipment and devices used to protect noise level	Concessionaire through approved monitoring agency	IE & PIU-NHAI
		Leq dB (A) (Day and Night) Average and Peak values	Ambient Noise Standard (CPCB, 2000)	at Construction sites and locations as identified by Engineer	Once in 3 months - for 3 Years at 8 locations				

Environment Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	**Standards**	**Locations**	**Frequency**	**Duration**	**Action Plan in case criteria exceeds**	**Implementation**	**Supervision**
	Operation	Leq dB (A) (Day and Night) Average and Peak values		Ambient Noise Quality at Baseline Locations	Once in 3 months for 3 Years at 4 locations	Readings to be taken at 60 seconds interval for every hour and then Leq are to be obtained for Day time and Night time	-	Concessionaire through approved monitoring agency	IE & PIU-NHAI
Soil	**Construction**	Physical Parameter: Texture, *Texture, Grain Size, Gravel, Sand, Silt, Clay, pH, Conductivity, Calcium, Magnesium, Sodium, Nitrogen, Absorption Ratio, heavy metals, oil & grease*, etc	-	Near Construction sites along the alignment	Once in 3 months for 3 Years at 8 locations	-	-	Concessionaire through approved monitoring agency	IE & PIU-NHAI

Environment Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	**Standards**	**Locations**	**Frequency**	**Duration**	**Action Plan in case criteria exceeds**	**Implementation**	**Supervision**
	Operation	Physical Parameter: Texture, Grain Size, Gravel, Sand, Silt, Clay; Chemical Parameter: pH, Conductivity, Calcium, Magnesium, Sodium, Nitrogen, Absorption Ratio			Once in 3 months for 3 Years at 4 locations	3 Years	-	Concessionaire through approved monitoring agency	IE & PIU-NHAI
Tree Plantation/Greenbelt Development	Construction	Tree Survival rate	90% Tree Survival Rate	Throughout the Project in substantially completed section	Once in a month	1 Years	Replacement of Dead tree with healthy saplings of same species, repairing of tree guards, fencing etc.	Concessionaire	IE, PIU NHAI
	Operation	Tree Survival rate	90% Tree Survival Rate	Throughout the Project stretch	Once in three months	3 years	Replacement of Dead tree with healthy saplings of same species	Concessionaire	IE, PIU NHAI
Water Bodies	Construction	Turbidity in Storm water Silt load in ponds	As specified by the engineer Water quality standards	At the drains, Ponds, water reservoir and tanks construction site/along the ROW	Pre-monsoon and post monsoon seasons for 3 years	3 years	Inspection and modification of silt fencing/ any leakage of drains to these surface water bodies	Concessionaire	IE, PIU NHAI

Environment Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	**Standards**	**Locations**	**Frequency**	**Duration**	**Action Plan in case criteria exceeds**	**Implementation**	**Supervision**
	Operation	Turbidity in Storm water Silt load in ponds	As specified by the engineer / Water quality standards	At major water bodies (Pond, Tanks, Reservoirs within the Proposed ROW and those located at immediate vicinity of the Proposed ROW.	3 Year before onset of monsoon and after monsoon	3 Years	Check and repair catch drains, storm water drains and silt trap	Concessionaire	IE till defect liability period, PIU NHAI

7 ADDITIONAL STUDIES

7.1 Social Impact Assessment and R&R Action Plan

7.1.1 Methodology

Social Impact Assessment (SIA) and resettlement action plan (RAP) is based on the primary and secondary data sources. Secondary data source includes Gazetteer of project districts, maps and Primary Census Abstract (PCA), 2011. A questionnaire was used to conduct census and socio-economic survey.

The primary purpose for preparing Resettlement Action Plan (RAP) is to assess the socio-economic condition of the Project Affected Persons (PAPs) in order to minimise and provide mitigative measures. Since the displacement is indispensable, rehabilitation shall be done in such a manner so that the standard of living of PAPs is restored. Special attention will be paid to the vulnerable groups. RAP has provisions to ensure that PAPs are compensated at replacement value for the assets lost and to enable them to regain or improve their socio-economic status enjoyed prior to the project. The RAP is a live document and will be updated as and when necessary. Implementation of the RAP will be done on data so modified. Acquisition of land as per NH act and compensation as per the Right to Fair Compensation and Transparency in Land Aqcuisition, Rehabilitation and Resettlement Act-2013 **(LA and R&R Act – 2013)** has been aplied for the project**.**

7.1.2 Objective of the Study

The objective of the social Impact assessment is to create a baseline database on social aspects containing the features and population with in the COI, and road as well as the structures likely to be affected by the the proposed ROW. The report aims to highlight the social problems and suggests general and typical mitigation measures to alleviate social problems that the project-affected people may face such as loss of livelihood, displacement and loss of access to community facilities through construction of service roads, underpasses and other facilities.

7.1.3 Scope of the Study

The scope of the study includes:

- Carry out Structure Verification Survey of the structures likely to be affected and Socio-Economic Survey of the Project Affected Persons (PAPs) to get the base line information about the level of impact and to get the base line socio economic status of the PAPs.
- Carry out Census Survey of the structures are to be affected and Socio-Economic Survey of the Project Affected Persons (PAPs) to get the base line information about the level of impact and to get the base line socio economic status of the PAPs
- Conducting Social Impact Assessment including Rehabilitation and Resettlement (R&R) studies
- Preparation of Social Impact Assessment (SIA) report and Resettlement Action Plan (RAP)

7.1.4 Social Impacts and Rehabilitation Issues

As the proposed project road is entirely a green field alignment except some entry/exit points near the proposed Inter-changes connecting existing State Highways and National Highways, SIA and R&R surveys need to be conducted in the DPR stage. The key social issues considered would be as below.

- Loss of fertile agricultural land;
- Loss of structures used for residential, commercial and other purposes and associated loss of livelihood i.e., loss of livelihood due to impacts on sources of earning;
- Loss of other properties and assets such as boundary walls, hand pumps, bore wells, dug wells, pump houses, ponds etc.;
- Disruption of livelihood due to affected fertile agriculture land of agriculturists;
- Loss of common property resources such as religious places, Samadhi, graveyard, cremation places, water resources, passenger shelters, etc;
- Land use along the proposed Green field expressway Project Road

The social impact assessment was carried out, considering Corridor of Impact (COI) 90 m all along the project road except at the proposed facilities such as Junctions, RoBs, Bridges etc. where additional width has been considering as per propose design. Most of the land use categories along this section is mainly agriculture land and at some locations it is either Residential or industrial units' land and activities are being carried out by the local residents. The proposed project road passes through Bangalore Rural and Kolar districts of Karnataka state. Almost all the settlement is has been avoided by carefull selection of alignment. However few of the built-up sections the entry/exit point near proposed major/minor interchanges connecting existing State Highways and National Highways through which the proposed alignment is passing where some pucca, semi pucca and kutcha structures are found in with in propose ROW in these section. The major portion is predominantly either agricultural land or barren land. In general, the inhabitants occupying lands for different activities along the proposed road have land titles. This has implications on the design of the Entitlement Matrix and mitigative measures. Common Property Resources along the sections of the project road include some religious structures, community/village bushy land, grazing lands, water resources, etc.

7.1.5 Negative Social Impact

The project alignment is passing through 72 villages spread over one state(Karnataka). As per the social survey assessment and base line verification survey, few private structures are either partially/completely affected generally. In addition to this other asset such as Bore Wells, Wells, Hand Pumps, Pump Houses etc, are likely to be affected.

Since the project is green field project there will be acquisition of private land and structures through out the alignment. This will lead to negative impact on the people whose property will be acquired. A totalno. of 344 structures shall be affected which are used for either residential or commercial purposes. **Table 7.1** provides information on District wise number of affected structures.

Table 7-1: Number of affected Structures and Households

Sl. No.	Name of the Distrcit	State	No. of Structures
1	Banglore Rural	Karnataka	176
2	Kolar		168
Total			**344**

Village wise Details of affected Households- **Annexure -1**

7.1.6 Preparation of Land Acquisition Report/Plan

As part of preparation of Land Acquisition (LA) Report/Plan, firstly after identifying the villages along the entire proposed project road, latest available Village maps were collected from the respective District Survey offices/Village Offices. After collecting the same reference points were collected along the project roads at common identifiable locations (both On Village Revenue Maps as well as on ground). The entire alignment of Phase-1 has been superimposed on revenue village maps of all the affected villages to identify the survey no. of affected land and subsiquntelly their ownership.

As part of the preparation of Land Plan Schedules (LPS), after identifying the Survey Numbers and each survey number details such as type of land, nature of land and other relevant data was collected from the respective Village offices.

7.1.6.1 Estimates of Land Requirements

District wise break-up of land is given in **Table 7.2**. Total land requirement for the project works out to be around 764.08 Ha (including Government Land) for Phase-1 project. The land required includes both private and government land and owned by various Government departments such as revenue department, Government Land required for Acquisition will be done through government procedures of inter departmental transfers.

Table 7-2: Details of Land to Acquired

Sl. No.	District	Total Area required (Ha)	Area by Ownership (Ha)	
			Private	Government
1	Bangalore Rural	151.31	138.22	13.09
2	Kolar	612.77	579.13	33.64
Grand Total		**764.08**	**717.35**	**46.73**

District and Village wise break-up of land required for acquition is given **Annexure -2**

7.1.7 Structures Affected with in proposed Green field expressway row

As per social survey total no. of 345 structures will be affected due to the project. The details of affected structures have been described in the following sub sections:

7.1.7.1 Ownership of the Affected Structures

The estimated number of structures identified and verified of which are affected completely or partially along the proposed green field project road in the states of Karnataka, is about 345 structures including private households, open well, bore well and one religious structures. 344 are

private (99.71%) and community structures affected in the form of religious 1 (0.29%). Ownership wise details of affected structures are presented in **Table 7.3**

Table 7-3: Ownership Status of the Affected Structures

Sl. No.	Ownership	No	% to total
1	Private	344	99.71
3	Government	0	0.00
5	Religious	1	0.29
	Total	**345**	**100**

7.1.7.2 Impact on Private Properties

The estimated land requirements are resulting in complete displacement of178 private structures of the total affected structures, 124 (36.04%) are residential, 54 (15.71%) are commercial. A considerable number 166 (48.25%) of affected structures are found to be Other assets and minor structures affected Open well, Bore wells and Water Tanks etc. Residencial and commercial structures are completely affected. The usage wise details of all private structures affected are presented in below **Table 7.4.**

Table 7-4: Usage of the Private Properties Affected

Sl. No.	District	No. Of Affected Structures			Religious	Other assets and minor structures affected (Incl. Bath rooms, Cattle sheds, Arch, Compound walls etc.)
		Residential	Commercial	Residential cum commercial		
1	Bangalore Rural	56	45	0	1	75
2	Kolar	68	9	0	0	91
Grand Total		**124**	**54**	**0**	**1**	**166**

Table 7-5: Other assets and minor structures affected

Sl No.	Usage	No.	% to total	Bangalore Rural	Kolar
1	Open well	20	12.05	9	11
2	Bore wells	129	77.71	59	70
3	Water Tanks	17	10.24	7	10
Total		**166**	**100.00**	**75**	**91**

7.1.7.3 Impact on Common Property Resources

Only 1 common property in the form of temple is affected in Banglore rural District. Details of the common propertie such as religious places are presented in below **Table 7.6**.

Table 7-6: Affected Common Properties

Sl. No.	Usage	No	% to total
1	Religious Places	1	100
Total		**1**	**100**

7.1.7.4 Typoloogy of affected structures

As discussed in the earlier section a total number of 178 private structures are affected due to the proposed alignment. Out of 178 residencial and commercial private structres, 115 structures are Pucca structers where as 49 are semi pucca and only 13 are Kucha structures. The district wise break-up of typology of affected private properties presented in below **Table 7.7**.

Table 7-7: Type of total Private affected

Sl. No.	District	No. of private Affected Structures			Total	% of Total
		Pucca	Semi Pucca	Kutcha		
1	Bangalore Rural	76	21	3	101	56.74
2	Kolar	39	28	10	77	43.26
Grand Total		**115**	**49**	**13**	**178**	**100**

7.1.7.5 Project Displaced Structures

All the 178 affected structures falling in the proposed ROW will require to be displaced.

7.1.7.6 Usage of Displaced Structures

As regards the usage of the displaced structures majority are used for either residential or commercial purposes.

7.1.7.7 Affected Mobile Vendors and Road Side Kiosks

There is no affected mobile vendors and kiosks with in proposed Green Field Expressway ROW.

7.1.8 Socio-Economic Profile of Affected Population

7.1.8.1 Project Affected Persons

The total numbers of affected household's structures are to be affected due to the proposed expressway are 344. The impact of project road would affect as many as 72 villages, 4 talukas/mandals and 2 Districts.

As part of the social assessment survey the demographic and socio-economic particulars of the occupants of the above discussed affected properties is collected. The total number of project-affected households who will be losing their166 privately owned structures including minor structures affected Open well, Bore wells and Water Tanks etc.

7.1.8.2 Socio-economic profile of the affected household

District wise lost no. of the affected family, households, persons displaced houselolds in **Table 7.8**

Table 7-8: Impact of the Project PAHs, PAFs, PAPs and PDPs

Impact of the Project		Bangalore Rural	Kolar	Total
For Impacted structures				
1	No. of PAHs	176	168	344
3	No. of PAFs	293	280	573
2	No. of PAPs	880	840	1720
4	No. of PDHs	101	77	178
For Lands				
1	No. of PAHs	850	4761	5611
3	No. of PAFs	2550	14283	16833
2	No. of PAPs	4250	23805	28055

The total 1720 persons are affected due to acquisition of houses and other assets of which (51.28 %) and (48.72%) each constitute Male and female. **Table 7.8** on the analysis of Socio-economic profile of the surveyed households shows that along the project corridor, there were households belonging to three religions viz Hindus (78.94 %), Christians (6.10%) and Muslims (15.41%). Social group-wise most of the affected people represents the backward caste (19.48 %) and of the remaining general castes constitute (53.78%) and Scheduled Castes comprises around 21.80 percent. The incidence of Scheduled Tribes is only (4.94 %) along the greenfield expressway project road. Observed across the family pattern majority (60.17 %) of the affected households are nuclear families and of the remaining 37.21 percent of the affected households live as joint families and 2.62% are Individual families.

Most of the households are staying with in proposed green field expressway ROW from a long time where in nearly 55.23% of them are living since more than 10 years. About 23% of them are found to have settled in the last 2-6 years. Details are presented in table below. Analysis on literacy level of the affected PAPs shows that, around 3.60 percent of them are literates. During the survey, some of the owners/occupants of the structures are not available and the respondent is not in a position to give the details of the concerned head of the Household.

Table 7-9: Socio-Cultural Characteristics of Structure Affected Population

Item	Description	No	% of total
Population PAPS	Male	882	51.28
	Female	838	48.72
	Total	**1720**	**100**
Religious Group PAHs	Hindu	270	78.49
	Muslim	53	15.41
	Christian	21	6.10
	Total	**344**	**100**
Social Group PAHs	General	185	53.78
	BC	67	19.48
	SC	75	21.80

Item	Description	No	% of total
	ST	17	4.94
	Total	**344**	**100**
Family Type PAHs	Joint	128	37.21
	Nuclear	207	60.17
	Individual	9	2.62
	Total	**344**	**100**
Years of stay PAPs	Up to 1 year	110	6.40
	2 to 4 years	183	10.64
	5 to 6 years	218	12.67
	7 to 9 years	259	15.06
	10 and above years	950	55.23
	Total	**1720**	**100**
Education level of PAPS	Illiterate	341	19.83
	Literate	62	3.60
	1-5 class	343	19.94
	6-7 Class	213	12.38
	8-9 Class	343	19.94
	SSC	190	11.05
	Inter	114	6.63
	Degree	76	4.42
	PG	38	2.21
	Technical	0	0
	Professional	0	0
	Total	**1720**	**100.00**

7.1.8.3 Economic Profile along the Project Road

Occupation wise, most of them are engaged into Agriculture where around (39.40%) of the households are doing agriculture followed by commercial activity of Petty Shop Keeping (8.96%), Trade/Business and Non-Agricultural Labours (16.42%) and other occupations sucha as Agricultural Labours, private service and others. Details are presented in **Table 7.10**.

The income levels of majority of the households fall under middle income families (40.90 percent) who are earning between Rs. 50000 to Rs. 100000 per annum. The incidence of lower income families is about 46.27 percent who earn less than Rs. 50000 per annum. Of the remaining, around 2.99 percent of Households are earning between Rs. 300000 to Rs. 500000 per annum. Along the project road around 1.49 percent of households are high income families who are earning more than Rs. 500000 per annum.

Table 7-10: Economic Profile of Structure Affected Population

Item	Description	Number of HH	% of total
Occupation of HH	Agriculture	133	39.4
	Trade/Business	20	5.67
	Petty shop keeping	31	8.96

Item	Description	Number of HH	% of total
	Agri labour	56	16.42
	Non-Agri labour	33	9.55
	HH Industries/Artisan activity	29	8.36
	Govt service	13	3.58
	Pvt.service	19	5.37
	Professional	0	0
	Self employed	10	2.69
	Others	0	0
	Total	**344**	**100**
Annual income (Rs)	Up to 50000	156	46.27
	>50000 to100000	138	40.9
	>100000 to 300000	30	8.36
	>300000 to 500000	12	2.99
	>500000	8	1.49
	Total	**344**	**100**

The expenditure pattern for the affected households shows that a majority of them are having an average monthly expenditure between Rs. 6000 to Rs. 10000 per month. Details are given in **Table 7.11**. Majority of the affected persons (77.03%) reportedly hold the ration cards given for Below Poverty Level (BPL) families.

Table 7-11: Monthly Expenditure and Others for Structure Affected Households

	Description	No. of HHs	% of HH
Monthly Expenditure (Rs)	<4000	48	13.73
	4000 to 6000	41	11.64
	6000 to 10000	190	56.12
	>10000	65	18.51
	Total	**344**	**100**
Ration Card	BPL	256	75.22
	APL	88	24.78
	Total	**344**	**100**

7.1.8.4 Details of Major Health problems

Health is a major development challenge in any infrastructure development project in India. Given the epidemic nature of the problem, it may reverse country's achievements in health and development. The major health issues of the affected households along the project road shows that, of the total households surveyed, around in 3 of the households, the household members are suffering with kidney problems. Details are given in **Table 7.12**.

Table 7-12: Major Health Problems of Structure Affected Households

	Description	No of HH	% of HH
Major Health Problem	Heart problem	0	0.00
	Cancer	0	0.00
	Diabetic	0	0.00
	Handicapped	0	0.00
	Mentally ill	0	0.00
	Censar	0	0.00
	Lungs problem	0	0.00
	Brain Problem	0	0.00
	Blindness	0	0.00
	Neuro problem	0	0.00
	Kidney Problem	2	66.67
	Others(Astama,Disc Problem,Spinal Cord problem etc.)	1	33.33
	Total	**3**	**100.00**

7.1.9 Land Acquisition and Resettlement and Rehabilitation (R & R) Act, 2013

Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act 2013

- The Ministry of Rural Development, Government of India (GOI) in August 2013 approved a Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act 2013. Following are some of the highlights of the Land Acquisition Bill:
- Payment of compensations that is up to 4 times the market value in rural areas and 2 times the market value in urban areas.
- To address historical injustice, the Bill applies retrospectively to cases where no land acquisition award has been made.
- No land can be acquired in Scheduled Areas without the consent of the Gram Sabhas.
- No one shall be dispossessed until and unless all payments are made and alternative sites for the resettlement and rehabilitation have been prepared.
- Compensation to those who are dependent on the land being acquired for their livelihood.
- In cases where PPP projects are involved or acquisition is taking place for private companies, the Bill requires the consent of no less than 70 per cent and 80 per cent respectively (in both cases) of those whose land is sought to be acquired.
- To safeguard food security and to prevent arbitrary acquisition, the Bill directs States to impose limits on the area under agricultural cultivation that can be acquired.
- In case land remains unutilised after acquisition, the new Bill empowers states to return the land either to the owner or to the State Land Bank.
- No income tax shall be levied and no stamp duty shall be charged on any amount that accrues to an individual as a result of the provisions of the new law.
- Where acquired land is sold to a third party for a higher price than 40 per cent of the appreciated land value (or profit) will be shared with the original owners.
- In every project those losing land and belonging to the SC or ST will be provided land equivalent to land acquired or two and a one-half acres, whichever is lower (this is higher than in the case of non-SC/ST affected families) -Where the affected families belonging to the SC and the ST

are relocated outside of the district then they shall be paid an additional 25 rehabilitation and resettlement benefits to which they are entitled in monetary terms along with a one-time entitlement of fifty thousand rupees.

- The policy does recognize some significant principles. It requires projects to (a) minimize displacement and to identify non-displacing or least-displacing alternatives; (b) plan the resettlement and rehabilitation of APs including special needs of tribals and vulnerable sections; (c) provide a better standard of living to PAFs; and (d) facilitate harmonious relationships between the requiring body and PAFs through mutual cooperation.

Compensation to Land Owners:

The First Schedule: The following components shall constitute the minimum compensation package to be given to those whose land is acquired and to tenants referred to in Clause (3) of Section 3 in a proportion to be decided by the appropriate Government.

Table 7-13: Component of compensation Package-First Schedule

Sl. No.	Component of compensation Package in respect of land acquired under the Act	Manner of Determination of Value	Date of Determination of Value
1	2	3	4
1	Market Value of Land	To be Determined as provided Under section 26.	
2	Factor by which the market Value is to be Multiplied in the case Of rural areas.	1.00 (one) to 2.00 (Two) based on the distance of project from urban area, as may be notified by the appropriate Government.	
3	Factor by which the market Value is to be Multiplied in the case Of Urban l areas	1.00 (One)	
4	Value of assets attached to Land or building	To be Determined as provided Under section 29.	
5	Solatium	Equivalent to one hundred per cent. Of the market valueOf land mentioned against serial number 1 multiplied by the Factor specified against serial number 2 for rural areas or serial number 3 for urban areas plus value of assets attached to land or building against serial number 4 under column (2).	
6	Final award in rural areas	Market value Of land mentioned against serial number 1 multiplied by the Factor specified against serial number 2 plus value of assets attached to land or building against serial number 4 under column (2) plus Solatium mentioned against serial number 5 under column (2).	
7	Final award in Urban areas	Market valueOf land mentioned against serial number 1 multiplied by the Factor specified against serial number 3 plus value of assets attached to land or building against serial number 4 under column (2) plus Solatium	

Sl. No.	Component of compensation Package in respect of land acquired under the Act	Manner of Determination of Value	Date of Determination of Value
1	2	3	4
		mentionedagainst serial number 5 under column (2).	
8	Other Component, if any, to be Included.		

The Second Schedule: Elements of Rehabilitation and Resettlement Entitlements for all the Affected Familes (Both Land Owners and the Families whose Livelihood is primarily dependent on Land Acquired) in addition to those provided in the First Schedule.

Table 7-14: Component of Compensation Package-Second Schedule

Sl. No.	Elements of Rehabilitation and Resettlement Entitlements	Entitlement/Provision	Whether Provided or not (if provided, details to be given
1	2	3	4
1	Provision of housing units in case of displacement	(1) If a house is lost in rural Areas, a constructed house shall be provided as per Indira Awas Yojana specifications. If a house Is lost in urban areas. a constructed house shall be provided, which will be not less than 50 sq mts in plinth area.	
		(2) The benefits listed above shall also be extended to any effected family which is without homestead land and which has been residing in the area continuously for a period of not less than three years preceding the date of notification of the affected area and which has been involuntarily displaced from such area.	
		Provided that any such family in urban areas which opts not to take the house offered, shall get a one-time financial assistance for house construction, which shall not be less than one lakh fifty thousand rupees:	
		Provided further that if any affected family in rural areas so prefers, the equivalent cost of the house may be offered in lieu of the constructed house:	
		Provided also that no family affected by acquisition shall be given more than one house under the provisions of the Act.	
		Explanation. – The houses in urban areas may, if necessary, be provided in multi-storied building complexes.	
2	Land for Land	In the case of irrigation project, as far as possible and in lieu of compensation to be paid for land acquired , each affected family owning agricultural land in the affected area and whose land has been acquired or lost, or who has, as a consequence of the acquisition or loss of land, been reduced to the status of a marginal farmer or landless, shall be allotted, in the name of each person included in the records of rights with regard to the affected family, a minimum of one acre of land in the command area of the project for which the land is acquired:	
		Provided that in every project those persons losing land and belonging to the Scheduled Castes or the Scheduled Castes or the Scheduled Tribes will be provided land equivalent to the land acquired or two and a one-half acres, whichever is lower.	

Sl. No.	Elements of Rehabilitation and Resettlement Entitlements	Entitlement/Provision	Whether Provided or not (if provided, details to be given
1	2	3	4
3	Offer for Developed Land	In case the land is acquired for urbanization purposes, twenty per cent. of the developed land will be reserved and offered to land owning project affected families, in proportion to the area of their land acquired and at a price equal to the cost of acquisition and the cost of development: Provided that in case the land owning project affected family wishes to avail of this offer, an equivalent amount will be deducted from the land acquisition compensation package payable to it.	
4	Choice of Annuity or Employment	The approapriate Government shall ensure that the affected families are provided with the following options: (a) where jobs are created through the project, after providing suitable training and skill development in the required field, make provision for employment at a rate now lower than the minimum wages provided for in any other law for the time being in force, to at least one member per affected family in the project or arranges (b) one time payment of five lakh rupees per affected family; or (c) annuity policies that shall pay not less than two thousand rupees per month per family for twenty years, with appropriate indexation to the Consumer Price Index for Agricultural Labourers.	
5	Subsistence grant for displaced families for a period of one year	Each affected family which is displaced from the land acquired shall be given a monthly subsistence allowance equivalent to three thousand rupees per month for a period of one year from the date of award. In addition to this amount, the Scheduled Castes and the Scheduled tribes displaced from Scheduled Areas shall receive an amount equivalent to fifty thousand rupees. In case of displacement from the Scheduled Areas, as far as possible, the affected families shall be relocated in a similar ecological zone, so as to preserve the economic opportunities, language, culture and community life of the tribal communities.	
6	Transportation cost for displaced families	Each affected family which is displaced shall get a one-time financial assistance of fifty thousand rupees as transportation cost for shifting of the family, building materials, belongings and cattle.	
7	Cattle Shed/Petty Shops cost	Each affected family having cattle or having a petty shop shall get one-time financial assistance of such amount as the appropriate Government may, by notification, specify subject to a minimum of twenty-five thousand rupees for construction of cattle shed or petty shop as the case may be.	
8	One –time grant to artisan, small traders and certain others	Each affected family of an artisan, small trader or self-employed person or an affected family which owned non-agricultural land or commercial, industrial or institutional structure in the affected area, and which has been involuntarily displaced from the affected area due to land acquisition, shall get one-time financial assistance of such amount as the appropriate	

Sl. No.	Elements of Rehabilitation and Resettlement Entitlements	Entitlement/Provision	Whether Provided or not (if provided, details to be given
1	2	3	4
		Government may, by notification, specify subject to a minimum of twenty-five thousand rupees.	
9	Fishing rights	In cases of irrigation or hydel projects, the affected families may be allowed fishing rights in the reservoirs, in such manner as may be prescribed by the appropriate Government.	
10	One-Time Resettlement Allowance	Each affected family shall be given a one-time "Resettlement Allowance "of fifty thousand rupees only.	
11	Stamp duty and registration fee	(1) The Stamp duty and other fees payable for registration of the land or house allotted to the affected families shall be borne by the Requiring Body.	
		(2) The land for house allotted to the affected families shall be free from all encumbrances.	
		(3) The land or house allotted may be in the joint names of wife and husband of the affected family.	

7.1.10 Institutional Arrangement

The action plan provides a detailed mechanism for the appropriate organisation and implementation of the plan. A social cell will be created which will be responsible for the implementation of the action plan. There will be a Land Acquisition Officer, who will be supported by concern revenue officer and PD NHAI for the projectThe district level committees SLO/ADM Revenue will be set up to facilitate the finalization of replacement value and all grievances of the project affected peoples.

Institutions for planning & implementation of RAP vary substantially in terms of their respective roles & capacity. Timely establishment & involvement of appropriate R&R institutions would significantly facilitate achievement of objectives of the R&R programme. The main R&R institutions would include:

- NHAI
- Local Administration
- Line departments
- NGO
- DLC/GRC
- Training Institutions
- M&E Agency

7.1.11 Resettlement Institutions and Framework

NHAI has an Environmental and Social Development Unit (ESDU) at the corporate level. The ESDU at apex level has overall responsibility for policy guidance, coordination and planning, internal monitoring and overall reporting. The ESDU headed by General Manager (GM) (Environment), has one Deputy General Manager (DGM) (Environment). An Independent Monitoring and Evaluation Agency would be appointed which will work in close association with ESDU/PIU.

NHAI will initiate the following activities to commence and implement the RAP:

- Establish PIU and field office

- Appointed of SLO/CALA with proven track records for the smooth implementation of R&R activities as stated;
- Orientation and awareness seminars for project implementation Unit (PIU).
- Appointment of external monitoring and evaluation consultants.

Effective RAP implementation will require institutional relationships & responsibilities, rapid organizational development & collaborative e fforts by NHAI, state government and district administrative .. It will provide means & mechanism for c oordinating the delivery of the compensation & assistance entitled to those who will suffer loss. On behalf of NHAI, SLO/CALA will assure the responsibility for representing the social impact & resettlement component of the project. The SLO/CALA will also be responsible for disseminating the information to the public & providing additional opportunities for public comment.

The SLO/CALA at the apex level will have overall responsibility for policy guidance, coordination, and contingency during project implementation.

The Organogram for the R&R cell is given in **Figure 7.1.**

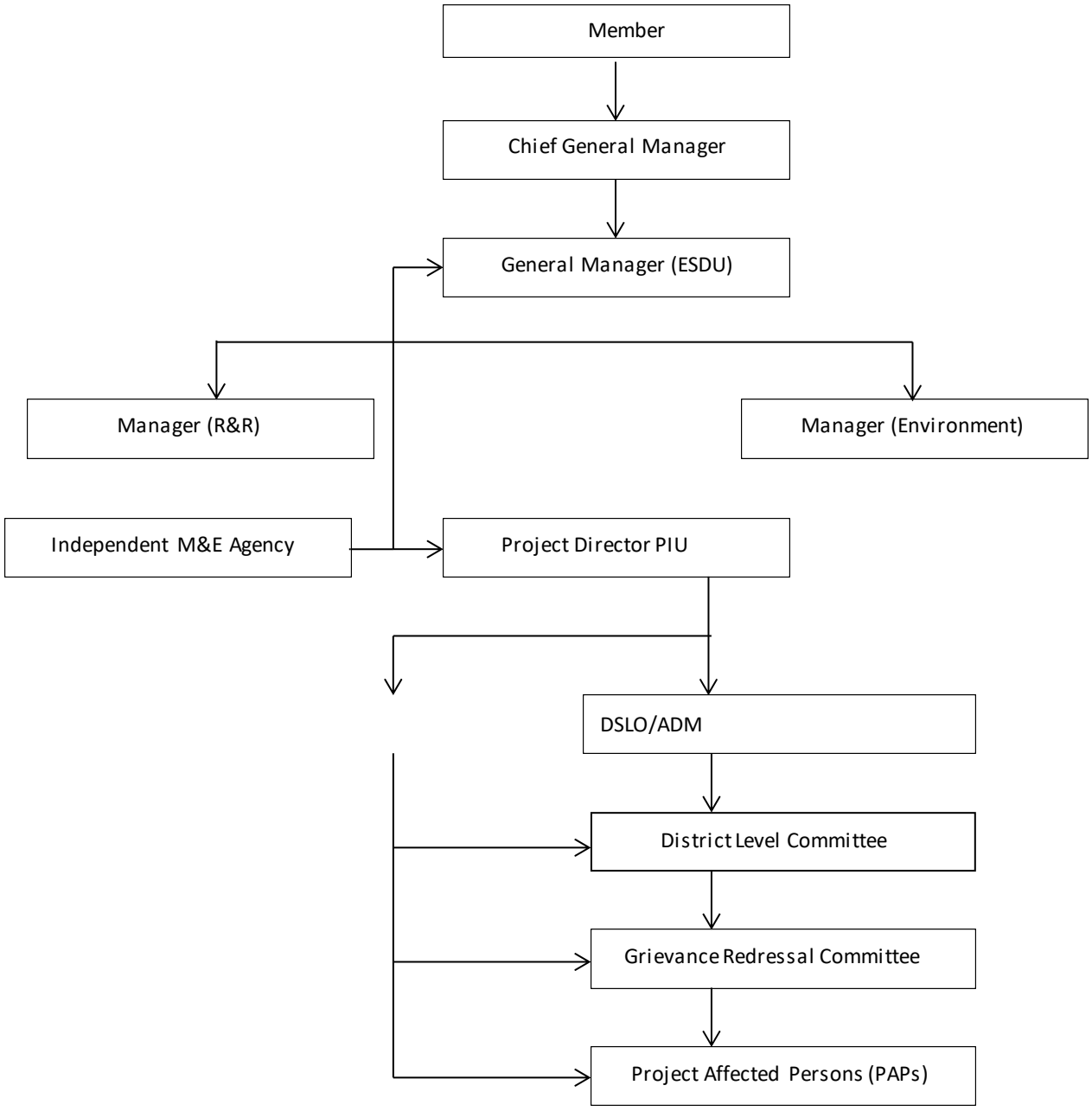


Figure 7.1: The Organogram for R&R Cell

7.1.12 Roles and Responsibilities

The role and responsibilities of the various offices in R&R implementation is presented below:

7.1.13 At Corporate Level: The Chief General Manager (CGM)

In-charge of overall project activities and participate in the State Level Committees to facilitate land acquisition, pre- construction activities and implementation of R&R activities.

- **District Level Committee (DLC)**
- RAP will be implemented through District Level Committees that will be established in each district i.e. Banglore Rural and Kolar. The committee would include District Magistrate or his

representative, District Land Acquisition Officer, Head of Village of Panchayat, representative of affected villages including women, representative of revenue department, line departments, PWD, people's representatives, NGO and representatives of affected population. The formation of DLCs would be facilitated by NGOs. . The functions of the DLC will be as follows: (i) to meet regularly to review the progress of land acquisition/ R&R;

- The DLC would also: (i) meet regularly at pre-decided dated specifically for grievance redressing purpose; (ii) help in amicable settlement of disputes at community level; (iii) carry forward the ones which are not reconciled to the Grievance Redressal Committee (iv) co-ordination with local govt. authorities & field offices.

7.1.14 Grievance Redress Cell

There is a need for an efficient grievance redressal mechanism, which will assist the PAPs in resolving queries and complaints. Any disputes will be addressed through the grievance redressal mechanism concern appointed SLO/CALA at District leval.

Formation of Grievance Redressal Cell (GRC) is most important f or g rievance redressal and it is anticipated that most, if not a ll grievance, are se ttled by the GRC. Detailed investigation will be undertaken which may involve field investigation with the concerned PAPs. The GRCs are expecte d to resolve the grievances of the eligible persons within a stipulated time. The decision of the GRCs is binding, unless vacated by court of law.

The GRCs will continue to function, for the benefit of the PAPs, during the entire life of the project including the defects liability periods. The response time prescribed for the GRCs is 15 days. The GRC will meet once in a fortnight to expedite redressal of grievances.

People are not debarred from moving to the court for issues including those related to R&R Entitlement. However, it is expected that the GRCs will play a very crucial role in redressing grievances of the PAPs, and will help the implementation of the project as scheduled.

7.1.14.1 Constitution of Grievance Redressal Committee (GRC)

The committee will comprise of representatives of local NGOs; public representatives (viz., Member of Parliament, Member of Legislative Assembly, et c) from respective district; representative of women group, squatters and vulnerable PAFs; line department and affected persons especially women as well as the representative of respective district administration. Minimum participation of women in GRC will be 33%. At least two persons from each group will be there in the GRC. The functions of the GRC will be:

- To provide support for the PAPs on problems arising out of Land/ Property acquisition;
- To record the grievances of the PAPs, categorizes and prioritize and solve them within a month;
- To inform PIU of serious cases within an appropriate time frame; and
- To report to the aggrieved parties about the development regarding their grievance.

7.1.14.2 Project Implementation Unit (PIU)

This unit will coordinate the process for land acquisition. Relocation and rehabilitation, distribution of project provided assistance and PAPs access to government programs with help of concern District SLO/ CAla officer.

7.1.15 Implementation Arrangements and Schedule

It is envisaged that the land acquisition and the R & R activities will be completed before initiating the civil works. And Land acquisition and compensation and land cost for phase-1 already 90% completed and project affected persons are satisfisfy. Details of Unit Cost Estimates

7.1.16 Land Cost

Land costs have been taken as per the prevailing market rates (Basic rate) collected from CALA and PIU Offices. Final Land cost per Sqm. was arrived as an average maximum values across all the project villages all along the project road. Unit wise details provided in below **Table 7.15.**

Table 7-15: Village/Taluk/ Wise Land Cost

Sl. No.	District	Taluk	Village	Acquired Land Area in Ha.			Compensatation Amount
				Total	Govt	Private	
1	2	3	4	5	6	7	8
1	Bangalore Rural	Hosakote	Dandupalya	0.510	0.000	0.510	66537174
2			Kolathur	59.580	0.000	59.580	11869886018
3			Hullur Amanikere	0.549	0.000	0.549	22785253
4			Kannurahalli	13.956	0.345	13.611	1421222292
5			Chimandahalli	3.918	0.000	3.918	133147871
6			Jinnagara	4.907	3.774	1.133	78930758
7			Vagata	9.727	0.000	9.727	359884688
8			Chandrapura	5.347	0.000	5.347	128555555
9			Vadigehalli	16.227	7.608	8.619	288368254
10			Gonakanahalli	7.560	0.884	6.676	290122915
11			Karibeerana Hosahalli	15.884	0.034	15.851	612602533
12			Tiratahalli	9.656	0.261	9.394	402041243
13			Thaggli Hosahalli	3.497	0.184	3.313	75437738
14	Kolar	Malur	Gangapura	11.140	1.544	9.596	246692688
15			Channigarayapura	1.988	0.000	1.988	25472203
16			Hedaginabele	18.617	0.122	18.494	449348313
17			Bellavi	11.291	0.749	10.542	285595135
18			Kondarahalli	5.443	0.000	5.443	137887049
19			Abbenahalli	15.510	1.053	14.457	339090566
20			Maliyappanahalli	17.022	1.682	15.340	301352413
21			Chikka Kadaturu	2.859	0.000	2.859	64190814
22			Obalapura	9.127	0.000	9.127	145867212
23			Dodda Shivara	1.896	1.118	0.778	17795572
24			Varadenahalli	10.238	0.592	9.646	297754414
25			Agrahara	1.944	0.010	1.934	59574203
26			Chikka Sabbenahalli	16.999	0.316	16.683	277479471
27			Dodda Sabbenahalli	4.043	0.067	3.976	64476612
28			Nambiganahalli	14.919	0.000	14.919	182874687

Sl. No.	District	Taluk	Village	Acquired Land Area in Ha.			Compensation Amount
				Total	Govt	Private	
1	2	3	4	5	6	7	8
29			Hijuvanahalli (Part)	1.016	0.000	1.016	9906974
30	Kolar	Malur	Hijuvanahalli (Part)	15.560	0.658	14.902	170638315
31			Nidaramangala	0.783	0.000	0.783	2864206
32			Anepura	6.736	0.798	5.937	73019572
33			Karangutte	8.339	0.043	8.295	34155052
34			Nakkanahalli	5.103	0.000	5.103	33183654
35			Kuntanahalli	10.465	0.267	10.197	87916931
36			Karadagurki	7.389	0.000	7.389	59274062
37		Kolar	Swamigala Gollahalli	11.032	0.000	11.032	44126846
38			Vadagere	6.600	0.000	6.600	29486189
39		Bangarpet	Sulikunte	14.685	0.639	14.046	56633694
40			Naganathapura	9.263	0.834	8.429	14696977
41			Mugalabele	3.601	0.000	3.601	18166231
42			Madamangala S.	10.348	0.776	9.572	78874312
43			Madigarahalli	8.027	0.358	7.669	16805454
44			Siddanahalli	8.772	0.446	8.326	16019199
45			Byadabele	1.738	0.000	1.738	2530570
46			Kuppanahalli	13.442	0.587	12.855	112663831
47			Birandahalli	10.773	0.770	10.004	47395552
48			Karabele	3.893	0.403	3.491	13714407
49			Maragal	18.337	1.477	16.860	69310569
50			Ithandahalli	41.633	1.297	40.337	73420578
51			Kavaranahalli	11.452	2.252	9.200	25743934
52			Dodduru Karapanahalli	51.337	4.177	47.160	107628820
53			Krishnarajapura	3.666	1.179	2.487	145458856
54			Gattakamadenahalli	7.873	0.000	7.873	28036994
55			Reddyhalli (Part)	2.125	0.000	2.125	2017789
56	Kolar	Bangarpet	Reddyhalli (Part)	16.089	0.010	16.079	20053694
57			Pedadampalli	7.838	0.293	7.545	17183675
58			Thammenahalli	9.296	0.435	8.861	20778055
59			Nagashettyhalli	3.820	0.000	3.820	4253615
60			Hosapalya	11.504	1.629	9.875	65297450
61			Parisepalli	7.801	0.293	7.507	22698090
62			Bethamangala	28.051	1.532	26.520	253553756
63			Byatarayanahalli	1.282	0.000	1.282	8023111
64			Doddakari	6.806	1.443	5.363	60924101
65			Doddakari Majara Kambampalli	3.096	0.563	2.532	18932549
66			Kulur	13.510	0.468	13.042	57882117
67			Vaddarahalli	12.486	0.190	12.296	37811863

Sl. No.	District	Taluk	Village	Acquired Land Area in Ha.			Compensatation Amount
				Total	Govt	Private	
1	2	3	4	5	6	7	8
68			Pillagondalahalli	7.892	0.114	7.778	42560754
69			Rayasandra	9.660	0.782	8.879	36902282
70			Sundrapalya	4.915	0.026	4.889	44958725
71			Vengasandra	31.691	1.648	30.043	111332306
72			N G Hulkur (Part)	0.006	0.000	0.006	13590
Total Phase-I				**764.080**	**46.730**	**717.350**	**20841822945**

Source – Estimation collected from SLO/CALA

7.1.17 R&R BUDGET

The estimated budget comprises of compensation for land, structures and other minor assets acquisition and supports in re-establishing the livelihood and shelter for the project affected people. for in **Table 7.16.**

Table 7-16: Preliminary Cost Estimates and R&R Budget (Bangalore-Chennai Expressway Phase-1)

Sl. No.	Item	Units Sq. Mtrs.	Quantity Ha	Rate (Rs)	Amount (Rs.)
A	**Compensation cost for land**	7173500	717.35	As per CALA	20841822945
B	**Compensation cost for structures**				
1	Cost of Affected Structures (including Pucca, Semi-pucca and Kachcha).	As per CALA			334950251
2	Bore well,Open Well,Pump House etc.	As per CALA			81717629
				Total (1+2+3)	**21258490825**

7.1.18 Monitoring and Evaluation

The action plan establishes the provisions for Monitoring and Evaluation (M & E). The social cell of the Project Implementing unit will undertake the monitoring progress and an external agency will be contracted for annual evaluation of the project.

7.2 Public Hearing

In compliance to approved ToR of MoEF&CC vide letter No. 10-15/2018-IA.III dated 14.05.2018 and request of the project proponent vide their letter No. NHAIII1016/MOEF & F (Phase-I)/1/2018/PIU-BNG (EXP)/791, dtd: 28.12.2018, the public hearing was conducted by the Karnataka State Pollution Control Board in Bengaluru Rural District and Kolar District as per EIA Notification 2006 and its amendments thereafter.

Date of PH	District	PH Venue	Officers who attended PH
28.02.2019	Bengaluru Rural District	Syed Palace Auditorium, National Highway, Dandu Palya, Near MVJ College, Bengaluru Rural District	Smt. S. Ramya, KAS, Additional Deputy Commissioner, Chairman of Public Hearing Committee Bengaluru Rural District.
			Shri M. Laxman, Senior Environmental Officer, KSPCB, Bangalore East.
			Sri K. V. Shivakumar, Environmental Officer, KSPCB, RO-Hoskote.
			Shri T. Parvateesam, Project Director, NHAI, Bangalore
			Smt. G R Harishilpa Special Land Acquisition Officer, Bangalore-Chennai Expressway
07.03.2019	Kolar District	Svr kalyana Mantapa, No.2211, KGF road, near KSRTC Bus stand, Bangarpet-563114, Kolar District.	Sri. J. Manjunath, IAS, Deputy Commissionar and Chairman of Public Hearing Committee, Kolar
			Sri. C.R.Manjunath, Environmental Officer, Regional Office-Kolar, Kamataka State Pollution Control Board,
			Shri M. Lakshman, Senior Environmental Officer, KSPCB, Zonal Office-Bangalore East, Bangalore
			Shri T. Parvateesam, Project Director, NHAI, Bangalore
			Smt. G R Harishilpa, Special Land Acquisition Officer, Bengaluru Chennai Expressway

In all, 146 (31 in Bangalore Rural and 115 in Kolar district) people including the concerned officer and affected villagers, others attended the public hearing. The team of technical and environmental experts from the consultant along with Director, National Highways Authority of India attended the public hearing to understand the issues/ queries from local public on project and to reply to their queries. Representative from M/s EGIS India (EIA Consultant) delivered presentation to public in Kannada in a manner to give better understanding of the developmental activity along with the related anticipated environmental and social impacts. The concerns raised by local affected peoples were adequately replied by the Project Proponent.

7.2.1 Advertisement published in newspaper

Advertisement regarding public hearing of Bangalore Chennai Expressway Phase –I was published in English and local language in the following 2 newspapers of each districts on for conducting public hearing in Bangalore Rural and Kolar districts

In Bangalore Rural District:

- "Prajavani" (Kannada) on 27.01.2019
- "The Hindu" (English) on 27.01.2019.

In Kolar District

- "Udayavaani" (Kannada) on 07.02.2019
- "Deccan Herald" (English) on 07.02.2019

7.2.2 Proceedings of public hearing

Bangalore Rural District

The proceedings of the public hearing conducted at Dandu Palya was conveyed by the Member Secretary, KSPCB, vide letter No. PCB/CNP-19/GEN/18/1310 dated 25.05.2019. The forwarding letter and proceedings including newspaper advertisement for public notice, issues raised and answers provided, attendance sheet and photographs are enclosed as **Annexure 7-3**.

All the issues/ aspects discussed during public hearing have been covered in EIA and EMP Reports of the Project. Chairman of Public Hearing informed that, the proposed expressway is a part of Chennai Bengaluru Industrial Corridor and helps overall economic development of the area. It was also informed that, the project will take care of mitigation measures during construction and operation phase to minimize environmental problems in the project area. She also assured that, the issues related to compensation will be addressed. Majority of the affected villagers welcomed the project and given their consent.

Kolar District

The proceedings of the public hearing conducted at Bangarpet, Kolar was conveyed by the Member Secretary, KSPCB, vide letter No. PCB/CNP-19/GEN/18/1271 dated 23.05.2019. The forwarding letter and proceedings including newspaper advertisement for public notice, issues raised and answers provided, attendance sheet and photographs are enclosed as **Annexure 7-4**.

All the issues/ aspects discussed during public hearing have been covered in EIA and EMP Reports of the Project. Most of the people appreciated the fact that, public hearing was organized in a transparent and peaceful manner. Majority of the affected villagers welcomed the project and given their consent.

Table 7-17: Issue Raised and Reply given by Project Proponent - Bangalore Rural District

S. No	Issue	Reply
1.	Sri. Harish, Kolathur Village, Hoskote Taluk, Bengaluru Rural District, requested to create job opportunities to residents of Kolathur Village as maximum land losers are from the said village. He also requested for hospital facility to the	The Chairman of Public Hearing Committee informed that, job opportunities will be created during formation of Road and the local people will be given preference for jobs during road formation. The Project Director, PIU, NHAI, Bengaluru, also informed that, road is being proposed as a part of

S. No	Issue	Reply
	Kolathur Village from the project proponent.	Chennai. Bengaluru industrial corridor which will help industrial development in the area through which job opportunities will be created to local people.
2.	Sri. Krishnamurthy, Kolathur Village, Hoskote Taluk, Bengaluru Rural District, informed that he has developed a residential layout adjacent to proposed expressway. He informed that, few full sites and part of few sites were acquired for road purpose because of which he could not sell the remaining portion of partially acquired sites. He requested for to suitable compensation for such sites. He also requested for road connectivity to his layout.	The chairman informed that, such issues may occur during acquisition process and informed him to submit a representation to SLAO office. However, as there is no specific provision under NH Act for acquiring such piece of land Chairman also informed that, road connectivity will be provided to layout through existing roads. Accordingly, VUPs, LVUPs etc., have been provided for Continuation of existing roads across express highway.
3.	Sri. Anjenappa, Kolathuru Village, Hoskote Taluk, Bengaluru Rural District, demanded for higher compensation for the land acquired in Kolathur village limits as present value is 8 -10 Crores per acre.	The Compensation fixed as per NH Act 1956 and Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act 2013 Guidelines by CALA. An amount of INR 26.97 Cr was awarded for said survey no. and amount was also received by the respective person. The documents regarding the same are enclosed as **Appendix I** of **Annexure 7.5.**
4.	Sri Hnumanthagowda Kolathuru Village, Hoskote Taluk, Bengaluru Rural District, requested for fixation of compensation based on the guidance value and also not to delay dispersal of compensation.	Chairman informed that, the compensation will be fixed based on the present guidance value and also informed that, action will be taken for speedy dispersal of compensation to land losers. An amount of INR 9.9 Cr was awarded as Compensation to land looser and amount was also received by the respective person. The documents regarding the same are enclosed as **Appendix II** of **Annexure 7.5**
5.	Sri. Shekar Kolathur Village, Hoskote Taluk, Bengaluru Rural District, informed that Government is forced to give interest for compensation value for the delayed period which is loss of Government revenue and requested for timely dispersal of compensation amount.	Chairman informed that 12% interest will be paid from the date of Publication of 3(A) notification as per RFCTLARR 2013. Amount disbursed to the concerned and obtained possession of land.

The gathering informed that, they do not have any environmental issues due to proposed Chennai-Bengaluru Expressway and support proposed Chennai Bengaluru Expressway.

In conclusion, the Chairman Smt. S Ramya, KAS, Additional Deputy Commissioner, Bengaluru Rural District informed that, the proposed expressway is a part of Chennai Bengaluru Industrial Corridor and helps overall economic development of the area. Madam also informed that, the project will take care of mitigation measures during construction and operation phase to minimize environmental problems in the project area. She also assured that, the issues related to

compensation will be addressed. Chairman thanked gathering for co-operation for successful completion of public hearing.

Sri. T. Parvateesam, Project director, NHAI, Bengaluru concluded public hearing with vote of thanks.

Table 7-18: Issue Raised and Reply given by Project Proponent - Kolar District

S. No	Issue	Reply
1.	Sri. M.S. Anand, Ex Zilla Panchyat Member, Hosur Village, Bangarpet Taluk, Kolar District. During the construction of road work using heavy vehicles, lot of dust and noise nuisance is going to be created and agricultural fields situated on either sides of the road are going to be affected to the maximum extent due to the dust generated during the usage of heavy vehicles. Since these types of projects will run for minimum of 2-3 years, the extent of pollution will be unbearable. Further, he wanted to know about any sort of compensation being paid for the said problem and questioned about the precautionary measures taken for mitigating sound and dust pollution being caused during the construction phase of the road works. Meantime he requested the project proponent to make provisions for underpass roads so as to have an access to the agricultural fields.	NHAI informed that continuous water sprinkling arrangements will be ensured at construction works as well as loading and unloading area of Camp site. All noise generating equipment will be installed sufficiently away from settlement area and will be operated with controlled devices. Green belt provided along the road will act as a vegetative noise barrier. In addition to that, Noise barriers have been proposed at 21 nos. of villages along the settlement falling within 500 m from the alignment covering a total length of 7270 m. The list of the area along with the location is enclosed as **Appendix III** of **Annexure 7.5**. A separate budgetary provision of INR 10.90 crores has been made for the provision of Noise barrier. In order to reduce the dust at construction sites. • The Concessionaire will take every precaution to control dust nuisance at all the construction zones and allied sites where works are under progress. • Every equipment and machinery will be fitted with dust suppression devices such as water sprinklers, dust bags, cyclone etc. as appropriate. • The Concessionaire will provide necessary certificates to confirm that all crushers used in construction conform to relevant dust emission control legislation. • At all the construction zones and unpaved lead roads, earthen temporary diversions and plant premises periodical water sprinkling will be carried out to suppress dust. • Transportation of loose earth, sand, and fly ash will be done in covered vehicles.

S. No	Issue	Reply
		• All equipments and machineries will be maintained properly. • Periodical monitoring of fine Particulate Matters (PM_{10} and $PM_{2.5}$) will be carried out as per Environmental Monitoring Plan. • Workers at mixing sites will wear masks to reduce the chances of exposure to fugitive dusts PD, NHAI informed that adequate number of underpasses and culverts will be provided at regular interval for ensuring movement of light vehicles / pedestrian / cattle movement from one side to another side of the Expressway..
1.1	Since there is an existing National Highway at a distance of about 20 Km, is it viable to have another highway road and also he wanted to know about the feasibility study reports. He also suggested the chair person and the project proponent that, meetings / interactions would have been held with the land losers / farmers to have any sort of suggestions before taking up these types of projects.	Feasibility Report is available with Office of the Project Director, National Highways Authority of India (NHAI). This is also submitted with MoEFCC during submission proposed ToR. There is a provision under NH Act for submission of objection within 21 days after 3(A) notifications. Further, there is a provision for arbitration even after disbursement. In addition, in between any affected person may also submit written grievance regarding compensation of land and structure as well as valuation with CALA. The date of hearing and notifications for land acquisition are published in the local newspaper intimating the public about the intension for acquisition under Section 3(A) of National Highway Act, 1956 notification inviting objection from the person losing the land. In this project also the 3(A) Notification was published in English News Paper Times of India, Bengaluru on 27 May vide Notification No.-LAQ/BC/EXPWAY/CR/10/2015-16 dt. 23 May, 2015. The same notification was sent to all the concern offices in local language. The copy of Newspaper cutting and circulation in local language are enclosed as **Appendix V** of **Annexure 7.5.**
1.2	Requested the Chairperson to take a fair decision about the compensation to be paid to the land losers and mentioned that, there is a disparity with respect to the compensation being paid to the land losers of Hoskote Taluk and Bangarpet Taluk. He emphasized the chair person to extend the provisions of providing or extending the compensation to the land losers as adopted	The value for compensation against land acquisition is determined by SLAO depending upon the specific criteria as per the NH Act 1956 and RFCTLARR Act 2013.

S. No	Issue	Reply
	in the industrial policy land acquisition procedures.	
1.3	Expressed his opinion that, while acquiring the land of the farmers, project proponent must explore the best possibilities of acquiring the whole land instead of dividing the land in to bits and pieces.	The project alignment is not passing through Hosur Village and no land is affected from this village. The name of Shri M. S. Anand is not within the affected person list. Design of Expressway is not possible to acquire 100 % land of the affected person due to maintaining the road geometry as per IRC and MoRTH guidelines. However, this type of stray issue is likely to be compensated during evaluation of compensation if same is raised with CALA before disbursement. In addition, such kind of issues are further settled as per NH Act 1956 and Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act 2013 by CALA.
2	Sri. Ramellowda. District President. Raita Sanlha. Kurugal Villlge. Bangarpet Taluk, Kolar District. Highlighted about the disparity of rates pertinent to Malur, Hoskote and Bangarpet for the lands being paid to the land losers and requested the chair person and the project proponent to grant more compensation if land to be acquired is of fertile in nature. On behalf of all the farmers who were present in the meeting that, he requested the project proponent to provide good number of underpass and service roads and meantime he has suggested to grant Gomala land (Government Land) to the land losers. He did not raise any issue pertaining to Environment.	The value for compensation against land acquisition is determined by SLAO depending upon the specific criteria as per the NH Act 1956 and RFCTLARR Act 2013. A total of 16 nos. of Light Vehicular Underpasses, 25 nos. Vehicular underpass and 4 nos. Vehicular Overpasses have provided in design in the project stretch of Kolar district for facilitating pedestrian/ cattle movement / vehicular movement across the Expressway. In addition, 96 nos. of box culverts have also been provided in this stretch which will also facilitate movement of pedestrian/cattle /smaller vehicle during dry period. Around Kurulu Village 2 underpasses have been provided at project cjhainages 64+472 and 65+533 to provide connectivity to the Village Roads. The list of underpasses is provided in **Appendix VI** of **Annexure 7.5**
3.	Sri. Babu, Ithandahalli Village, Bangarpet Taluk, Kolar District - He also expressed about the disparity with respect to the compensation being paid to the land losers and only Rs. 28.5/- per Sq. Mtr, which is very minimal is going to be paid to our land of 17 Acres of extent belonging to 10 Brothers and even no nearby gomala land	The Compensation fixed as per NH Act 1956 and RFCTLARR 2013 Guidelines by CALA and an amount of INR 9.5 Lakh was awarded for said survey no. and amount was also received by the respective person. The

S. No	Issue	Reply
	is available to obtain land under the provisions of the Acts. In addition to that, about 100 Acres of land on either sides of the road is being acquired for the development of townships. He mentioned that, these grievances were brought to the kind notice of the Chair person through Memorandums and meantime requested to do the favor in this Regard.	documents regarding the same are enclosed as **Appendix VII** of **Annexure 7.5**.
3.1.	Meantime, Sri Babu pointed out specifically about the disparity of compensation for the land being paid in Hoskote and Bangarpet Taluks and in this regard, the Chair person has briefed that, the guidance value for the lands at different places will be fixed by the Government based on the certain criteria's such as business and affairs of that particular location / area. He did not raise any issue pertaining to Environment.	The Compensation fixed as per NH Act 1956 and Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act 2013 Guidelines by CALA
4.	Sri. Srinivasagowda, Ex-Gram Panchyat Chairman, S. Madamangala Village, Bangarpet Taluk, Kolar District. During the acquisition process, on certain occasions, along with the land, dwelling houses will also be acquired partially. Under these circumstances project proponent is extending compensation only to the particular affected / acquired portion which will be a huge loss to the house owners and also it is impossible to lead life in that house, since it is prone to be affected due to sound and noise pollution. Considering all these situations, requested the project proponent to grant compensation by considering the dwelling house as a whole instead as a part. Meantime he also expressed/ suggested the project proponent to provide service roads on either side of the highway including underpass and also requested the project proponent to ensure the nature of the agricultural land / fields before disbursing the compensation to the land losers. He did not raise any issue pertaining to Environment.	NHAI submitted compensation with CALA for disbursement as per evaluation of land and any property as per NH Act 1956 and Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act 2013. Public Works Department (PWD) evaluate value of the affected structures. However, any structure is partially affected – whether it will be compensated for the whole or partial shall be recommended by PWD based on the stability of the structure after acquisition of required part. The final evaluation is determined by SLAO (CALA). The Compensation fixed as per NH Act 1956 and Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act 2013 Guidelines by CALA. In Madamangala Village 1 no. of Vehicular Underpass including access has been incorporated in the project. A total of 16 nos. of Light Vehicular Underpasses, 25 nos. Vehicular underpass and 4 nos. Vehicular Overpasses have provided in design in the project stretch of Kolar district for facilitating pedestrian/ cattle movement / vehicular movement across the Expressway. In addition, 96 nos. of box culverts have also been provided in this

S. No	Issue	Reply
		stretch which will also facilitate movement of pedestrian/cattle /smaller vehicle during dry period. (**Appendix VI** of **Annexure 7.5)**
5.	Sri. Muniyappa, Margal Village, Bangarpet Taluk, Kolar District. He expressed his views to the chair person that, meetings / interaction sessions with the villagers / land losers / public would have been conducted to discuss about the pros and cons of the proposed project or before taking up the project. Also felt that, what the farmers can do with the compensation after losing the agricultural lands which is nothing but routine bread and butter. He also extended heartfelt thanks to the chair person for his concern towards the farmers and meantime requested the chair person to amicably settle the compensation to the land losers. He did not raise any issue pertaining to Environment. The gathering informed that, they do not have any environmental issues due to proposed Chennai Bengaluru Expressway and support the proposed Chennai Bengaluru Expressway.	The Compensation fixed as per NH Act 1956 and Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act 2013 Guidelines by CALA.
6.	The Chairperson requested the audience to submit their representations pertinent to environmental issues and impact being caused due to the proposed project and request can be made to the SLA Office pertinent to land acquisition issues.	No written representation received

8 PROJECT BENEFITS

8.1 Introduction

Expressways have varied embedded connotations, like the backbone of modern economy, the philosophy of life signifying the 'voyage unremitting' from birth till death, the history of mankind and its endeavour, the passion for speed and dart non-episodically etc. Expressway projects promote access to markets, materials and opportunities by facilitating movement of persons and goods and improve earning and thereby level of living. This in turn enhances the demand for transport. The two-way interaction works through a host of inter-sectoral forward and backward linkages effects and dynamics externalities tends to relocate industries, services and labours thus help to shape the economic geography of the region.

Government of India has decided to take up through National Highways Authority of India (NHAI) about 1000 Kms of expressways under Phase VI of the National Highways Development Project (NHDP). NHAI has decided to take up the Bangalore-Chennai Expressway project to facilitate high speed travel in this corridor. The existing National Highway–4 which is running parallel to the proposed expressway carries one of the highest traffic carrying corridors in India. The proposed expressway facility is to be developed as a fully access controlled facility on a new alignment.

The developments due to this project play a significant role in changing the socio -economic condition of the living of people of a region through dynamic externalities that such development often generates. This would in turn lead to changes in the level of well-being and human development, through their benefit in consumption level, education attainment, health status, etc.

8.2 Economic Development

Bangalore is widely known as the 'Silicon Valley of India' as it houses many Information Technology companies both national and international. It houses many public sector industries and has advanced industrially due to the diligent efforts of the state government. Chennai is known as 'Detroit of India' as it houses many four wheeler manufacturing plants. Also it houses many industries and Tamilnadu is in the forefront of industrial development. These two cities are separated by a distance of about 326 km and there is lot of interaction between these two cities. Presently NH-4, NH-46 & NH-7 is providing the connectivity between these two cities. To further improve the interaction and development, NHAI proposed Bangalore-Chennai Expressway between these two cities.

The proposed BCE Phase-I project will provide better connectivity between Bangalore to Chennai and will act as a link between major commercial, industrial and corporate centres of Karnataka, Andhra Pradesh and Tamil Nadu and rest of the South through connectivity. This can contribute economic development by encouraging attraction of business to site equipped with good access and by improving the travel efficiencies of the existing business and to start new avenues. This also helps in developing the following:

- Bangalore Chennai Expressway is a part of Chennai-Bangalore Industrial Corridor (CBIC), one of the largest Infrastructure Projects of Government of India.
- Narsapur Industrial Area in Kolar District is getting connected to the Bangalore Chennai Expressway at Km 24.125
- Development of new Industries
- Development of new Educational Institutions and Hospitals/Health Centers
- Development of Real Estates
- Development of Infrastructure projects
- Development of IT parks
- Development of Special Economic Zones

8.3 Employment Opportunity

Expressway project requires large number of local people during construction stage. The proposed Bangalore-Chennai Expressway Phase-I would require large number of people from nearby villages during construction stage of the project. Thus there will be increase in employment opportunity for the project area directly and indirectly.

8.4 Road Safety

Presently the existing road like NH-4 carries one of the highest traffic carrying corridors in India. In order to cater the traffic demands, NHAI has proposed to provide standard eight-lane dual carriageway configuration of Bangalore-Chennai Expressway to ease traffic flow and also to enhance the safety aspect of the Expressway. There will be segregation of local traffic from those of through traffic by providing grade separators in all the major settlement area, systematically located and designed bus bays and truck lay byes, improvement of sharp curves, etc. The main objective of the proposed project is to ensure:

- Enhanced safety of the though traffic, the road users and the people living close to the Expressway.
- Enhanced operational efficiency of the expressway.
- Fulfilment of the access needs of the local population.
- Minimal adverse impact on the road users and the local population due to construction. Feasible and constructible options for the project with least cost options.

To meet the project objective following provisions have been included in the proposed project:

- **Construction of Access Controlled Expressway**: Construction of 8-lane divided carriageway facility throughout the project length with access controlled facility. The following facilities are to be provided in **Table 8.1**;

Table 8.1: Provisions in Bangalore-Chennai Expressway

S. No.	Items	Proposed
1.	ROW	• Main alignment =90 m • Spur alignment =45 m At Rest Area= 690 m for 425 m length
2.	Carriageway	4 lane divided carriageway with 21 m depressed median expandable to 8-Lane configuration

S. No.	Items	Proposed
3.	Design Speed	120 Kmph
4.	Major Bridge	15 Nos. (13 nos. in Main Expressway and 2 nos. im the Interchange)
5.	Minor Bridge	44 Nos. (41 Nos. at Main Alignment & 3 Nos. at Interchange)
6.	ROB	1 No.
7.	No. of Culverts (Box)	123 Nos. (98 Nos. along Main Alignment & 23 Nos. along Interchange)
8.	Vehicular Underpass	36 Nos. (34 Nos. along Main Alignment & 2 Nos. along Interchange)
9.	Vehicular Overpass	6 Nos.
10	Light Vehicular Underpass	19 Nos.
11.	Interchange	4 Nos.
13.	Rest Area	2 Nos. (Including Both Sides)
14.	Toll Plaza	4 Nos.
15.	Truck Lay Byes	2 Nos. (Including Both Sides)
16.	Connecting roads	9.618 Km
17.	IOCL Crossing	2 nos.
18.	Wayside Amenities	1 no. at 47.906
19.	Street Light	The street light has been proposed for locations at LVUP, VUP, Interchange, Check Post, Rest Area and Toll Plaza Locations.
20.	High Mast Light	The High mast lighting has been proposed along the project highway locations in interchange locations, Rest area, Toll plaza locations and check post locations.
21.	Construction Cost of the Project	Rs. 2676.85 crores.

Others: comprehensive Highway Traffic Management System, User Facilities, Roadside Furniture and safety features, lighting. Street lights at all the settlement areas, additional guard railings and crash barriers, traffic signboards, etc.

With the provisions of the above features, the road safety will definitely be enhanced to a great extent, thereby minimizing the vulnerability of the area to accident hazards.

8.5 Reduction in Vehicle Operating Cost (VOC)

Vehicle Operating Cost (VOC) will be reduced when the road is of improve quality. Fuel consumption, wear and tear of tyres, suspension will be benefited when a geometric of the road is improved. VOC consist of the following components:

- Fuel consumption
- Lubricating oil consumption
- Spare part consumption
- Tyre consumption
- Vehicle depreciation

8.6 Environmental Benefits

The proposed BCE project will ensure the smooth flow of traffic, which reduces the emissions and noise level. Apart from these, plantation will be done throughout the project road, which will increase the aesthetic of the project road. All the bus bays will be provided with proper toilet and drinking water facilities for the people who will be using the local communications. Rest areas with various facilities are proposed for the Expressway users.

8.7 Indirect Benefits

In addition to the direct benefits, there are number of indirect benefit attributed to the Expressway project. Lowering transportation cost for users and improving access to goods and services enables new and increased economic and social activities. The indirect benefits include changes in land use and development, changes in decision on residential area or colonies where land are less expensive or more desirable, changes in development of business in order to take advantage of improved speed and reliability in the transportation system. These benefits hence lead to increase property values, increased productivity, employment and economic growth.

The indirect benefit of the proposed Bangalore-Chennai Expressway would work through the dynamic developmental externalities generated through the forward and backward linkages. The better connectivity on NH-4, NH-7 and NH-207 and will increase the business, which will reflect in the changes in the pattern of economic activities, income generation, price evolution, and employment condition and increase in the Tourism Business. There will be also increase in greater accessibility to job market, health and educational facilities.

9 ENVIRONMENTAL MANAGEMENT PLAN (EMP)

The Environmental Management Plan (EMP) consists of the set of mitigation, monitoring and institutional measures to be taken during the design, construction and operation stages of the project to eliminate adverse environmental impacts, to offset them, or to reduce them to acceptable levels. The plan also includes the actions needed for the implementation of these measures.

The major components of the Environmental Management Plan are

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

9.1 Objectives of the EMP

The main aim of the Environmental Management Plan is to ensure that the various adverse impacts are mitigated and the positive impacts are enhanced. The objectives of the EMP at various stages of the project planning and implementation are as follows:

Design Stage

- To have minimum impact on road side trees, forestation and ground cover
- To keep land acquisition and building demolition at a minimum
- To provide maximum safety to the Expressway users and road side communities as well as segregation of local and slow moving traffic in the congested areas
- To develop a design that incorporates environmental safeguards and
- To provide mitigation measures to all expected environmental degradation

Construction Stage

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

Operation Stage

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

9.2 Critical Environmental Issues

The critical environmental components along the project corridor were identified on the basis of the assessment of the potential impacts. These issues need to be addressed carefully in the Environmental Management Plan. The most critical issues identified at various locations along the project corridor are described in the following **Table 9.1**.

Table 9.1: Critical Environmental Issues to be addressed

S. No.	Critical Environmental Issues	Location
1	Loss of land and properties	Throughout the project alignment
2	Removal of trees	Along the whole stretch
3	Water Tanks (Irrigation Tanks)	Tanks Locations within COI
4	Air Pollution	Throughout the project corridor and allied sites such as borrow area, quarry, campsite, plant site, stockyards, etc.
5	Noise Pollution	Throughout the project corridor
6	Traffic Safety	Throughout the corridor
7	OH&S	Labour Camps & work zones
8	Public Safety	Along the project activity area and project access roads

9.3 EMP Implementation Framework

9.3.1 Key Players of EMP Implementation

The EMP implementation structure, following key players are involved in EMP implementation during construction stage:

- Project Implementation Unit (PIU, NHAI)
- Concessionaire's Supervision Team
- Independent Engineer engaged by NHAI
- Contractors

The General Manager of Concessionaire with the assistance of Project Manager of Contractor and supporting Environmental / Safety Engineer shall be responsible for ensuring compliance of safeguard measures through Contractors under the supervision of concessionaire and will be reporting to the regulatory bodies and competent authority for certifying that relevant environmental safeguard measures have been complied with during project implementation.

Concessionaire shall coordinate with Contractors for complying the requirements of various environmental safeguard measures through supervision, monitoring and reporting on the same. The General Manager, Project Manager of concessionaire, Environmental / Safety Engineers of Contractor and their Field Representatives shall be responsible for discharging the duties of supervising EMP compliance.

9.4 Responsibilities and Authorities

This sub-section has defined the responsibilities and authorities of each of the person of Concessionaire who are involved in supervision, monitoring and reporting of EMP compliance. The responsibilities of Contractors personal who shall be involved in EMP compliance under the contractual obligations have also been delineated for providing guidance and to facilitate in

implementing environmental safeguard measures in proper and acceptable way within the time frame.

9.4.1 Responsibilities of Concessionaire's Chief Project Manager / General Manager (CPM/GM)

Concessionaire's Chief Project Manager / General Manager shall be responsible for providing over all guidance and ensure that responsibilities are complied with. He shall coordinate / discuss with NHAI, PIU / IC on matters requiring their intervention. He shall address the issues of any dispute related to environmental safeguard measures.

9.4.2 Responsibilities of Concessionaire's Project Manager (PM)

The Project Manager shall be responsible for:

- Seeing that those items shown as the responsibility of concessionaire's and Construction Contractor are complied with. In addition, he, through the Environmental / Safety Engineers, shall ensure that Contractor complies with requirements of the Govt. of India / State Govt. Departments/ Authorities including MoEFCC / KSPCB / Forest Department.
- Directing Contractors to comply with those recommendations, on matters related to environment and safety and that he considers being within the Contractor's contractual obligations.
- Consult with NHAI / Independent Consultants for their comment / Feedback in case of repeated non – compliance by the Contractor and inform the same to Chief Project Manager / General Manager.
- Certifying completed road works and environmental monitoring and enhancement measure after satisfactory complying with the Technical Specification and the EMP.
- Reviewing the Contractor's monthly / quarterly report on environmental supervision, monitoring and control.

9.4.3 Responsibilities of Concessionaire's Environmental / Safety Engineer

The Concessionaire's Environmental / Safety Engineers (EEs) shall provide guidance to the Contractor's Field Representatives (FRs), for compliance of each of the activities as per the EMP. He shall be responsible for record keeping, providing instructions to the field representative corrective actions, ensuring compliance of various statutory and legislative requirements and reporting to General Manager / Project Manager for submitting reports to the Independent Consultants (IC). He shall maintain coordination with the contractor and General Manager / Project Manager for successful compliance with the environmental safeguard measure. He shall be working under the overall guidance of the General Manager and Project Manager on environmental aspect.

9.4.4 Responsibilities of Contractor's Project Manager

The responsibilities of Contractors Project Manager under the contractual obligations for EMP implementation has been delineated for providing guidance and ensuring fulfillment of

requirements of Construction Agreement. Under the contractual obligations, the Project Manager (PM) is responsible for**:**

- Preparing EMP implementation plan in consonance with the various construction activities as per the Work Program.
- Ensuring compliance with the statutory / regulatory requirements for sitting and operating plants and equipment i.e. obtaining permits / license / consent in time.
- Ensuring compliance with safeguard measure stipulates in the Contract Document and EMP.
- Maintaining record on EMP compliance at site office and producing the same, as may be required during the inspection of representative/s of Concessionaire, Independent Engineer/ NHAI, MoEFCCCC and KSPCB.
- Submit information / documents on environment and safety requirements at least 48 hours in advance before opening up any site.
- Submit monthly/ quarterly pollution monitoring report.
- Complying with Non-conformance, taking corrective action/s directed by General Manager / Project Manager and submits compliance report for inspection.
- Overseeing the activities of his Environmental and Safety Engineer. Ensuring representation during periodic joint inspections.
- Submission of Monthly Summary Report to the General Manager on all matters related to environment and safety.

9.4.5 Responsibilities of Contractor's Environmental/ Safety Engineer (CEE/CSE)

He shall be responsible for compliance the environmental and safety safeguard as per EMP, ensuring compliance of the instructions given by the General Manager / Project Manager. He shall maintain close interaction with Environmental Engineer of concessionaire for environment and safety measure. He is advised to maintain records, and reporting to the Concessionaire through Project Manager (Contractor) on actions taken for any non-conformances found during inspection or any recommendation given by the General Manager / Project Manager and agreed by the contractor.

9.5 Environmental Management Action Plan

This section describes the Environmental Management Action Plan for the proposed project during different stages of project. The Environmental mitigation measures have been incorporated at all the stages of the project right from Designing phase to Construction and Operational Phase. All care has been taken to have minimum impact on trees and ground cover, to keep impacts on people at a minimum, to keep land acquisition at a minimum, to provide maximum safety to the Highway users and to provide mitigation measures to all expected environmental degradation during design stage itself. Further to this the Management Plan has been formulated for implementation of environmental mitigation measures to be carried out by the Concessionaire and to ensure that the provisions of the EMP are strictly followed and implemented by strengthening implementation arrangements to prevent and minimize the adverse environmental impacts during Construction phase of the project. EMP has also addressed certain environmental measures to be taken to prevent further deterioration of

environment components and to improve the safety of the Highway users and roadside communities during Operational Stage of the Project.

Appropriate measures have also been identified for action during various stages of the project, viz, Design and Pre-Construction, Construction and Operational phases. The measures identified for all three phases, are tabulated in **Table 9.2** which describes the nature of the potential environmental impact, the measures, which have or will be taken, the timeframe in which they are taken, the implementing agency and responsible organization.

9.6 Environmental Training

The Project Implementation Unit (PIU) & the EO, in addition to implementing and monitoring different environmental attributes, will also be actively involved in imparting training and raising environmental awareness level of Construction Engineers/Contractors and the other staff members/workers so as to enable them to take the environmental aspects into consideration as and when required. In the long term, the PIU can impart additional and specialized training in the environmental management of the road system. A budgetary provision of Rs. 27,00,000 has been made for imparting Environmental Training.

Table 9.2: Environmental Management Plan

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
A. DESIGN & PRE-CONSTRUCTION STAGE					
PC.1.1 Acquisition of Land and Properties	• Land acquisition will be kept bare minimum. The acquisition of land and private properties will be carried out in accordance with the RAP and entitlement framework for the project. • Early identification of entitlement for Compensation and Advance planning of Resettlement and Rehabilitation Action Plan to Compensate the Losses. • All the affected people will be compensated as per LA & R&R 2013 Act before commencement of Construction works and the cost of compensation will be finalized by the Competent Authority and the Project Proponent will pay the compensation at all the entitles persons through the Competent Authority. • It will be ensured that all R & R activities including implementation of Environment Management Plan are completed before the start of work. • PIU has to ascertain that any additional environmental impacts resulting from acquisition of land are addressed and integrated into the EMP and other relevant documents.	Throughout Corridor	Pre-Construction Stage	PIU Revenue Dept. NGOs Collaborating Agencies	PIU-NHAI
PC.1.2 Tree Cutting	• About 20,748 trees will be required to be felled due to the proposed Project. • The statutory permission for tree felling will be obtained prior to cutting of trees. • All efforts will be made to preserve trees by restricting tree cutting within the formation width. Special attention	Through the Project Stretch	Pre-Construction Stage	Concessionaire & PIU-NHAI	PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	will be given for protecting giant trees, and locally important trees (having cultural importance). • The required number of trees will be planted within the proposed ROW along the proposed project by following NHAI Plantation Strategy and Guidelines for Landscaping and Tree Plantation IRC: SP:21-2009. • A general compensatory plantation scheme is presented in **ANNEXURE 9.1**				
PC.1.3 Relocation of Community Utilities and Common Property Resources	• All community utilities and properties i.e., water supply lines, hand pumps will be relocated before start of construction. • The PIU will relocate these properties in consultation and written agreement with the agency/ owner/community. • Environmental considerations with suitable/required actions including health and hygiene aspects will be kept in mind while relocating all community utilities and resources.	Throughout Corridor wherever these features are located	Pre-Construction Stage	PIU, NHAI, NGOs and R&R unit	PIU-NHAI, Line Department
PC.1.4 Water Tanks/ Reservoirs	• Altogether a total number of 14 Tanks will be partially affected due to the proposed alignment passing through the water tanks used for irrigation purpose. • Necessary permission will be obtained from the line department for acquisition of water tank prior to commencement of construction and all the conditions stipulated by the line department for protection of the affected tanks will be complied with. • To avoid major impact on water flow and water holding capacity of the irrigation tanks, elevated structures have been proposed across these affected tanks. The details of the mitigation measures in design has been listed in	At locations where these water bodies are present	Pre-Construction Stage	PIU Concerned Agencies Concessionaire	PIU-NHAI, Line Department

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	Annexure 4.2 • The cost of protection measures of water tank will be borne by the NHAI • Filling will be limited to the actual formation width only. Major Bridges, Minor Bridges have been proposed for all the tanks/ponds which are crossing the alignment for ensuring cross water flow. • Bunds will be constructed/ the existing bund will be strengthened along the ponds/tanks parallel to the project alignment in consultation with the Irrigation Department so as to avoid impacts during operational stage.				
PC.1.5 Religious/Cultural Properties	• The project alignment has been selected to minimize displacement of population, properties and cultural cultural properties. However, dislocation of few of the structures is unavoidable. • Consultations have been carried out with the local communitioes for obtaining opinion for shifting of religious structures. Relocation of religious structures will be ensured. The relocation site will be decided with the consultation with local population and the related community users. • Preference of the local community using the structure will be addressed during relocation/ renovation of such affected features.	At 1 location where these features are present	Pre-Construction Stage	PIU, NHAI, NGOs and R&R unit	PIU, NHAI
PC-1.6 Arrangements for	• The Concessionaire as per prevalent rules will carry out negotiations with the landowners for obtaining their	At temporary camp site,	Pre-Construction	Concessionaire	IE; PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
temporary land for Establishing Camps/Plants/ Temporary diversions, etc.	consent for temporary use of lands for workers camp, construction sites/mixing plants/traffic detours etc. • The Concessionaire will submit the legal agreement/ written Consent letter from the owner of the land for using fir specific purpose along with its rehabilitation plan as agreed by the owner. • The Concessionaire will ensure that the site is properly restored to the satisfaction of the land owner prior to handling over to the owner and shall submit satisfactory certificate from the Land Owner.	temporary diversion and plant sites	Stage and Post utilization of the land		
PC. 1.7 Establishment of Construction/ Workers Camp	• The locations of construction camp to be identified by the Concessionaire. Construction camps will not be proposed within 500 m from the nearest settlements to avoid conflicts and stress over the infrastructure facilities with the local community. Location for stockyards for construction materials will be identified at least 1000m from water sources. • The Concessionaire will submit the legal agreement/ written Consent letter from the owner of the land for using fir specific purpose along with its rehabilitation plan as agreed by the owner. • The Camp site will be provided with all the necessary facilities as per norms.	At temporary camp site, temporary diversion and plant sites	Pre-Construction Stage and Post utilization of the land	Concessionaire	IE; PIU-NHAI
PC 1.8: Establishment of Stone crushers, mixing plants, WMM Plant, Concrete Batching plants etc.	• Stone crushers, mixing plants: WMM Plants and Concrete Batching plants will be sited sufficiently away from settlements, agricultural operations and any commercial establishments. Such plants will be located at least 800m away from the boundary of the nearest village/settlement preferably in the predominant downwind side.	Plant Site	Pre-Construction Stage	Concessionaire	IE/ PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	• The Concessionaire shall submit a detailed layout plan for all such sites and approval of the Environmental Expert of Independent Engineer (IE) shall be necessary prior to their establishment. • All plants will be fitted with adequate dust suppression and emission control equipment and facilities. • Specifications of crushers and mixing plants will comply with the requirements of the relevant current emission control legislations and Consent/NOC for all such plants shall be obtained from the State Pollution Control Board. • The Concessionaire shall not operate the plants till the required legal clearance are obtained and submitted. • A general guideline given in **ANNEXURE-9.2** may be followed for establishing the plants sites, operation and pollution control measures to be adopted at site.				
PC.1.9 Borrow Area	• Finalizing borrow areas for borrowing earth and all logistic arrangements are well as compliance to environmental requirements, as applicable, will be the sole responsibility of the Concessionaire. • The Concessionaire will obtain Environmental Clearance for each proposed borrow area as per the provisions of EIOA Notification. Each borrow area will be selected and operated in compliance with the norms as well as the conditions stipulated by the regulatory Authority. • The Concessionaire will not start borrowing earth from select borrow area until the formal agreement is signed between the land owner and the Concessionaire and a copy is submitted to the IE and the PIU.	Identified Borrow area	Pre-Construction and Construction Stage	Concessionaire	IE; PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	• Non-productive, barren lands, raised lands, river beds, waste lands are recommended for borrowing earth. • If vehicles carrying materials from borrow areas are pass through villages, the excavation and carrying of earth will be done during day time only. • The unpaved surfaces used for the haulage of borrow materials will be maintained properly • To avoid any embankment slippages, the borrow areas will not be dug continuously, and the size and shape of borrow pits will be decided by the Engineer • Borrow pits will be redeveloped. • A general guideline for Borrow area operation and rehabilitation given in **ANNEXURE 9.3** may be followed				
PC.1.10 Quarry Area	• The quarry material will be obtained from licensed sites only, which operate with proper environmental clearances, including clearances under the Air Act or if Concessionaire wants to open a new Quarry. In case the Concessionaire decides to use quarries other than recommended by Consultants, then it will be selected based on the suitability of the materials and shall take the entire requisite licenses from Dept. of Mines and Geology. • The Concessionaire will obtain Environmental Clearance for the operating new quarry for construction as per the provisions of EIA Notification, 2006 and amendment thereafter. • The quarry operations will be undertaken within the rules and regulations in force. All safety and environmental concerns will be addresses adequately during quarry	Quarry sites	During construction	Concessionaire	IE; PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	operations and transportation of materials as per prevailing rules. • Only controlled blasting shall be carried out, if necessary for extraction of stone materials in strict compliance with the statutory norms and specification. Explosive Management is given in **Annexure 9.9** • The restoration of Quarry will be done as per the conditions of the owner before handing over the site back to the owner. • A general guideline for Quarry area operation and rehabilitation given in **ANNEXURE 9.4** may be followed.				
B. CONSTRUCTION STAGE					
C.1. Impact on Land and Soil					
C.1.1. Soil Erosion	• High embankments will be provided with chutes and drains to minimize soil erosion • Stone pitching and retaining walls will be made at high embankments in critical areas • Turfing of low embankments and plantation of grasses and shrubs will be done in slope stabilisation. • In borrow pits, the depth of the pit will be regulated that the sides of the excavation will have a slope not steeper than 1:2, from the edge of the final section of bank. • Soil erosion checking measures as the formation of sediment basins, slope drains, etc, will be carried out.	At all embankment locations, bridge locations and borrow pits	During construction	Concessionaire	IE; PIU-NHAI
C.1.2. Loss of topsoil	• Agricultural areas will be avoided for borrowing of materials, unless requested by the land owner. • The topsoil from all areas of cutting and all areas to be permanently covered will be stripped to a specified depth	Throughout project corridor	During construction	Concessionaire	IE; PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	of 150 mm and stored in stockpiles of height not exceeding 2m. • The stored topsoil will be spread back to maintain the soil physico-chemical and biological activity. The preserved top soil will be used for restoration of sites, in landscaping and avenue plantation				
C.1.3. Compaction of soil	• Construction vehicles, machinery and equipment will move, or be stationed in the designated area, to avoid compaction of soil. • If operating from temporarily hired land, it will be ensured that the topsoil for agriculture remains preserved & not destroyed by storage, material handling or any other construction related activities.	Throughout Project Corridor	During construction	Concessionaire	IE; PIU-NHAI
C.1.4. Contamination of land from fuel and lubricants	• Impervious platform and oil and grease trap for collection of spillage from construction equipment vehicle maintenance platform will be appropriately provided at construction camp, servicing area and liquid fuel and lubes at storage areas.	Construction Camp, Vehicle and Equipment Servicing Centre and Construction site	During Construction	Concessionaire	IE; PIU-NHAI
C.1.5. Contamination of land from construction wastes and spoils	• All spoils will be disposed off as desired and the site will be fully cleaned before handing over. The non-usable bitumen spoils will be disposed off in a deep trench providing clay lining at the bottom and filled with soil at the top (for at least 0.5m)	All construction sites, borrow pits camps Throughout Project Corridor	During construction	Concessionaire	IE; PIU-NHAI
C. 2. Impact on Water Resources					
C.2.1. Drainage and run-off	• The Concessionaire will always clear all the cross drainage structures and natural drainage before onset of monsoon in order to keep all drainage unblocked Earth,	At locations of CD structures	During construction	Concessionaire	IE; PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	stones, wastes and spoils will be properly disposed off, to avoid blockage of any drainage channel. • All necessary precautions will be taken to construct temporary or permanent devices to prevent inundation or ponding.				
C.2.2 Rainwater Harvesting & Removal of Oil & Grease from Runoff water	• The Concessionaire will construct Rain water harvesting pits at an average distance of 500 m which will be connected with longitudinal drains • The pits should be at least 3-5 m above the highest ground water table. • The Concessionaire shall submit a detailed layout plan for all such sites in consultation with Central Ground Water Board and approval of the Engineer (IE) shall be necessary prior to their establishment. • The schematic diagram of Rain water harvesting pit is presented as **ANNEXURE 9.5**. • The Concessionaire will provide oil receptors connected with longitudinal drains in a manner that can regulate the runoff water as well as extract the oil and grease from the runoff water before entering the rainwater harvesting pits or nearby water bodies or agriculture fields. A typical schematic plan may be followed for construction oil receptors at strategic locations as per **ANNEXURE 9.6.**	Throughout the stretch	Construction Stage	Concessionaire in consultation with Ground Water Board	IE; PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
C.2.3. Contamination of water from construction and allied activities	• All necessary precautions will be taken to construct temporary or permanent devices to prevent water pollution due to increased siltation and turbidity. • The Concessionaire will take all precautionary measures to prevent the wastewater generated during construction from entering into canals, water bodies or the irrigation system and avoid construction works close to canals or water bodies during monsoon. • All wastes arising from the project will be disposed off, as per SPCB norms, so as not to block the flow of water. • No construction materials/ spoils will be stored along the water bodies and adequate provision will be made for preventing spillage of materials into these water bodies. • Wastes must be collected, stored and taken to approved disposal site. • Water quality to be monitored periodically as per Environmental Monitoring Plan.	Throughout Project Corridor where the Ponds/Tanks and Reservoirs are present	During construction and after	Concessionaire	IE; PIU-NHAI
C.2.4. Contamination of water from fuel and lubricants	• The Concessionaire will ensure that all construction vehicle parking location, fuels/lubricants storage sites, vehicles, machinery and equipment maintenance sites are located at least 100m away from any water body. The Concessionaire will also ensure that spillage of fuels and lubricants do not contaminate the ground. • The slopes of embankment leading to water bodies will be modified and rechanneled so that contaminants do not enter the water body. • Oil and grease traps will be provided at fuelling locations, to prevent contamination of water. • The Concessionaire will arrange for collection, strong and	Throughout Project Corridor and at all locations of water bodies (Ponds/Tanks and Reservoirs)	During construction	Concessionaire	IE; PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	disposal of oily wastes to the pre-identified disposal sites (list to be submitted to IE and PIU) and approved by the Environmental Expert. All spills and collected petroleum products will be disposed off in accordance with statutory guidelines.				
C.2.5. Sanitation and waste disposal in construction camps	• Garbage tanks and sanitation facilities will be provided at camps. • The construction camps will be located away from water sources. • Efforts will be made to provide good sanitary conditions at camp to avoid epidemics. • The workplace will have proper medical approval by local medical, health or municipal authorities.	At Construction camp locations, wherever located along the Project corridor	During construction	Concessionaire	IE; PIU-NHAI
C.2.6. Use of water for construction	• The Concessionaire will make their own arrangement to meet water requirement for construction and other usage for the project. • The Concessionaire will use ground water/surface water as a source of water for the construction after taking prior permission from Competent Authority. • The Concessionaire will at all-time abide by the conditions stipulated under the permission for water abstraction for construction purpose. • The Concessionaire will provide a list of locations and type of sources from where water for construction will be used and obtained approval from the Engineer/NHAI • To avoid disruption/disturbance to other water users, the Concessionaire will extract water from fixed locations away from local community sources. The Concessionaire will not be allowed to pump water from any irrigation	Throughout Project Corridor	During construction	Concessionaire	IE; PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	canal and surface water bodies used by the community. • The Concessionaire is required to comply with the requirements of the State Ground Water Department and seek its approval for doing so and submit copies of the permission to Environmental Expert of IE and PIU. • Wastage of water during the construction will be minimized.				
C.2.7 Community water Source	• Damage to any community water source such as wells, tube-wells, water supply pipelines etc., due to construction activities in a particular area, will be replaced immediately by the Concessionaire at their own cost.	Throughout the Stretch	During construction	Concessionaire	IE; PIU-NHAI
C.3. Impact on Air Environment					
C.3.1. Emission from construction vehicles and machinery	• All vehicles, equipment and machinery used for construction will be regularly maintained to ensure that the pollution emission levels conform to the KSPCB norms. • The asphalt plants, crushers and the batching plants will be sited at least 800 m in the downwind direction from the nearest human settlement (Boundary of town/village). • Vehicles transporting earth materials will be covered • Mixing equipment will be well sealed and equipped as per KSPCB norms.	Throughout Project Corridor at construction sites, mixing plant, concrete batching plant	During construction and after	Concessionaire	IE; PIU-NHAI
C.3.2 Emission from Construction Vehicles, Equipment	• Concessionaire will ensure that all vehicles, equipment and machinery used for construction are regularly maintained and confirm that pollution emission levels comply with the relevant requirements of KSPCB.	Throughout Project Corridor at construction sites, mixing	During construction	Concessionaire	IE; PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
and Machineries	• The Concessionaire will submit PUC certificates for all vehicles/ equipment/machinery used for the project. Monitoring results will also be submitted to 'PIU' through the 'Engineer'. • Periodical monitoring of fine Particulate Matters (PM10 and PM2.5) will be carried out as per Environmental Monitoring Plan. • Workers at mixing sites will be provided with good quality personal protective equipments (PPE) reduce the chances of ill effect of dust.	plant, concrete batching plant and the equipments and vehicles at sites			
C.3.3 Dust Pollution	• The Concessionaire will take every precaution to control dust nuisance at all the construction zones and allied sites where works are under progress. • Every equipments and machinery will be fitted with dust suppression devices such as water sprinklers, dust bags, cyclone etc. As appropriate. • The Concessionaire will provide necessary certificates to confirm that all crushers used in construction conform to relevant dust emission control legislation. • At all the construction zones and unpaved lead roads, earthen temporary diversions and plant premises periodical water sprinkling will be carried out to suppress dust. • Transportation of loose earth, sand, and fly ash will be done in covered vehicles. • All equipments and machineries will be maintained properly. • Periodical monitoring of fine Particulate Matters (PM10 and PM2.5) will be carried out as per Environmental	Throughout the Construction zones, plant sites, borrow area/quarry sites, camp site	During construction	Concessionaire Concessionaire through Approved Monitoring Agency	IE/SC, PIU,NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	Monitoring Plan. • Workers at mixing sites will wear masks to reduce the chances of exposure to fugitive dusts.				
C.3.4 Dust due to Fly Ash Utilization	• The Concessionaire will submit the details of fly ash utilisation plan in construction along with handling, handling and transportation plan. • Fly ash shall be handled and stocked by following the statutory norms and the Guidelines as per IRC: SP:58-2001 • On daily basis it will be ensured that all dumpers carrying fly ash are fully covered by tarpaulin • Fly ash from hoppers or silos must be conditioned with water at power plant to prevent dusting enroute. • As far as possible stockpiling of Fly ash should be avoided, but in case stockpiling at site is inevitable, adequate precautions should be taken to prevent dusting by spraying water on stockpiles at regular intervals and by providing covers of tarpaulins or a thin layer of soil or other granular material not subject to dusting. • The Traffic movement may be restricted to those areas which are kept moist to prevent tyres of passing vehicles dispersing ash into the air. • Fly Ash utilisation plan for the project road is given in **ANNEXURE 9.7**.	Construction sites and Stock yards	During construction	Concessionaire	IE/SC, PIU,NHAI
C.4. Impact on Noise level					
C.4.1. Noise from vehicles, asphalt plants and	• The Concessionaire will confirm the following: • All plants and equipments used in construction shall strictly conform to the CPCB/KSPCB noise standards.	Throughout Project Corridor and at all	During the construction, till the closure	Concessionaire	IE; PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
equipments	• All vehicles and equipment used in construction will be fitted with exhaust silencers. • Servicing of all construction vehicles and machinery will be done for exhaust silences and will be checked and if found defective will be replaced. • All the construction sites within 150m of the nearest habitation, noisy construction work such as crushing, concrete mixing will be stopped during the night time between 10.00 pm to 6.00 am. • No noisy construction activities will be permitted around educational institutions/health centres (silence zones) up to a distance of 100 m from the sensitive receptors. • Monitoring shall be carried out at the construction sites as per the monitoring schedule and results will be submitted to IC and PIU. • Environmental Expert will be required to inspect regularly to ensure the compliance of EMP.	construction sites, hot mix plant concrete batching plants	of such sites		
C.5. Impact on Flora					
C.5.1. Loss or damage to vegetation	• Vegetation will be removed from the construction zone before commencement of construction. All works will be carried out such that the damage or disruption to flora other that those identified for cutting is minimum. • Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works will be removed with prior approval from the Environmental Expert. • The Concessionaire, under any circumstances will not cut or damage trees. • Trees identified under the project will be cut only after	Throughout Project Corridor	Just after completion of construction activities	Concessionaire	IE; PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	receiving clearance from the Forest Department and after the receipt of written permission from PIU. • Vegetation only with girth of over 30 cm measured at a height of 1.0 m above the ground will be considered as trees and shall be compensated.				
C.5.2. Compaction of vegetation	• Construction vehicles, machinery and equipment will move or be stationed in the designated area only (RoW or CoI, as applicable), to prevent compaction of vegetation outside the RoW. • While operating on temporarily acquired land for traffic detours, storage, material handling or any other construction related or incidental activities, it will be ensured that the trampling of soil and damage to naturally occurring herbs and grasses will be avoided.	Throughout Project Corridor	Just before commencement of construction	Concessionaire	IE; PIU-NHAI
C.6. Impact on Fauna					
C.6.1. Loss, damage or disruption to fauna	• Construction workers will be directed not to disrupt or damage the fauna. • State rules for hunting (wild life protection) will be adhered and rules for Bird catching (wild life protection) will be adhered • Construction vehicles will run along specified access to avoid accidents to cattle.	Along Forest Stretch	During construction	Concessionaire	IE; PIU-NHAI
C.7. Safety And Accident Risks					
C.7.1. Accident risks from construction activities	• To ensure safe construction in the temporary accesses during construction, lighting devices and safety sign boards will be installed. • Traffic rules and regulations will be strictly adhered to. • At blasting sites, the blasting time, signal and guarding	Throughout Project Corridor	During construction	Concessionaire	IE; PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	will be regulated. Prior to blasting the site will be thoroughly inspected. Blasting will not be carried out during rush hours • Safety of workers undertaking various operations during construction will be ensured by providing helmets, masks, safety goggles, etc. • The electrical equipment will be checked regularly • At every camp site, a readily available first aid unit including an adequate supply of dressing materials, a mode of transport (ambulance), para medical staff and an attending doctor will be provided. • Road safety education will be imparted to drivers running construction vehicles. In case of negligent driving, suitable action will be taken. • Adequate signage, barriers and persons with flags during construction to control the traffic will be provided. • Communications through newspaper/announcements/radio/TV about the time frame of the project and the activities causing disruptions on road access and the temporary arrangement made to give relief to the public will be undertaken.				
C.7.2 Occupational Health & Safety of Workers	• The Concessionaire will provide adequate good quality Personal Protective Equipment's (PPE) to all the workers working at construction zones and Plant sites and will ensure that these PPEs are used by workers at all time during works. • Adequate drainage, sanitation and waste disposal will be provided at workplaces. • Proper drainage will be maintained around sites to avoid	Workers Camp Site and Construction Zones	During construction	IE, PIU, NHAI	Occupational Health & Safety

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	water logging leading to various diseases • Adequate sanitation and waste disposal facilities will be provided at construction camps by means of septic tanks, soakage pits etc. • A health care system will be maintained at construction camp for routine checkup of workers and avoidance of spread of any communicable disease • Readily available First Aid kit bearing all necessary first aid items will be proved at all the work sites and should be regularly maintained.Environment,Health and Safety Management Plan is given as **Annexure 9.10**				
C.7.3 Accessibility	• The Concessionaire will all time provide safe and convenient passage for vehicles, pedestrians and livestock to and from roadsides and property access as connecting the project road. The Concessionaire will also ensure that the existing accesses are not blocked without providing adequate provisions and to the prior satisfaction of Engineer. • The Concessionaire will take care that the cross roads are constructed in such a sequence so that traffic movement on any given area does not get affected.	At all Construction Zones Along settlement stretches and at major intersections	During construction	Concessionaire	IE; PIU-NHAI
C.7.4 Traffic Management during Construction	• In the construction zones the Concessionaires shall provide adequate traffic safety measures conforming to the of Manual of Specifications and Standards for Expressways **(IRC: SP:99-2013)** • Detailed Traffic Control Plans will be prepared and submitted to the Engineer and PIU-NHAI for approval, five days prior to commencement of works on any section of road. The traffic control plans shall contain	All the Construction Zones	During Construction	Concessionaire	IE; PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	details of temporary diversions, traffic safety arrangements for construction under traffic, details of traffic arrangement after cessation hazardous materials and arrangement of flagmen. • The Concessionaire will provide specific measures for safety of pedestrians and workers at night as a part of traffic control plans. The Concessionaire will ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. The Concessionaire will also inform local community of changes to traffic routes, conditions and pedestrian access arrangements with assistance from IC and PIU. • A general Guidelines' for managing traffic may be followed as per **ANNEXURE-9.8**.				
C.8. Impact Cultural Properties					
C.8.1. Damage or loss of cultural properties	• Relocation of adversely impacted cultural properties • If any valuable or invaluable articles such as fabrics, coins, artefacts, structures, or other archaeological relics are discovered, the excavation will be stopped and Archaeology Department, Karnataka will be intimated. • Construction camps blasting sites and all allied construction activities will be located at least 500 m away from the cultural property	Throughout Project Corridor and at all locations of Cultural Properties	Before construction starts During construction	Concessionaire and Archaeology Department Karnataka	IE; PIU-NHAI
C.9 Camp Site Management					
C.9.1 Labour Camp facility	• Contractor will follow all relevant provisions of the Factories Act, 1948 and the Building and the other Construction Workers (Regulation of	Camp Site	Construction Stage	Concessionaire	IE; PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	Employment and Conditions of Service) Act, 1996 for construction and maintenance of labour camp. • The location, layout and basic facility provision of each labour camp will be submitted to the Engineer and PIU prior to their construction. • The construction will commence only upon the written approval of the Engineer. • The contractor will maintain necessary living accommodation and ancillary facilities in functional and hygienic manner and as approved by the Engineer. • Periodical medical check-up will be ensured for all the workers. The details are given in **Annexure 9.11.**				
C.9.2 Potable Water	• The Concessionaire will provide potable water facilities within the precincts of every workplace in an accessible place. • The Concessionaire will also guarantee the following: • Supply of sufficient quantity of potable water (as per IS) in every workplace/labour camp at suitable and easily accessible places and regular maintenance of such facilities. • If any water storage tank is provided, the bottom of the tank will be kept at least 1mt. above from the surrounding ground level. • If water is drawn from any existing well, which is within 30mt. proximity of any toilet, drain or other source of pollution, the well will be disinfected before water is used for drinking. • All such wells will be entirely covered and provided with a trap door, which will be dust proof and waterproof.	Camp site and work zones	Construction Stage	Concessionaire	IE; PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	• A reliable pump will be fitted to each covered well. The trap door will be kept locked and opened only for cleaning or inspection, which will be done at least once in a month.				
C.9.3 Sanitation and Sewage system	• The Concessionaire will ensure that- • The sewage system for the camp will be designed, built and operated in such a fashion that it should not pollute the ground water or nearby surface water. • Separate toilets/bathrooms, will be arranged for men and women • Adequate water supply is to be provided in all toilets and urinals • All toilets in workplaces are with dry-earth system (receptacles) which are to be cleaned and kept in a strict sanitary condition • Night soil (human excreta) is to be disposed off by putting layer of it at the bottom of a permanent tank prepared for the purpose and covered with 15cm, layer of waste or refuse and then covered with a layer of earth for a fortnight.	Camp Site	Construction Stage	Concessionaire	IE; PIU-NHAI
C.9.4 Waste disposal	• The Concessionaire will provide segregated garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner as per the Comprehensive Solid Waste Management Plan approved by the Environmental Expert of IE. • Unless otherwise arranged by local municipal authority, arrangements for disposal of night soils (human excreta) suitably approved by the local municipal authority or as directed by the Engineer, will be arranged by the	Camp site	Construction Stage	Concessionaire	IE; PIU-NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	Concessionaire.				
C.10 Monitoring of Pollution					
C.10.1 Monitoring of Air, Water & Noise Quality Pollution Monitoring	• The periodic monitoring of the ambient air quality, noise level, water (both ground and surface water) quality, soil pollution/contamination in the selected locations as suggested in environmental monitoring plan will be the responsibility of Concessionaire. • PIU will appoint MOEFCC/KSPCB approved pollution monitoring agency for this purpose.	As per Environmental Monitoring Plan (Construction Zones and Plant/Camp Sites)	During Construction	Concessionaire through approved laboratory	IE; PIU-NHAI–
C.11 Site Restoration and Rehabilitation					
C.11.1 Clean-up Operations, Restoration and Rehabilitation	• Contractor will prepare site restoration plans, which will be approved by the Engineer. • The clean-up and restoration operations are to be implemented by the Concessionaire prior to demobilization. • The contractor will clear all the debris material at site, temporary structures; dispose all garbage, night soils and POL waste as per Comprehensive Waste Management Plan and as approved by the Engineer (IE). • All disposal pits or trenches will be filled in and effectively sealed off. Residual topsoil, if any will be distributed on adjoining/ proximate barren land or areas identified by the IE in a layer of thickness of 75 mm-l50 mm. • All construction zones including river-beds, culverts, road-side areas, camps, mixing plant sites, crushers, batching plant sites and any other area used/affected by the project will be left clean and tidy, at the contractor's expense, to the entire satisfaction of the Engineer (IE).	Construction zones, Camp and other allied sites	After Completion of Construction and before demobilization of Construction Team	Concessionaire	IE, PIU – NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
O. OPERATION STAGE					
O.1 Road and Traffic Safety	• Traffic Control Devices/Road Safety Devices/ Roadside Furniture including various types of cautionary, informatory, regulatory as mandatory signboards, road markers, studs, etc. shall be provided at appropriate locations all along the project stretch in accordance with the specifications laid down in Manual of Specifications and Standards for Expressways **(IRC:SP:99-2013)** and IRC:8, IRC:25, IRC:26, IRC:35, IRC:67, IRC:79, IRC:103 and Section 800 of MORTH Specifications. General guidelines have been presented in **ANNEXURE-9.8.** • Post-accident assistance plan will be implemented in accordance with the standards and specifications stipulated under Manual of Specifications and Standards for Expressways **(IRC:SP:99-2013)** • There will be provision of one highway traffic Patrol vehicle, one crane and one well equipped ambulance at every 50 Km intervals. • The Concessionaire has to ensure regular patrolling of highway section and to adopt effective communication system to monitor the highway and respond quickly in case of any emergency situations • Display of Emergency contact numbers, at regular intervals • In case of breakdown of vehicles, the highway should be cleared by using necessary machinery within short duration time. • In case of any accident the ambulance will give necessary assistance to the accident victims and take	Throughout the Project Stretch	Operation stage		

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
	them to nearest hospital.				
O-2 Monitoring of Operation Performance	• The PIU will monitor the operational performance of the various mitigation/enhancement measures carried out as a part of the project. • The indicators selected for monitoring include the survival rate of trees; utility of enhancement provision for relocated utilities, hand pumps and other relocated structures if any; status of rehabilitation of borrow areas; and noise barriers, which are proposed at different locations.	Throughout the project Stretch	Operation stage	Concessionaire	IE; PIU-NHAI
O-3 Maintenance of Drainage	• PIU will ensure that all drains (side drains, cross drains etc.) are periodically cleared especially before monsoon season to facilitate the quick passage of rainwater and avoid flooding. • PIU will ensure that all the sediment and oil and grease traps set up at the water bodies are cleared once in every three months.	Throughout the project Stretch	Operation stage/	Concessionaire	IE; PIU-NHAI
O-4 Pollution Monitoring	• The periodic monitoring of the ambient air quality, noise level, water (both ground and surface water) quality, soil pollution/contamination in the selected locations as suggested in environmental monitoring plan will be the responsibility of Concessionaire. • PIU will appoint MOEFCC/KSPCB approved pollution monitoring agency/Laboratory for this purpose.	As per Environmental Monitoring Plan	Operation stage/	Concessionaire through approved laboratory	IE; PIU-NHAI
O-5 Contamination of Surface Water due to Traffic Movement & Accidents	• Contingency Plans will be developed for cleanup of oil spills, fuel and toxic chemicals.	Throughout the project stretch	Operation stage/	Concessionaire PIU, NHAI	PIU, NHAI

Environmental issue/ component	Mitigation Measures	Location	Timeframe	Institutional responsibility	
				Implementation	Supervision
O.6 Noise Pollution	• Noise pollution will be monitored as per monitoring plan at different zones. • Noise attenuating Tree Species to be planted along the road • Noise control programs are to be enforced strictly. Monitoring the effectiveness of the pollution attenuation barriers, if there is any, will be taken up.	especially inhabitant location	Operation stage	Concessionaire through approved laboratory	PIU, NHAI
O.6 Accident Hazard and Safety	• Provision of elaborate system of sign boards and road markings along the whole stretch • Provision of suitable lighting arrangement at required locations • Development of Emergency Response and Contingency Plan for accidents • Regular highway patrolling	Throughout the project stretch	Operation Stage	Concessionaire, PIU-NHAI	PIU-NHAI

9.7 Corporate Environment Responsibility

Corporate Environment responsibility (CER) is a form of corporate self-regulation integrated into a business model. CER policy functions as a built-in, self-regulating mechanism whereby business monitors and ensures its active compliance with the spirit of the law, ethical standards, and international norms. The Corporate Environment Responsibility is a proactive process to sustainable development approaches. It demands that businesses manage the economic, social and environmental impacts of their operations to maximise the benefits and minimise the downsides The goal of CER is to embrace responsibility for the organisation's actions and encourage a positive impact through its activities on the environment, consumers, employees, communities, stakeholders and all other members of the public sphere. Key CER issues include governance, environmental management, stakeholder engagement, labour standards, employee and community relations, social equity, responsible sourcing and human rights.

Furthermore, CER-focused development activities would proactively promote the public interest (PI) by encouraging community growth and development, and voluntarily eliminating practices that harm the public sphere, regardless of legality. CER is the deliberate inclusion of PI into corporate decision-making that is the core business of the company or firm, and the honouring of a triple bottom line: people, planet, profit. CER describes an organisation's commitment to be accountable to its stakeholders.

The responsibility for implementation of CER will lie with the NHAI. The following activities may be considered under Corporate Social Responsibility.

Avenue Plantation:

Avenue plantation (plantation of trees on an above the statutory requirement) may be taken up in the affected villages under CER programme. The trees have multiple benefits to the society and environment. There are various reasons for which the plantation services hold high importance.

- ***Trees clean the air***: Trees help cleanse the air by intercepting airborne particles, reducing heat, and absorbing pollutants such as carbon monoxide, sulphur dioxide, and nitrogen dioxide.
- ***Trees are Effective Sound Barriers***: Trees, planted at strategic points in a neighborhood or around your house, can mitigate major noises from crowded roads, railway stations and airports.
- ***Trees Produce Oxygen***: A mature leafy tree, in a few months, produces as much oxygen as that required by 10 people for one year.
- ***Trees become dustbins for harmful gases***: a tree absorbs and locks away carbon dioxide, and other harmful gases which warm the environment. An urban forest is a carbon storage area that can lock up as much carbon.
- ***Trees Shade and Cool:*** Shade from trees reduces the need for fan, coolers and air conditioning in summer.
- ***Trees Fight Soil Erosion:*** Trees fight soil erosion, conserve rainwater, and reduce water runoff and sediment deposit after storms.
- Trees help in lowering the dust levels and pollution levels in the cities.
- ***Trees decrease respiratory problems:*** Children staying in areas and localities with trees have much less breathing problems that children staying in localities which have no trees.

- There are number of tree species having high economic values such as fruit bearing trees, Timber yielding trees, species having medicinal values, etc.
- The tree provides shelter for a number of animals especially birds.

The local population can be encouraged to participate in plantation programme. The plant saplings may be distributed to the villagers of affected villages for plantation and management of trees. The local body may be consulted for the land area for plantations. Suitable species in consultation with the people can be identified for plantation.

Road Safety Awareness Campaign:

The human and economic damage caused by road crashes is largely preventable. Lack of knowledge and awareness regarding road traffic rules and regulations, violation of traffic rules, driver behavior, etc. are the main reasons for majority of accidents. Drivers, for instance, are often not conscious of the inherent risks of high travel speeds, and overcrowded passenger buses. This problem can be mitigated with public awareness campaigns, improved driver training and testing.

Road user error is believed to be a factor for 95 percent of all road accidents, improving road user behavior should always be priority. With the ability to educate and influence the general public, road safety publicity is needed in order to:

- Create awareness of road accident threats and vulnerability of certain road users, including children;
- Educate road users as to what constitutes road user behavior;
- Change attitudes and beliefs to more positive road safety approach; and
- Inform road users of change in traffic regulations or operating conditions

The NHAI can organize periodical Road Safety Awareness programmes for the road users and local populations living adjacent to the highways.

Health Awareness Programmes

NHAI recently acknowledged HIV/AIDS as a corporate social responsibility and has taken the lead in association with the WB, ADB & NGOs on HIV/AIDS awareness programs to truckers and migrant workers. NHAI launched an awareness program called "Pathik Mela" on two national highways. In the similar fashion the NHAI can cover this project under the programme of CER. The target people may be truck drivers, commercial sex workers and the communities surrounding the truckers. Such programme can be organized from time to time at different locations along the project section.

Budgetary Provision under CER: A separate budgetary provision is given for CER in Table 9.3

9.8 Environmental Budgeting

The environmental budget for the various environmental mitigation measures and monitoring proposed in the EMP are given presented in **Table 9.3**. Some of the provisions of budget for environmental protection measures are the part of engineering cost and Resettlement and Rehabilitation Cost and hence they have not been included here.

Table 9.3: Environmental Mitigation and Monitoring Cost

Component	Item	Unit	Quantity	Rate (Rs.)	Amount (INR)
A. ENVIRONMENTAL MITIGATION COST:					
Pre-Construction Stage					
Common Property Resource (CPR)	Shifting of Common Property Resource (CPR)	No.	-	Part of R&R Cost	-
Water Tank/Reservoir Shifting	Shifting of Water Tank, Bund Construction and Tank Protection,	No.	-	Part of Engineering Cost	
Utilities Shifting	Shifting of utilities such as Electric Poles, Cables, Telephone lines, Water pipes, etc.	No.	-	Part of Engineering Cost	-
Project Affected Person (PAFs)	Compensation to PAFs	No.	-	Part of R&R Cost	-
Construction Stage					
Flora	Clearing of Plantation with in Row	Km	Throughout project stretch	Part of Engineering Cost	-
	Compensatory Avenue Plantation (Minimum of 10 trees planted for every tree cut)	No.	2,07,480	1027	21,30,81,960
Landscaping / Plantation in the median	a) Planting Flowering Plants and Shurbs	KM	65.60	23,795	15,60,952
	b) Maintaining of Flowering Plants and Shurbs for one years	KM	65.60	2,12,914	1,39,67,158
	C) Drip irrigation system for median plantation on expressway by gravity/pressure source with all necessary components/ systems and emitting devices at plants etc.	LM	65,599	2,000	13,11,98,000
Slope /Embankment protection	Turfing of embankment with grasses and herbs	Sqm	10,13,119.00	26.00	2,63,41,094
Renovation lawns including, weeding, forking the ground, top dressing with forked soil, watering and maintenance the lawns		Sqm	1,20,000.00	17.00	20,40,000

Component	Item	Unit	Quantity	Rate (Rs.)	Amount (INR)
Borrow areas	Redevelopment of borrow areas by tree plantation and fisheries	m^2	-	Part of Engineering Cost	-
Water Resources					
	Relocation of Open Well	No.	-	Part of R&R Cost	-
	Relocation of Bore well	No.	-	Part of R&R Cost	-
Rain Water Harvesting Structure	Rain Water Harvesting Structure at every 500 meter intervals along the project road	No	286	Part of Engineering Cost	-
Environmental issues at construction sites	Sanitation Arrangement at Camp	Lump sum	-	Lump Sum	40,00,000
	Dust Suppression Measures	Km	71.000	Lump Sum	30,00,000
	Silt Fencing	rm	3500	1000	35,00,000
	Oil interceptors	No.	8	30000	2,40,000
	Environmental Training & Awareness Programmes during Construction Stage	Lump sum		Lump Sum	27,00,000
Environmental Enhancements	Enhancement of Cultural Features	No.	-	Part of R&R Cost	-
	Provision of Noise Barriers	rm	7270	15000/rm	10,90,50,000
Total Amount in (Rs)					**51,06,79,164**
CORPORATE ENVIRONMENT RESPONSIBILITY (0.5% OF PROJECT COST AS PER MOEFCC CIRCULAR NO 22-65/2017-IA.III DATED 1ST MAY 2018					**13.38 Crores**

B. ENVIRONMENTAL MONITORING COST:

(i) Environmental Monitoring Cost During Construction Stage (2.5 Years)

Component	Item	Unit	Quantity	Rate Per Sample (Rs.)	Recurring Cost (Amount per Annum in INR)	Total cost During 2.5 Year Construction Period (INR)
A. Construction Stage						
Ambient Air Quality	Ambient Air Quality at Plant Sites and equipment yards and locations as identified by the Engineer. (*PM10, PM2.5, SO_2, NOx, CO*) – Once a month for 2.5 Years at 9 - locations	No.	9 Locations X 9 = 81 Per Year (216 in 2.5 years)	10,000	8,10,000	21,60,000
	Ambient Air Quality along the project alignment at locations of baseline monitoring in consultation with IE (*PM10, PM2.5, SO_2, NOx, CO*) -Once in three months excluding monsoon for 2.5 Years at 4 locations	No.	4 Locations X 3 = 12 Per Year (32 in 2.5 Years)	10,000	1,20,000	3,20,000
Surface Water Quality	Surface Water Quality at identified locations (*pH, temperature, DO, BOD, COD, Oil & Grease, Total Suspended Solid, Turbidity, Total Hardness, Chlorine, Iron, Total Coli form*) - Once in three months excluding the Monsoon for 2.5 Years at 7 locations	No.	7 locations x 3 = 21 Per Year (56 in 2.5 years)	8,000	1,68,000	4,48,000
Ground Water Quality	Ground Water Quality at Plant Sites and equipment yards and locations as identified by the Engineer (*pH, Temperature, Total hardness, TDS, Iron, Sulphate, Nitrate, Bacteriological, Heavy metals such as Cr, Ni, Pb, Hg, etc.*)-Once in three months for 2.5 Years at 6 locations	No.	6 locations x 3 = 18 Per Year (48 in 2.5 years)	8,000	1,44,000	3,84,000

Component	Item	Unit	Quantity	Rate Per Sample (Rs.)	Recurring Cost (Amount per Annum in INR)	Total cost During 2.5 Year Construction Period (INR)
Groundwater Quality	Ground Water Quality at Baseline sampling locations site and Camp site (*pH, Temperature, Total hardness, TDS, Iron, Sulphate, Nitrate, Bacteriological, Heavy metals such as Cr, Ni, Pb, Hg, etc.*)-Once in 3 months for 2.5 Years at 5 locations	No.	5 locations x 3 = 15 Per Year (40 in 2.5 years)	8,000	1,20,000	3,20,000
Noise Level	Noise level at Plant Sites and equipment yards and locations as identified by Engineer (Leq Day and Night in dB (A))-Once in a month - for 2.5 Years at 9 locations	No	9 Locations X 9= 81 Per Year= 216 in 2.5 years	4,000	3,24,000,	8,64,000
	Ambient Noise level along the project alignment at locations of baseline monitoring in consultation with IE (Leq Day and Night in dB (A))-Once in 3 months - for 2.5 Years at 4 locations (approved by Engineer)	No.	4 locations x 3 12 Per year 32 in 2.5 years	4,000	48,000	1,28,000
Soil Quality	Soil Quality near Construction sites, productive Agricultural land along the road and as identified by the Engineer as per requirements(*Texture, Grain Size, Gravel, Sand, Silt, Clay, pH, Conductivity, Calcium, Magnesium, Sodium, Nitrogen, Absorption Ratio*)-Once in 3 months for 2.5 Years at 8 locations	No	8 locations X 3 = 24 Per Year (64 in 3 years)	8,000	1,92,000	5,12,000
Water Bodies	Turbidity in Storm water & Silt load in Tanks as specified by the Engineer at major water bodies-Pre-monsoon and Post monsoon for 2.5 Years	Lump Sum	-	-	2,40,000	7,20,000
					18,42,000	**58,56,000**
Total Environmental Monitoring Cost During Construction Stage						**58,56,000**

(ii) Environmental Monitoring Cost During Operation Stage (15 Years)

Component	Item	Unit	Quantity	Rate Per Sample (Rs.)	Recurring Cost (Amount per Annum in INR)	Total cost During 3 Year Operation Period (INR)
B. Operation Stage						
Ambient Air Quality	Ambient Air Quality along the project road at locations of baseline monitoring in consultation with IE (*PM10, PM2.5, SO_2, NOx, CO*)- Two samples at each location in a Year for 15 Years at 4 locations	No	4 Locations X2= 8 per Year 8X15 =120 for 15 Years	10,000	80,000	12,00,000
Surface Water Quality	Surface Water Quality along the project road at locations of baseline monitoring in consultation with IE (*pH, Temperature, DO, BOD, COD, Oil & Grease, Total Suspended Solid, Turbidity, Total Hardness, Iron, Total Coli form, heavy metals*)- Two samples at each location in a Year for 15 Years at 4 locations	No	4 Locations X2= 8 per Year 8X15 =120 for 15 Years	8,000	64,000	9,60,000
Ground Water Quality	Ground Water Quality along the project road at locations of baseline monitoring in consultation with IE (*pH, Temperature, TSS, Total hardness, Suspended Solid, Chlorine, Iron, Sulphate, Nitrate*) - Two samples at each location in a Year for 15 Years at 5 locations	No	5 Locations X2= 10 per Year 10X15 =150 for 15 Years	8,000	80,000	12,00,000
Noise Level	Ambient Noise Quality at Baseline Locations (Leq Day and Night in dB (A))- Two samples at each location in a Year for 15 Years at 4 locations	No	4 Locations X2= 8 per Year 8X15 =120 for 15 Years	4,000	32,000	4,80,000
Soil Quality	Soil Quality along the project road at locations of baseline monitoring in consultation with IE (*Texture, Grain Size, Gravel, Sand, Silt, Clay, pH, Conductivity, Calcium, Magnesium, Sodium, Nitrogen, Absorption Ratio, heavy metals, oil & grease*)- Two samples at each location in a Year for 15 Years at 4 locations	No	4 Locations X2= 8 per Year 8X15 =120 for 15 Years	8,000	64,000	9,60,000
Water Bodies	Turbidity in Storm water & Silt load in Tanks as specified by the Engineer at major water bodies-Pre-monsoon and Post monsoon for 15 Years	Lump sum	-	-	1,00,000	15,00,000
Total Monitoring Cost During Operation Stage.					**4,20,000**	**63,00,000**
Grand Total (Environmental Mitigation Cost + Environmental Monitoring Costs for Construction Stage (2.5 Years) and Operation Stage						**52,28,35,164**

Component	Item	Unit	Quantity	Rate Per Sample (Rs.)	Recurring Cost (Amount per Annum in INR)	Total cost During 3 Year Operation Period (INR)
(15 Years)						

10. SUMMARY AND CONCLUSION

10.1 Project Description

The Environment Impact Assessment study has been conducted for the proposed Phase-I of Bangalore-Chennai Expressway in the states of Karnataka, Andhra Pradesh and Tamil Nadu to investigate and assess the environmental concerns, potential environmental impacts associated with the project and their mitigation measures. The Environmental Impact Assessment (EIA) study covers anticipated potential impacts during different stages of the project viz., Design & Preconstruction Phase, Construction Phase and the Operational Phase and accordingly the mitigation measures have been suggested. The objective of the study is to identify and assess the potential impacts on different physical, ecological and socio-economic environment due to the proposed project within the project influence area and providing measures to offset or minimise the potential adverse impact and enhance the positive impact as well as effective implementation and monitoring plan the environmental safeguard measures during different stages of the project.

10.1.1 Implementing Agency

The National Highways Authority of India (NHAI) is the Implementing Agency for the project including the environmental and social safeguard measures. The NHAI has appointed M/s Egis-BCEOM International S.A. in association with M/s SECON Pvt. Ltd. as consultants to carryout Consultancy Services for Feasibility Study cum Preliminary Design Report for the Bangalore-Chennai Expressway under NHDP Phase-VI including the EIA study.

10.1.2 Project Location

- The proposed project is a new 8-Lane Bangalore Chennai Expressway which has been divided into three Phases. The Phase-I is located in the state of Karnataka. It is proposed to construct the Expressway in phased manner. Presently it is proposed to construct the BCE Phase-I Expressway with 4-lane dual carriageway configuration with 21 m depressed median based on present traffic project which will be expandable to 8-lane for keeping future traffic requirement of 8-Lane.
- The entire length of Phase-I is extended over Bangalore Rural District (from proposed Km 0+000 to Km 11+682) and Kolar District (from proposed Km 11+682 to Km 71+000) of Karnataka State.
- The project section of Phase-I takes off from east of Bangalore at existing Km 301.200 of NH-4 (Proposed Km 0+000) at Kolathur Village of Bangalore Rural District and terminates at proposed Km 71+000 near N.G.Hulkur Village of Bangarpet Taluka in Kolar District of Karnataka covering a length of 71 Km.
- The project also includes one 2.050 Km long Spur alignment connecting Kolar Goldfields on SH-95 starting from proposed Km of 52+085 the main BCE alignment. So the effective project length will be 73.050 Kms including spur.

- The geographical extension of the project alignment is between 13°5'3.38" and 13°00'28.49" of North Latitude and 77°49'20.59" and 78°25'34.00" of the Eastern Longitude between Bangalore and Chennai.

Salient Features of the Project:

A. General Information:

S. No.	Project Components	Details
1.	Project	Construction of Bangalore Chennai Expressway including spur alignment in the states of Karnataka.
2.	Administrative locations	Districts: Bangalore Rural, Kolar.
3.	State	Karnataka.
4.	Length of the Project road	Bangalore rural District :11.682 Km Kolar District: 59.318 Km + Spur 2.050 Km Total Length in Kolar District: 61.368 Kms Total Length including Spur : 73.050 (Km 71.000 + Km 2.050)
5.	Terrain	Bangalore rural District: Plain Kolar District : Plain and Rolling
6.	Major Settlement along the Project Stretch	Bangalore rural District: Hoskote Kolar District: Bangarapet, Kolar Gold Fields, Bethamangala.
7.	Rivers/Streams/Canals	Bangalore Rural District: 0 Kolar District: Palar River at Km 61.100 The project mainly crosses the natural streams/nallahs.
8.	Ponds/Tanks	14 (Bangalore Rural District: 2 Kolar District: 12)
9.	Forest area	Nil
10.	Ecologically Protected areas	The project does not pass through any National Park, Wildlife Sanctuary, Tiger Reserve, or notified Eco-sensitive areas/Protected areas. Neither the project falls in eco-sensitive zone

B. Design Features

S. No.	Items	Proposed
1.	ROW	• Main alignment =90 m • Spur alignment =45 m At Rest Area= 690 m for 425 m length
2.	Carriageway	4 lane divided carriageway with 21 m depressed median expandable to 8-Lane configuration
3.	Design Speed	120 Kmph
4.	Major Bridge	15 Nos. (13 nos. in Main Expressway and 2 nos. im the Interchange)
5.	Minor Bridge	44 Nos. (41 Nos. at Main Alignment & 3 Nos. at Interchange)
6.	ROB	1 No.
7.	No. of Culverts (Box)	123 Nos. (98 Nos. along Main Alignment & 23 Nos. along Interchange)
8.	Vehicular Underpass	36 Nos. (34 Nos. along Main Alignment & 2 Nos. along Interchange)
9.	Vehicular Overpass	6 Nos.
10	Light Vehicular Underpass	19 Nos.

S. No.	Items	Proposed
11.	Interchange	4 Nos.
13.	Rest Area	2 Nos. (Including Both Sides)
14.	Toll Plaza	4 Nos.
15.	Truck Lay Byes	2 Nos. (Including Both Sides)
16.	Connecting roads	9.618 Km
17.	IOCL Crossing	2 nos.
18.	Wayside Amenities	1 no. at 47.906
19.	Street Light	The street light has been proposed for locations at LVUP, VUP, Interchange, Check Post, Rest Area and Toll Plaza Locations.
20.	High Mast Light	The High mast lighting has been proposed along the project highway locations in interchange locations, Rest area, Toll plaza locations and check post locations.
21.	Construction Cost of the Project	Rs. 2676.85 crores.

10.2 Description of the Environment

A) Physical Environment

Physiography: The project stretch is located over flat to rolling terrain. The area is drained Palar river which is seasonal in nature. Apart from this river, there are some local streams/nallahs which cross the project alignment which are ephemeral in nature.

Geology & Soil:

- The geological formation in Bangalore Rural District is dominating Archaean crystalline formation and smaller stretches of unconsolidated sediments, whereas the geological formation in Kolar District are Sheet Laterite, Granite & Granite-gneiss, Dolerites, Schist & Quartzite's, Gneiss Hornblende-Biotite and other unclassified crystallines.
- The soils within the study area is predominantly red loamy soil to red sandy soil and lateritic soil.

Seismicity

The project stretch of Phase-I falls under ZONE III of seismic zone of India. This zone is classified as Moderate Damage Risk Zone.

Climate

Both the concern districts fall in Eastern Dry Agro Climatic Zone. They experience a semi-arid climate, characterized by typical monsoon tropical weather with hot summers and mild winters. The monthly maximum temperature varies between 27.2°C to 36.3°C in Bangalore Rural district whereas the same varies between 25.1°C to 38.3°C in Kolar District. The average minimum temperature varies between 26.3°C to 13.4°C in Bangalore Rural District and between 22.2°C to 13.4°C in Kolar District. The mean annual rainfall of Bangalore Rural district is 986.19 mm whereas the same in Kolar District is 743 mm. majority of rainfall occurs during Southwest Monsoon season between June to September. The average wind speed in Bangalore Rural District varies between 3.3 Km/Hour and 5.5 Km/Hr. In Kolar District the Average wind speed varies from 1.5 Km/Hour to 6 Km/Hr.

Land Use

The land use along the proposed project alignment within project influence area is predominantly agriculture land followed by vegetation, fallow land, waste land and settlement.

Water Resources

Surface water Resources

The river Palar is the only perennial river in the project area and crosses the project alignment at proposed Chainage 61+100. Apart from Palar River there are few local streams and nallah located in the project area which carry water only during monsoon period. The project alignment is dotted with water tanks. The project alignment passes through 2 water tanks in Bangalore Rural District and 12 water tanks in Kolar District. Elevated structures have been provided across these water tanks to avoid impacts on storage capacity of these water bodies.

Ground Water Resources

The project area falls under over-exploited zone with respect to groundwater utilization but is suitable for artificial groundwater recharge. The water table in the study area ranges from 5 to 15 mgbl. The net annual groundwater availability of Bangalore Rural district is 19,394 ham whereas in Kolar District the net annual ground water availability is 29144 Ham.

Water Quality

The ground water samples were tested from 5 locations to assess the physico-chemical characteristics of groundwater within project area and found that pH varies between 6.36 to 7.93, TDS (mg/l) varies between 205 to 600, Faecal coliform absent, As, Hg, Lead, Boron are below detectable limit.

Surface Water Quality Results: The pH value ranged between 7.13 – 7.19, DO ranges from 6.5 to 6.7 mg/l, BOD (3 day 27 deg C) varies from nil to 2.1 mg/l, COD ranges from nil to 7.84 mg/l, Total Dissolved Solid ranges from 106 to 616 mg/l, Total coliform (MPN/100ml) absent.

Air Quality

To assess the ambient air quality within the project area air quality monitoring was carried out at 4 locations. All the stations fall in residential and rural zone except Kolathur (Industrial). The monitoring results shows that mean concentration of PM_{10} varies between 66.2µg/m^3 to 75.2 µg/m^3, $PM_{2.5}$ varies between 36.8 µg/m^3 to 39.6 µg/m^3, SO_2 varies between 14.8 µg m^{-3} and 15.3 µgm^{-3}, NO_x varies between 19.9 µgm^{-3} to 22.9 µg m^{-3}, Concentrations of all the parameters are within permissible limit.

Noise Quality

Noise level monitoring was conducted at 4 locations, one location is industrial and three locations are rural residential zone. Among the four sample locations, maximum equivalent noise level was recorded at Kolatturu Village at NH-4 near starting point of the project alignment both during daytime and nighttime. This area falls in industrial and mix category of lanuse. The mean daytime equivalent noise level was recorded to 63.48 LeqdB(A), which is within the maximum permissible

limit of 75 LeqdB(A) for industrial landsue. The Leq (Day) and Leq (Night) levels at Doddura Karpanahalle are 61.45 dB(A) and 45.81 dB(A), respectively. The Leq (Day) and Leq (Night) levels near N.G.Hulkur Village were 61.46 dB(A) and 47.79 dB(A) respectively. The Leq (Day) and Leq (Night) levels at Nambiganhalle,Doddura Karpanahalle and N.G.Hulkur Village exceeded the National Ambient Noise Standards for rural and residential land use but within the permissible limit of Commercial area land use.

B) Ecological Environment

Phase-I of the Expressway does not pass through any forest area or ecological protected area (Wildlife Sanctuary/ National Park, Tiger Reserve or Eco-sensitive zone). No such sensitive environmental features exist within 15 Km radius of the project alignment. There are about 16049 trees in Bangalore Rural district and 4699 trees in Kolar district within proposed Right of Way of Project stretch. The predominant tree species are Eucalyptus, Ashoka, Neem, Silver Oak, T. Bevu, Teak, Seema tangadi, Gobbali, Honge, Acasia, Nelli (Amla), etc. at some location private plantation of Eucalyptus has been recorded. These eucalyptus plantations are done as a cutting crop.

There are some horticultural orchards along the proposed alignment which may be impacted due to the project. Main species found are coconut, Mango, Rose, Sapota, Guava and Grapes.

Fauna: The fauna population in the project area is comprised of common animals like dogs, cats, monkey, pig and cattle are present. Avifauna includes common birds like peacock, myna, kingfisher, pigeon, kite, egret.

C) Social Environment

A total number of 344 Households will be affected due to the proposed project due to acquisition of structures and other assets, constituting a total affected population of 1720 persons. Out of total affected 1720 persons due to acquisition of houses and other assets of which 51.28 % constitute male population and 48.72% female. The affected households belonging to three religions viz Hindus (78.94 %), Christians (6.10%) and Muslims (15. 41%). Social group-wise most of the affected people represents the backward caste (19.48 %) and of the remaining general castes constitute (53.78%) and Scheduled Castes comprises around 21.80 percent. The incidence of Scheduled Tribes is only (4.94 %) along the greenfield expressway project road. Observed across the family pattern majority (60.17 %) of the affected households are nuclear families and of the remaining 37.21 percent of the affected households live as joint families and 2.62% are Individual families.

Due to land acquisition, a total 5611 households constituting 16833 Families with total population of 28055 will be affected.

D) Cultural Environment

There is no historical and cultural conserved site or archaeological site present within the study area. There are 1 religious places falling within the proposed RoW and will require to be relocated.

There are no any archaeological/ historical sites/monuments located within the project corridor.

The project does not locate within 10 km of critically polluted area.

10.3 Anticipated Environmental Impact and Mitigation Measures

A) Anticipated Impacts

The impacts of the project have been categorized into three phases: pre-construction, construction and operation phase.

(i) Pre-construction Phase: Impacts during the preconstruction phase primarily relate to preconstruction activities such as acquisition of new Right of Way and site clearance activities will result in cutting of trees exists within Row. The estimated total revenue land requirement for the project is 764.08 Ha. There are number of amenities and utility services such as electrical lines, OFC, water supply lines etc. are being intersected at a number of locations. About 20748 trees are likely to be impacted. No forest land is impacted due to the proposed project.

Total 124 number of residential structures and 54 commercial structures and 166 other assets (including wells, bore well, water storage tanks etc.) exist within proposed RoW and require displacement. In addition to these 1 temple falling within the proposed ROW is affected.

(ii) Construction Phase: Impacts during construction phase are primarily on account of negligence while undertaking the construction works. Impacts include nuisance on account of air, noise and vibration effects during road construction, hindrance of access to RoW side properties during shifting of utilities and construction of road side drains and road safety issues from construction materials and equipment.

The microclimate is likely to be affected due to removal of trees and creation of impervious surface. The project will require about 1,95,07,688 Cum soil, 22,17,500 cum stone aggregate and 5,01,300 Cum sand for construction. These quantities will be excavated from different borrow areas and quarries. The excavation at these borrow areas will lead to adverse impact on the soil fertility. However, it can be managed through proper planning for preservation of fertile top soil before material extraction for construction and then relaying of top soil during restoration activities. The acquisition of agricultural land would cause loss of productive soil. All bridge locations where elevated embankments are required would be more sensitive to erosion during the construction period. Spillage of construction materials like bitumen, asphalt, oil & grease, fly ash etc. and the unwarranted disposal of construction spoils and debris will affect the core characteristics of the soil, which in turn can become unsuitable for agriculture. 2 borrow areas and 6 quarry areas have been identified as source of earth and aggregates and 1 sand mining area identified in the project influence area. These sites and haul roads will have impact in terms of dust and noise. During construction, the disposal of solid and liquid waste from labour camps, fuel and lubricant spills or leaks from construction vehicles, pollution from fuel storage & distribution sites is likely to affect water quality. The negative impacts on air quality during construction will be mostly localized and concentrated in the Right of Way (RoW)/COI. However, it is likely that impacts due to dust generation are felt downwind of the site rather than the site itself. The noise levels in the project area during construction will increase though it will be intermittent and temporary in nature. The noise levels will be more pronounced around settlements and in inhabited areas. Sewage and domestic solid waste will be generated at the construction

workers' colony. Improper management of these wastes may lead to health and hygiene related problems among the construction workers and the local population.

(iii) **Operation Phase**: Soil pollution due to accidental vehicle spills or leaks is a low probability but potentially disastrous to the receiving environment, if they occur. These impacts can be a long term and irreversible depending upon the extent and type of spill. Pollutants from vehicles, and accidental fuel spills may also make their way into surface water bodies across/along the project corridor. Higher traffic volume and speed will have impact on the ambient air quality as the due to construction of green field project. Increase in the number of vehicles would increase the pollutant load. Higher noise levels due to increased traffic volume and speed will affect the residential areas and sensitive receptor like educational institutes, hospitals and nursing homes.

B) Environmental Mitigation Measures

(i) **Pre-construction Phase*:*** As per IRC SP:99-2013, Right of Way of Expressway is 90m to 120m.This is a new alignment and will have 90 m of Right of Way. The selection of alignment has been designed in such a manner that the right of way of the expressway is restricted to minimum 90m bypassing the villages and the habitations. No forest land is impacted due to the project. The amenities like hand pumps, water tap, bore wells etc. which comes under direct impact will be compensated as per The National Highways Act 1956 (NH Act). Religious structures will be compensated/relocated as per directions of the competent authority. Avenue plantation shall be carried out by NHAI on either side of the Expressway throughout its length.

(ii) **Construction Phase:** Avenue plantation and landscaping, to be carried out as part of the project, shall help in restoring the green cover along the corridor. Cut and fill is being balanced in the design to the extent feasible and fly ash is also to be used to minimize impacts on the physiography of the area. The permanent loss of topsoil proposed to be avoided by conserving the topsoil from such areas and using it at other places for tree plantation, landscaping etc. Adequate slope protection measures need to be provided next to water bodies mainly during the rainy season. Disposal of construction waste shall be undertaken at landfill sites to minimize impacts. If a spill occurs, measures for safe incineration of spilled oil shall be taken to prevent seepage into the ground. Exhausted borrow areas shall be rehabilitated in environmentally sound manner. Aggregates will be sourced only from the licensed quarry, complying with the environmental and other applicable regulations, Quarry and crushing units will have adequate dust suppression measures like sprinkler in work area and along approach road to quarry site. To avoid contamination of the water bodies and drainage channels from fuel and lubricants, oil interceptor shall be provided at fuelling locations, construction vehicle parking area, vehicle repair area and workshops. The sewage system (including septic tanks and soak pits) for construction camps will be properly designed and built so that no water pollution takes place in any water body or watercourse. The asphalt plants, crushers and the batching plants will be sited at least 500 m in the downwind direction from the nearest settlement. All precautions to reduce the level of dust emissions from the hot mix plants, crushers and batching plants will be taken up. Construction vehicles, equipments and plants shall strictly adhere permissible noise standard during construction period. All necessary and adequate care has been taken to minimize impact on cultural properties. The affected temples will be relocated with proper compensation and community consultation to avoid any kind of local conflict.

(iii) **Operation Phase:** Operation of the BCE project will reduce traffic load on other parallel roads. Higher speed of the vehicle will reduce the time to reach origin to destination. Growth of the vegetative cover along the corridor with time shall again reduce impact of the air pollution. Plantation of green vegetative noise barriers have been proposed in

front of the schools and hospitals depending on the space available. These will reduce noise level. Air quality and noise level monitoring shall be conducted as per monitoring plan during operation phase of the project to confirm whether further mitigation measures required.

10.4 Environmental Monitoring Programme

Provisions have been made for monitoring of environmental attributes during construction and operation phase of the project. The details of the parameters, frequency and duration are given in Table 10.1.

Table 10.1: Details of Environmental Monitoring

Environment Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	**Standards**	**Locations**	**Frequency**	**Duration**	**Action Plan in case criteria exceeds**	**Implementation**	**Supervision**
Air	**Construction**	PM_{10} µg /m^3, $PM_{2.5}$ µg/m^3, SO_2, NOx, CO	National Ambient Air Quality Standard (**CPCB, 18th Nov, 2009**)	Batching Plant site, HMP and Stone Crusher	Once a month for 3 years except monsoon	Continuous 24 hours	Check and modify control device like bag filter/cyclones of hot mix plant	Concessionaire through approved monitoring agency	IE & PIU-NHAI
		PM_{10} µg /m^3, $PM_{2.5}$ µg /m^3, SO_2, NOx, CO		Along the project RoW at locations of baseline monitoring in consultation with IE	Once in a season excluding the monsoon for 3 years	Continuous 24 hours	-	Concessionaire through approved monitoring agency	IE & PIU-NHAI
	Operation	PM_{10} µg /m^3, $PM_{2.5}$ µg /m^3, SO_2, NOx, CO		Along the project RoW at locations of baseline monitoring in consultation with IE	Thrice a year for 3 years	Continuous 24 hours	-	Concessionaire through approved monitoring agency	IE & PIU-NHAI
Surface Water Quality	**Construction**	pH, temperature, DO, BOD, COD, Oil & Grease, Total Suspended Solid, turbidity, Total Hardness, Chlorine, Iron, Total Coliform.	Surface Water Quality Standard as per use based classification for Surface Water as per CPCB Guidelines. (**Ref IS: 10500, 1991**)	At identified locations	Once in a season excluding the monsoon for 3 years	Grab Sampling	Check and modify oil interceptors, silt fencing devices	Concessionaire through approved monitoring agency	IE & PIU-NHAI
	Operation	pH, temperature, DO, BOD, COD, Oil & Grease, Total Suspended Solid, turbidity, Total Hardness, Chlorine, Iron, Total Coliform		At identified locations	Once in a season excluding the monsoon for 3 years	Grab Sampling	Check and modify oil interceptors, silt fencing devices	Concessionaire through approved monitoring agency	IE & PIU-NHAI
Ground Water Quality	**Construction**	pH, Temperature, TSS, Total hardness, Suspended Solid, Chlorine, Iron, Sulphate, Nitrate	Ground Water Quality Standard as per **IS: 10500, 1991**	Plant Construction site	Once in a season for 3 years excluding monsoon period	Grab Sampling	Check and modify oil interceptors, silt fencing devices	Concessionaire through approved monitoring agency	IE & PIU-NHAI

Environment Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	**Standards**	**Locations**	**Frequency**	**Duration**	**Action Plan in case criteria exceeds**	**Implementation**	**Supervision**
	Operation	pH, Temperature, TSS, Total hardness, Suspended Solid, Chlorine, Iron, Sulphate, Nitrate		At identified locations	Once in a season excluding monsoon for 3 year	Grab Sampling	Check and modify oil interceptors, silt fencing devices	Concessionaire through approved monitoring agency	IE & PIU-NHAI
Noise Level	**Construction**	Leq dB (A) (Day and Night) Average and Peak values	Ambient Noise Standard (CPCB, 2000)	At equipment yards and locations as identified by IE	Once in a month excluding monsoon for 3 years	Readings to be taken at 60 seconds interval for every hour and then Leq are to be obtained for Day time and Night time	Check and modify equipment and devices used to protect noise level	Concessionaire through approved monitoring agency	IE & PIU-NHAI
	Operation	Leq dB (A) (Day and Night) Average and Peak values		Locations as identified by IE	Once in a season excluding monsoon for 3 year	Readings to be taken at 60 seconds interval for every hour and then Leq are to be obtained for Day time and Night time	-	Concessionaire through approved monitoring agency	IE & PIU-NHAI
Soil	**Construction**	Physical Parameter: Texture, Grain Size, Gravel, Sand, Silt, Clay; Chemical Parameter: pH, Conductivity, Calcium, Magnesium, Sodium, Nitrogen, Absorption Ratio	-	Near Construction sites along the RoW as identified by the IE	Once in a season excluding the monsoon for 3 years	-	-	Concessionaire through approved monitoring agency	IE & PIU-NHAI
	Operation	Physical Parameter: Texture, Grain Size, Gravel, Sand, Silt, Clay; Chemical Parameter: pH, Conductivity, Calcium, Magnesium, Sodium, Nitrogen, Absorption Ratio			Once in a season excluding the monsoon for 3 year	3 Years	-	Concessionaire through approved monitoring agency	IE & PIU-NHAI
Tree Plantation/Greenbelt Development	**Construction**	Tree Survival rate	90% Tree Survival Rate	Throughout the Project in substantially completed section	Once in a month	1 Years	Replacement of Dead tree with healthy saplings of same species, repairing of tree guards, fencing etc.	Concessionaire	IE, PIU NHAI

Environment Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	**Standards**	**Locations**	**Frequency**	**Duration**	**Action Plan in case criteria exceeds**	**Implementation**	**Supervision**
	Operation	Tree Survival rate	90% Tree Survival Rate	Throughout the Project stretch	Once in three months	3 years	Replacement of Dead tree with healthy saplings of same species	Concessionaire	IE, PIU NHAI
Water Bodies	**Construction**	Turbidity in Storm water Silt load in Tanks	As specified by the engineer Water quality standards	At the drains, Ponds, water reservoir and tanks construction site/along the ROW	Pre-monsoon and post monsoon seasons for 3 years	3 years	Inspection and modification of silt fencing/ any leakage of drains to these surface water bodies	Concessionaire	IE, PIU NHAI
	Operation	Turbidity in Storm water Silt load in Tanks	As specified by the engineer / Water quality standards	At major water bodies (Pond, Tanks, Reservoirs within the Proposed ROW and those located at immediate vicinity of the Proposed ROW.	3 Year before onset of monsoon and after monsoon	3 Years	Check and repair catch drains, storm water drains and silt trap	Concessionaire	IE till defect liability period, PIU NHAI

10.5 Project Benefit

Implementation of the Project will have following benefits:

- Bangalore Chennai Expressway is a part of Chennai-Bangalore Industrial Corridor (CBIC),one of the largest Infrastructure Projects of Government of India.
- Narsapur Industrial Area in Kolar District is getting connected to the Bangalore Chennai Expressway at Km 24.125
- Accelerate regional economic development in terms of industry, tourism and agriculture,
- Reduce vehicle operating and maintenance costs due to availability of express way,
- Minimize road accidents due to introduction better safety features,
- The project shall also generate local employment opportunities through the construction activities and local business.
- Increase in safety due to construction of median between two directions of traffic flow and plantation of shrub in median
- Provision of pedestrian and cattle underpasses shall provide safe movement from one side of the project RoW to the other side of the project RoW
- Construction of Road Over Bridge (ROBs) shall reduce travel time and enhance smooth flow of the traffic

- Project facilities included in the project preparation are Rest Area, Bus Bays, Truck Lay Bye, Road Side Furniture, Street Lighting, Traffic Aid Post, Highway Patrolling, Medical Aid Posts, Vehicle Rescue Posts etc.

10.6 Environmental Management Plan

Several mitigation measures have been suggested along with the agency responsible for planning, execution, supervision and monitoring of the Environment Management Plan for pre-construction, construction and operation stages to avoid or mitigate the adverse impacts.

Pre-construction Phase

Pre-construction activities include acquisition of land and structures, relocation of utilities, removal of trees, relocation/compensation of common property resources viz. temple, hand pumps, obtaining Environmental Clearance, Consent to Establish from KSPCB etc. NHAI/Concessionaire and concerned departments shall be responsible for those activities

Construction Phase

Construction activities during this phase include setting up of Construction Camp, setting up of plants namely crusher plant, concrete batching plant, hot mix plant; clearing and grubbing, collection, storage and utilization of topsoil, identification of borrow pit & aggregate quarry (if other than those identified by design consultant), operation of the quarry, plantation on either side of the proposed expressway & at median, environmental protection & monitoring. Concessionaire shall be responsible for obtaining consent for establish and operate of those plants. Concessionaire shall also be responsible for implementation of the environmental protection measures during construction. The Independent Engineer/Authority Engineer shall be responsible for monitoring & supervision of the Concessionaire's activities as per Contract & report it to PIU, NHAI time to time. Project Implementation Unit (PIU), NHAI shall be responsible for regulatory compliance.

Operation Phase

Operation phase activities include environmental monitoring and monitoring of survival rate of the plantation etc. The Independent Engineer/Authority Engineer and Concessionaire shall be responsible for those activities.

Environmental costs

The costs for mitigation and management measures have been estimated. These costs along with the social costs have to be incurred by the implementing agency to include environmental and social safeguard measures into the proposed project. The environmental cost estimates are presented in Table 10.2.

Table 10.2: Environmental Cost Estimates

Particulars	Amount (Rs)
Construction Phase (A)	
Environmental Protection and Enhancement	**51,06,79,164**
Environmental Monitoring Cost	**58,56,000**

Particulars	Amount (Rs)
Sub Total	**51,65,35,164**
Operation Phase (B)	
Air Quality & Noise Level Monitoring and Maintenance of plantation for 15Yr.	**63,00,000**
Total (A+B)	**52,28,35,164**
Say	**52.284 Crores**
Corporate Environment Responsibility (0.5% of Project Cost)	**13.38 Crores**

**Environmental monitoring has been considered for 3-year construction and 15-year operation period.*

11 DISCLOSURE OF CONSULTANTS ENGAGED

11.1 Preamble

This chapter provides information & experience of consultancy firm and professionals engaged in preparation of EIA report.

11.2 Environmental Impact Assessment Study – Consultancy Firm

The National Highways Authority of India (NHAI) has appointed M/s Egis-BCEOM International S.A. in association with M/s SECON Pvt. Ltd. as consultants to carryout Consultancy Services for Feasibility Study cum Preliminary Design Report for the Bangalore-Chennai Expressway under NHDP Phase-VI. The scope of study included the EIA study for the project.

The Egis India Consulting Engineers Pvt. Ltd. is Accredited Consultant for conducting EIA studies. The Consultant has got provisional accreditation in Sector 34 Highways, railways, transport terminals, mass rapid transport systems.

11.3 Team of Consultants

Sr. No.	EC/ Functional Area Expert	Name of Expert
1.	EIA Coordinator	Dr S S Deepak
2.	Air Pollution Monitoring, Prevention & Control (AP)	Anand K Tripathi
3.	Water Pollution (WP)	Sanjeev Kumar
4.	Solid Waste (SW)	Sultana Mehabooba/Sajal Bhowmick
5.	Socio-economy (SE)	Dr Gagan C Patra
6.	Land Use (LU)	Mohan Zade
7.	Ecology and Biodiversity (EB)	Sajal Bhowmick
8.	Soil Conservation (SC)	Vinay Rathi
9.	Risk Hazard (RH)	Sajal Bhowmick

1. Dr. S. S. Deepak

Dr. S. S. Deepak is a Post graduate in Environmental Sciences and Ph.D. in the thrust area of Ecology & Environment. He has over 22 years of research and professional experience in the fields of ecology and environment and EIA studies. He has widespread experience in carrying out environmental impact assessment study of different infrastructure projects including Highways, roads, urban infrastructure projects, solid waste management projects, township and building projects, etc. Some of the projects he has worked are funded by multilateral funding agencies such as Asian Development Bank, World Bank, DFID. Dr. Deepak is NABL accredited EIA coordinator for Highways, railways, transport terminals, mass rapid transport systems and Solid Waste Management Sectors. He is also NABET accredited Functional Area Expert in Ecology and Biodiversity.

In the current project Dr. S.S. Deepak has coordinated the EIA study of the project. He has also contributed in data compilation and analysis of flora, fauna and biodiversity. He has

contributed in developing Environmental Management Plan. Dr. Deepak has been involved in data analysis and report writing, compilation of all the sections of EIA report.

2. Mr. Anand Kumar Tripathi

Mr. Anand Kumar Tripathi is a Post Graduate in Ecology & Environment. He has an experience of more than 12 years in the field of environment. He has worked for environmental studies of many Building and Township projects and Highways and roads projects. Mr. Tripathi is NABET accredited Functional Area Expert in Air Pollution Control.

Mr. Tripathi has contributed in collection and compilation of field and secondary data on Ambient Air quality in the project area, monitoring of Environmental Monitoring agency at site during air, has also coordinated in tree enumeration in RoW of the project. His input in the EIA report is related to water and air pollution mitigation and management plan.

3. Dr. Gagan C. Patra

Dr. Gagan C. Patra is a Post Graduate in Economics M.A. in Sociology and Ph.D. in Rural Economics. He has an experience of over 20 years in the field of Social Impact Assessment and Resettlement & Rehabilitation Plan for different types of projects including Highways, Urban infrastructure, water sector, rural development, public health sectors funded by multi funding agencies such as World Bank, Asian Development Bank, JICA, IL&FS, etc. He has contributed in this project for collation and analysis of data on various socio-economic issues of the projects, Social Impact Assessment and formulation of R&R Plan for the project.

4. Debashis Pal

He has passed 2-year Master Level Post Graduate Diploma in Environment Management in 2001, M Sc in Ecology and Environment, Sikkim Manipal University in 2006 and I-Yr Diploma in Industrial Safety, Annamalai University, August 2009. He has completed Environmental Impact Assessment Study in a number of infrastructure sector projects.

5. Sajal Bhoumick

He has passed 2-year Master Level Post Graduate Diploma in Environment Management in 2000, M Sc Zoology, Annamalai University in 2005 and I-Yr Diploma in Industrial Safety, Annamalai University, August 2008. He has completed Environmental Impact Assessment Study in a number of infrastructure sector projects.

6. Vinay Rathi

He has passed B.Tech. in Agricultural Engineering in 1996, M Tech in Agricultural Engineering 1999. He has completed Environmental Impact Assessment Study for a number of infrastructure sector projects.

7. Mr. Mohan R. Zade

Mr. Mohan R. Zade is M.Tech in Agriculture Engineering and has undergone specialized training on Remote Sensing from International Institute for Geo-information Science and Earth Observation, ITC Enscheda, The Netherlands. He has over 12 years of experience. He

has been working on land use and image processing for various projects. He has contributed in the collection and analysis of data on land cover, interpretation of satellite imagery based land use and land cover and land use pattern within the project influence area.

8. Ms. Mehbooba Sultana

Ms. Sultana is M. Tech. in Environmental Management and M.Sc. in Environmental Studies. She has over 9 years of experience in the field of Environmental Studies for different highway and road projects. She has contributed in preparation of waste management plan and contributed in conducting Public Hearing. Ms Sultana is NABET accredited Functional Area expert in Municipal Solid waste and Hazardous Waste Management.

11.4 Laboratory

Krishna Aqua Engineering Pvt. Ltd., Hubbali, Karnataka has carried out the sampling and analysis for various air, water, noise samples as per procedure & guidelines of Central Pollution Control Board and the requirements of MoEF on behalf of Egis India Consulting Engineers Pvt. Ltd. The study period was the months of March, April, May 2018.The laboratory is a NABL accredited.

ANNEXURES

ANNEXURES 1.1

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
National Highways Authority of India
(सड़क परिवहन एवं राजमार्ग मंत्रालय)
(Ministry of Road Transport & Highways)
परियोजना कार्यान्वयन इकाई
Project Implementation Unit - Bengaluru (Expressway)
सर्वे नं. ४६, ४७ कि. मी. नागसंद्रा बेंगलूरु - तुमकूर सड़क, (एन. एच.-४) बेंगलूरु - ५६० ०७३
Sy. No. 45, 46, 47 Km Nagasandra, Bengaluru - Tumkur Road (NH-4) Bengaluru -560 073

Mob +91-8088334383
Email piubngexpressway@gmail.com

NHAI/11019/TN/I/2014/PIU-BNG (EXP)/1495 12.09.2017

To
The Executive Engineer,
PWD. Upper Palar Basin Division
Kengeyanallur Road,
Gandhinagar,
Vellore-632006(Tamil Nadu)

Sub: NHAI-PIU Bangalore (Expressway) – Bangalore-Chennai Expressway under NHDP Phase VI - **Irrigation tanks and Ponds along the Project Highway –No Objection Certificate –Requested**- reg

Ref: (1) Consultant M/s Egis - BCEOM International S.A. in association with M/s Secon Pvt. Ltd., Secunderabad letter No. FINTL/HYD/BCE/26657/2016 dated 02.06.2016
(2) Engineer-in-Chief, WRD & Chief Engineer (General), PWD (i/c), Chepauk, Chennai letter No. 33864/Chennai Region/NOC dated 04.07.2016
(3) This office letter No. NHAI/11019/Vol-IV/2010/NHAI/PIU-K'giri/1655 dated 22.08.2016 addressed to Chief Engineer,Chennai.
(4) This office letter No. NHAI/11011/07/3/2016/Vol.I/PIU-BNG (Exp)/22 dated 02.01.2017 addressed to Chief engineer.
(5) This office letter no. NHAI/11011/07/3/2016/Vol I/PIU-BNG (Exp)/325 dated 11.05.2017
(6) This office letter no. NHAI/11011/07/3/2016/Vol.I/PIU-BNG (Exp)/422 dated 29.07.2017

Sir,

Please refer this office letter dated 29.07.2017 requesting therewith to expedite your recommendations for issuance of NOC for 7 tanks falling on Bangalore-Chennai Expressway Project alignment under your jurisdiction. . The same is still awaited.

It is pertinent to mention here that the Chief Secretary, Govt. of Tamilnadu during review meeting with Secretary, MORT&H on 10.05.2017 assured that Govt. of Tamilnadu will extend the full support for early implementation of BCE and will be monitored at the highest level.

It is therefore, once again requested that to expedite your recommendations for issuance of "No objection Certificate" at the earliest to proceed further with regard to fulfilment of obligations of NHAI in obtaining the MOEF clearances.

Yours faithfully,

Encl: As above

(T Parvateesam)
DGM (T) & Project Director
PIU- Bangalore (Expressway)

CC: (1) Principal Secretary to Govt. of Tamil Nadu, WRD, Chennai – for favour of kind information.
(2) The Engineer-in-Chief, W.R.D. and Chief Engineer (General) P.W.D., Chepauk, Chennai – 600 005- for favour of kind information.
(3) Executive Engineer, PWD-WRO, Chennai – for information & necessary action.
(4) Superintending Engineer, PWD-WRO, Chennai- for information & necessary action.
(5) M/s Egis Consultants,Secunderabad- For information and necessary action.

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
National Highways Authority of India
(सड़क परिवहन एवं राजमार्ग मंत्रालय)
(Ministry of Road Transport & Highways)
परियोजना कार्यान्वयन इकाई - बेंगलूरु (एक्सप्रेसवे)
Project Implementation Unit - Bengaluru (Expressway)
सर्वे नं. ४३, ४४ कि. मी., नागनहल्ली, बेंगलूरु - तुमकूरु राष्ट्रीय राजमार्ग, (एन एच - ४), बेंगलूरु - ५६२ १२३
Sy No. 43, 44th Km, Nagasandra, Bengaluru - Tumkur Road (NH-4) Bengaluru -562 123
Mob : +91 8618199014
Email: piubngexpressway@gmail.com

NHAI/1019/KNT:01/2015/PIU-BNG (EXP) /438 07.08.2017

To

The Team Leader
M/s Egis-BCEOM JV with M/s Secon Pvt. Ltd (JV),
9-1-77/3, No.31
S. D. Road
Secunderabad – 500 003

Sub: NHAI-PIU-Bangalore (Expressway)–Chennai Expressway from Km 11/450 to Km 74/870 and Km 82/150 to Km 83/350 under NHDP Phase VI –**Irrigation tanks and Ponds along the Project Highway- Issue of No Objection Certificate**–reg.

Ref: (1) Consultant M/s Egis-BCEOM International S.A. in association with M/s Secon Pvt.Ltd, Secunderabad Letter No. EINTL/HYD/BCE/26654/2016 dt.02.06.2016
(2 This office letter no. NHAI/1019/1/07/01/2016/Vol.I/PIU-BNG(EXP)/340 dated 26.05.2017
(3) Chief Engineer, Minor Irrigation (South), Bangalore Letter CEMI(S)/TA3/AR15/2017-18 dated 28.07.2017

Sir,

Please find attached a copy of the NOC received from the Chief Engineer, Minor Irrigation (South), Bangalore with certain conditions. It is requested to ensure compliance to the above conditions while finalizing the revised feasibility report.

Please refer to this office letter of even no. dated 26.05.2017 requesting to take up the issue with Zilla Panchayath Authorities to obtain NOC at the earliest for the balance tanks in the state of Karnataka. The status of the same may please be reported to this office on priority as Package-I is targeted to be awarded in the year 2017-18.

Yours sincerely,

Encl: As above

T Parvateesam 7/8/17
(T Parvateesam)
DGM (T) &Project Director
PIU-Bangalore (Expressway)

C:\Projects\Chennai Expressway\2017\Secon1.odt

Government of Karnataka
Minor Irrigation and Ground Water Development Department

No:-CEMI(S)/TA3/AE15/2017-18. 1709

Office of the Chief Engineer,
Minor Irrigation (South), Bengaluru

To,

Dy.General Manager (Tech) & Project director,
NHAI,
Project Implementation Unit,
Nagasandra,
Bengaluru-560 073

28 JUL 2017

Respected sir,

Sub: NHAI-PIU-K'giri-Bangalore-Chennai Expressway from Km 11/450 to Km 74/870 and Km 82/150 to Km 83/350 under NHDP phase VI-Irrigation tanks and ponds along the project Highway-**issuing of NOC reg**

Ref:1) Your office letter no:NHAI/11019/Vol-IV/2010/NHAI/PIU-K'giri/1470 Dated:20-07-2016.
2) Your office letter no:NHAI/11019/Vol-IV/2010/NHAI/PIU-K'giri/1670 Dated:23-08-2016.
3) Your office letter no:NHAI/11012/07/1/2016/Vol-I/PIU-BNG(Exp)/24 Dated:02-01-2017.
4) Secretary to Government, Minor Irrigation and Ground Water Development Department, Bengaluru letter no:ಇಆ 75 ಐಮಾಇ 2017 Dated:27-06-2017

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With reference to above subject , and letters cited vide references 1, 2 and 3, it was requested to accord NOC for obtaining MoF&F clearance for Bangalore-Chennai Expressway project. Out of 15 tanks list submitted by the consultants *M/s.Egis International* as directed by NHAI, only one tank i.e., Madivala Dodda kere comes under jurisdiction of Minor Irrigation Department. As such necessary NOC is accorded by the Department vide ref(4) above subjected to the following conditions.

1. Road work should be carried out near down stream toe of the tank.
2. Bund may be extended on down stream side of the tank while widening the road as per NH guidelines.
3. While extending bund width it is to follow guidelines and circulars of Minor Irrigation Department compulsorily.
4. Care should be taken while constructing longitudinal drain and cross drains along extended side of the bund without affecting pillars on the tank bund.
5. Care should be taken to carry out the work without affecting the water spread area and yield capacity of the tank.
6. The water inflow to the tank should not be disturbed.

Thanking you

Your's faithfully,

Chief Engineer
Minor Irrigation (South), Bengaluru

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
National Highways Authority of India
(सड़क परिवहन एवं राजमार्ग मंत्रालय)
(Ministry of Road Transport & Highways)
परियोजना सूचना केन्द्र (बंगलूरु)
Project Information Unit - Bengaluru (Expressway)
Sy.No. 12/1 & 49, Km 7, Nagasandra, Bengaluru - Tumkur Road (NH-4), Bengaluru-560 073
Ph: 080 - 2837 4193
Email: piu-blr-expressway@gov.in

NHAI/PIU-BLR/CH/01/2016/Vol.I/2811-DNG (EXP) /5442 26.05.2017

To

The Team Leader
M/s Egis-BCEOM JV with M/s Secon Pvt. Ltd (JV),
9-1-77/3, No.31
S. D. Road
Secunderabad – 500 003

Sub: NHAI-PIU-Bangalore (Expressway)–Chennai Expressway from Km 11/450 to Km 74/870 and Km 82/150 to Km 83/350 under NHDP Phase VI –**Irrigation tanks and Ponds along the Project Highway- Issue of No Objection Certificate**–reg.

Ref (1) Consultant M/s Egis-BCEOM International S.A. in association with M/s Secon Pvt.Ltd. Secunderabad Letter No. EINTL/HYD/BCE/26654/2016 dt.02.06.2016
(2) Chief Engineer, Minor Irrigation (South), Bangalore Letter No. 1129 dated 04.05.2017
(3) M/s Egis e-mail dated 12.05.2017

Sir,

Please refer to the recommendation of the Chief Engineer, Minor Irrigation (South) to the Secretary, Government of Karnataka for according NOC with certain conditions for the proposed Bangalore-Chennai Expressway across Madiwala Tank in Kolar District.

The Consultant informed vide reference 1st cited that the alignment is passing through 15 tanks in the State of Karnataka, out of which 7 are under the jurisdiction of Panchayath Raj Department and balance 8 are under Minor Irrigation Department.

This Office keep on pursuing with the Minor irrigation Department for according NOC for the last 1 year. The Chief Engineer has recommended NOC for only 1 tank (which was shown under the jurisdiction of Minor Irrigation Department by M/s Egis) and informed that the balance tanks are not under their jurisdiction.

It is regretted to inform that the above scenario clearly reflects that poor performance of the consultant in identifying the Controlling Authority of the tanks through which the alignment which was approved in 2010 itself, is passing through.

In view of above, it is requested to take up the issue with the ZillaPanchayath Authorities as informed by Chief Engineer, Minor Irrigation to obtain NOC at the earliest for the balance tanks in the state of Karnataka.

Yours sincerely,

(T Parvateesam)
DGM (T) &Project Director
PIU-Bangalore (Expressway)

ಸಂಖ್ಯೆ :ಸಕಾಅ/ಪಂರಾಇಂಉವಿ/ಬಂ.ಪೇಟೆ/ಅಂ.ಪಟ್ಟಿ/262/2017–18.

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರ ಕಛೇರಿ,
ಪಂಚಾಯತ್ ರಾಜ್ ತಾಂತ್ರಿಕ ಉಪ ವಿಭಾಗ,
ಬಂಗಾರಪೇಟೆ. ದಿನಾಂಕ :14/9/2017

ರವರಿಗೆ,

ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು,
ಪಂಚಾಯತ್ ರಾಜ್ ಇಂಜಿನಿಯರಿಂಗ್ ವಿಭಾಗ,
ಕೋಲಾರ.

ಮಾನ್ಯರೇ,

ವಿಷಯ: ಬೆಂಗಳೂರು–ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ಹೆದ್ದಾರಿ NHDP Phase-VI ಕಾಮಗಾರಿಗೆ ನಿರಪೇಕ್ಷಣಾ ಪತ್ರ ನೀಡುವ ಬಗ್ಗೆ.

ಉಲ್ಲೇಖ: ಮುಖ್ಯ ಇಂಜಿನಿಯರ್, ಪಂಚಾಯತ್ ರಾಜ್ ಇಂಜಿನಿಯರಿಂಗ್ ಇಲಾಖೆ, ಬೆಂಗಳೂರು ರವರ ಪತ್ರದ ಸಂ.ಇಜಿಐಎಸ್/2016–17, ದಿನಾಂಕ:10/06/2016.

ಮೇಲ್ಕಂಡ ವಿಷಯಕ್ಕೆ ಸಂಬಂಧಪಟ್ಟಂತೆ, ಉಲ್ಲೇಖಿತ ಪತ್ರದಲ್ಲಿ ಬೆಂಗಳೂರು–ಚೆನ್ನೈ ಎಕ್ಸ್ ಪ್ರೆಸ್ ಹೆದ್ದಾರಿ NHDPphase-VI ಕಾಮಗಾರಿ ನಡೆಸಲು ಉದ್ದೇಶಿಸಿರುವ ಜಾಗದಲ್ಲಿ ಈ ಇಲಾಖೆಗೆ ಸೇರಿದ ಕೋಲಾರ ಜಿಲ್ಲೆ ವ್ಯಾಪ್ತಿಯಲ್ಲಿ ಬರುವ ಬಂಗಾರಪೇಟೆ ತಾಲ್ಲೂಕಿನ ಜಿಲ್ಲಾ ಪಂಚಾಯತ್ ವ್ಯಾಪ್ತಿಗೆ ಸೇರಿದ ಕೆರೆ ವ್ಯಾಪ್ತಿಯಲ್ಲಿ ಈ ಕೆಳಕಂಡ ಕೆರೆಗಳು ಹಾದು ಹೋಗುತ್ತಿದ್ದು. ಸಂಬಂಧ ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿ ಪ್ರಾಧಿಕಾರಕ್ಕೆ ನಿಪೇಕ್ಷಣಾ ಪತ್ರವನ್ನು ನೀಡುವಂತೆ ಕೋರಿರುವುದು ಸರಿಯಷ್ಟೆ.

ಕ್ರ.ಸಂ	ಜಿಲ್ಲೆ/ತಾಲ್ಲೂಕು	ಗ್ರಾಮದ ಹೆಸರು	ಕೆರೆಯ ಹೆಸರು	ಜಲಾನಯನ ಪ್ರದೇಶದ ವಿಸ್ತೀರ್ಣ (ಹೆಕ್ಟೇರ್)	ಅಚ್ಚುಕಟ್ಟು (ಹೆಕ್ಟೇರ್)
1	ಬಂಗಾರಪೇಟೆ	ನಾಗನಾಥಮರ	ನಾಗನಾಥಮರ ಕೆರೆ	8.00	11.00
2		ಕುಪ್ಪನಹಳ್ಳಿ	ಊರು ಮುಂದಿನ ಕೆರೆ	23.00	18.00
3		ಮರ್ಗಲ್	ಗೌಡನ ಕೆರೆ	20.00	22.00
4		ಐತಾಂಡ್ಲಹಳ್ಳಿ	ಚಿಕ್ಕನ ಕೆರೆ	37.00	27.00
5		ಕವರನಹಳ್ಳಿ	ಕವರನಹಳ್ಳಿ ಕೆರೆ	18.00	18.00
6		ದೊಡ್ಡಕರಪನಹಳ್ಳಿ	ಅಣ್ಣಿ ಕೆರೆ	32.00	51.00
7		ಕೂಳೂರು	ಜಂಗಮನ ಕೆರೆ	6.00	11.00
8		ಎನ್.ಜಿ.ಹುಲ್ಕೂರು	ಪಿತರಕುಂಟೆ	6.00	7.00

ಸದರಿ ವಿಷಯದ ಬಗ್ಗೆ ಸ್ಥಳ ಪರಿವೀಕ್ಷಣೆ ಮಾಡಿ ಈ ಕೆಳಕಂಡ ಷರತ್ತುಗಳೊಂದಿಗೆ ನಿಪೇಕ್ಷಣಾ ಪತ್ರ ನೀಡಬಹುದಾಗಿದೆ ಎಂಬ ಅಂಶವನ್ನು ತಮ್ಮ ಅವಗಾಹನೆಗೆ ಈ ಮೂಲಕ ಸಲ್ಲಿಸಿದೆ.

1. ಜಿಲ್ಲಾ ಪಂಚಾಯತ್ ಕೆರೆಗಳ ಮುಳುಗಡೆ ಪ್ರದೇಶ ಹಾಗೂ ಶೇಖರಣಾ ಸಾಮರ್ಥ್ಯವನ್ನು ಕಾಯ್ದಿಟ್ಟುಕೊಳ್ಳುವುದು. (Zilla Panchayath Tank holding capacity and submergence area will not going to be squeezed)
2. ಕೆರೆಗಳ ಏರಿಗಳ, ತೂಬು ಹಾಗೂ ಕೋಡಿಗಳ ಬದಲಾವಣೆಯನ್ನು ಮಾಡತಕ್ಕದ್ದಲ್ಲ (Component of the tank such as bund, sluice and water weir will not be changed).
3. ಕೆರೆಗಳ ಮಾಲೀಕತ್ವವನ್ನು ಯಾವುದೇ ಕಾರಣಕ್ಕೂ ಬದಲಾಯಿಸತಕ್ಕದ್ದಲ್ಲ. (The ownership pf the tank shall not be altered).

ಕರ್ನಾಟಕ ಸರ್ಕಾರ

ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರ ಕಛೇರಿ ಪಂಚಾಯತ್ ರಾಜ್ ಇಂಜಿನಿಯರಿಂಗ್ ವಿಭಾಗ, ಕೋಲಾರ-563101.

ಇ-ಮೇಲ್ ವಿಳಾಸ: **eepredkolar1@gmail.com** ದೂರವಾಣಿ ಸಂಖ್ಯೆ: 08152-222570, ಫ್ಯಾಕ್ಸ್: 08152-222166

ಸಂಖ್ಯೆ: ಕಾಪಾಅ/ಪಂ.ರಾ.ಇಂ.ವಿ/ಕೋ/ಸ.ಇಂ-2/1310/2017-18 ದಿನಾಂಕ: 16-09-2017.

ರವರಿಗೆ,

SECON Private Limited,
Plot No.147, 7B Road,
Export Promotion Industrial Park (EPIP)
Whitefield, Bangalore - 560066 INDIA
Tel: +91-80-41197778
Fax: +91-80-41194277

ಮಾನ್ಯರೆ,

ವಿಷಯ: ಬೆಂಗಳೂರು-ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ಹೆದ್ದಾರಿ NHDP Phase-VI ಕಾಮಗಾರಿಗೆ ನಿರಪೇಕ್ಷಣಾ ಪತ್ರ ನೀಡುವ ಬಗ್ಗೆ (Formal No objection Certificate)

ಉಲ್ಲೇಖ: 1)ಮುಖ್ಯ ಇಂಜಿನಿಯರ್, ಪಂಚಾಯತ್ ರಾಜ್ ಇಂಜಿನಿಯರಿಂಗ್ ಇಲಾಖೆ, ಬೆಂಗಳೂರು ರವರ ಪತ್ರದ ಸಂಖ್ಯೆ:ಇಜಿಐಎಸ್/2016-17, ದಿನಾಂಕ: 10-06-2016.
2)ತಮ್ಮ ಕಛೇರಿ ಪತ್ರದ ಸಂಖ್ಯೆ: SPL/BCE-PDR/ZP/07-15/261 dt: 22-07-2015.
3)Egis International Letter dt: 30-05-2017.
4)ವಿಭಾಗ ಕಛೇರಿ ಪತ್ರದ ಸಂಖ್ಯೆ: 458/2017-18 ದಿ: 05-06-2017.
5)ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು ಪಂಚಾಯತ್ ರಾಜ್ ಇಂಜಿನಿಯರಿಂಗ್ ಉಪವಿಭಾಗ ಬಂಗಾರಪೇಟೆ ರವರ ಪತ್ರದ ಸಂಖ್ಯೆ: 262/2017-18 ದಿ: 14-09-2017.

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ಮೇಲ್ಕಂಡ ವಿಷಯಕ್ಕೆ ಸಂಬಂಧಪಟ್ಟಂತೆ, ಉಲ್ಲೇಖಿತ ಪತ್ರದಲ್ಲಿ ಬೆಂಗಳೂರು-ಚೆನ್ನೈ ಎಕ್ಸ್ ಪ್ರೆಸ್ ಹೆದ್ದಾರಿ NHDP Phase-VI ಕಾಮಗಾರಿ ನಡೆಸಲು ಉದ್ದೇಶಿಸಿರುವ ಜಾಗದಲ್ಲಿ ಈ ಇಲಾಖೆಗೆ ಸೇರಿದ ಕೋಲಾರ ಜಿಲ್ಲೆ ವ್ಯಾಪ್ತಿಯಲ್ಲಿ ಬರುವ ಬಂಗಾರಪೇಟೆ ತಾಲ್ಲೂಕಿನ ಜಿಲ್ಲಾ ಪಂಚಾಯತ್ ವ್ಯಾಪ್ತಿಗೆ ಸೇರಿದ ಕೆರೆ ವ್ಯಾಪ್ತಿಯಲ್ಲಿ ಈ ಕೆಳಕಂಡ ಕೆರೆಗಳು ಹಾದು ಹೋಗುತ್ತಿದ್ದು. ಸಂಬಂಧ ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿ ಪ್ರಾಧಿಕಾರಕ್ಕೆ ನಿಪೇಕ್ಷಣಾ ಪತ್ರವನ್ನು ನೀಡುವಂತೆ ಕೋರಿರುವುದು ಸರಿಯಷ್ಟೆ. ಅದರಂತೆ ಸದರಿ ಕೆರೆಗಳನ್ನು ಪರಿವೀಕ್ಷಣೆ ಮಾಡಲಾಗಿರುತ್ತದೆ.

Sl. No	Name of the Tank	Catchment Area Details	Sub mercisible area at full tank level in Ha	How many acres under Irrigation land
1	2	3	4	5
1	SULIKUNTE	6.00	5.00	7.00
2	NAGANATHAPURA	6.00	4.82	6.11
3	MUGALABELE	13.00	3.00	16.00
4	MADAMANGALA	48.00	6.50	33.00
5	MADIGARAHALLI	6.00	5.00	7.00
6	SIDDANAHALLI	19.00	5.00	14.00
7	BYASABELE	30.00	5.50	21.00
8	KUPPANAHALLI	11.00	5.00	9.00
9	BIRANDAHALLI	10.00	3.00	8.00
10	KARABELE	66.00	6.00	20.13
11	MARGAL	10.00	5.00	7.00
12	ITHANDAHALLI	37.00	5.00	27.00
13	KAVARANAHALLI	5.00	3.00	4.40
14	DODDUR KARAPANAHALLI	20.00	4.00	18.00
15	KRISHNARAJAPURA	8.00	7.50	8.00
16	GATTAKAMADENAHALLI	19.00	5.00	14.00
17	REDDYHALLI	77.00	5.00	24.19
18	PEDDYHALLI	77.00	5.00	24.19
19	THAMMENAHALLI	10.00	5.50	19.00

20	NAGASETTTIHALLI	90.00	10.50	65.24
21	HOSA(KOTTA)PALYA	8.00	5.50	5.00
22	PARISEPALLI	18.00	7.50	30.00
23	BETHAMANGALA	57.00	7.00	54.27
24	BYATARAYANAHALLI	21.00	6.00	24.00
25	DODDAKARI	24.00	6.00	12.00
26	DODDAKARI (M) KAMBAMPALLI	5.00	4.34	4.99
27	KULURU	11.00	6.00	6.00
28	NERNAHALLI	25.00	6.00	20.00
29	VADRAHALLI	48.00	6.00	14.00
30	PILLAGUNDLAHALLI	5.00	3.00	4.40
31	RAYASANDRA	26.00	5.00	22.00
32	VENGASANDRA	63.00	9.33	65.13
33	SUNDRAPALYA	6.00	4.50	8.00
34	N.G.HULKUR	5.00	3.00	4.40
35	KODIGEPALLI	6.00	4.50	5.94
36	KASARIGANAKUPPA	7.00	6.66	7.34
37	PUGANAHALLI	5.00	3.30	4.80

ಮುಂದುವರೆದು ಸದರಿ ವಿಷಯದ ಬಗ್ಗೆ ಸ್ಥಳ ಪರಿವೀಕ್ಷಣೆ ಮಾಡಿ ಈ ಕೆಳಕಂಡ ಷರತ್ತುಗಳೊಂದಿಗೆ ನಿಪೇಕ್ಷಣಾ ಪತ್ರ ಈ ಕೆಳಕಂಡ ಷರತ್ತುಗಳೊಂದಿಗೆ ನಿರಾಪೇಕ್ಷಣಾ ಪತ್ರವನ್ನು ನೀಡಲಾಗಿರುತ್ತದೆ.

1. ಜಿಲ್ಲಾ ಪಂಚಾಯತ್ ಕೆರೆಗಳ ಮುಳುಗಡೆ ಪ್ರದೇಶ ಹಾಗೂ ಶೇಖರಣಾ ಸಾಮರ್ಥ್ಯವನ್ನು ಕಾಯ್ದುಟ್ಟುಕೊಳ್ಳುವುದು. (Zilla Panchayath Tank holding capacity and submergence area will not going to be squeezed)
2. ಕೆರೆಗಳ ಏರಿಗಳ, ತೂಬು ಹಾಗೂ ಕೋಡಿಗಳ ಬದಲಾವಣೆಯನ್ನು ಮಾಡತಕ್ಕದ್ದಲ್ಲ (Component of the tank such as bund, sluice and water weir will not be changed).
3. ಕೆರೆಗಳ ಮಾಲೀಕತ್ವವನ್ನು ಯಾವುದೇ ಕಾರಣಕ್ಕೂ ಬದಲಾಯಿಸತಕ್ಕದ್ದಲ್ಲ. (The ownership pf the tank shall not be altered).
4. ಕಾಮಗಾರಿ ರಚನೆ/ ನಿರ್ಮಾಣದ ಸಂದರ್ಭದಲ್ಲಿ ಉಂಟಾಗುವ ಭಗ್ನಾವಶೇಷಗಳನ್ನು ಕಾಮಗಾರಿ ಸಂಪೂರ್ಣವಾದ ನಂತರ ಮುನ್ನ ಇದ್ದ ಯಥಾ ಸ್ಥತಿಯನ್ನು ಕಾಪಾಡಿಕೊಳ್ಳಬೇಕು. (During the construction of structures, the debris tackled area during excavation should be refilled).
5. ಸ್ವತಂತ್ರ ಮತ್ತು ತಡೆಹಿಡಿಯದ ಸಂಗ್ರಹಣಾ ಒಳಹರಿವಿಗೆ ಯಾವುದೇ ರೀತಿಯಲ್ಲಿಯೂ ಅಡ್ಡಿಯುಂಟಾಗಬಾರದು. (The inflow its independent and intercepted catchment shall not be obstructed).
6. ನಿರ್ಮಾಣದ ಸಮಯದಲ್ಲಿ ಮೂಲ ಕೆರೆಯ ಸಾಮರ್ಥ್ಯದಲ್ಲಿ ಯಾವುದೇ ವ್ಯತ್ಯಾಸವಾಗದಂತೆ ಮುನ್ನೆಚ್ಚರಿಕೆ ಕ್ರಮ ವಹಿಸುವುದು. (During the construction original tanl capacity if any, lost shall be restored).
7. ಕೆರೆಯ ಮೂಲ ಭಾಹ್ಯ ರೇಖೆಗಳಲ್ಲಿ ಯಾವುದೇ ವ್ಯತ್ಯಾಸವಾಗದಂತೆ ಮುನ್ನೆಚ್ಚರಿಕೆ ಕ್ರಮ ವಹಿಸುವುದು. (The capacity contours, if any disrupted shall be restored).
8. ಕೆರೆಯ ಸಾಮರ್ಥ್ಯವು ಪೂರ್ಣವಿದ್ದಾಗ, ಹೊರಹರಿವಿನ ಸಮಯದಲ್ಲಿ ಅಗತ್ಯ ರಕ್ಷಣಾತ್ಮಕ ಕ್ರಮಗಳನ್ನು ಮುನ್ನೆಚ್ಚರಿಕೆಯಾಗಿ ತೆಗೆದುಕೊಳ್ಳತಕ್ಕದ್ದು. (Necessary protective works and precautionary measures shall be undertaken at the time of discharge, when the tank is upto its full capacity).

ತಮ್ಮ ವಿಶ್ವಾಸಿ,

ಕಾರ್ಯಪಾಲಕ ಅಭಯಂತರರು,
ಪಂ.ರಾ.ಇಂ. ವಿಭಾಗ, ಕೋಲಾರ.

4. ಕಾಮಗಾರಿ ರಚನೆ/ ನಿರ್ಮಾಣದ ಸಂದರ್ಭದಲ್ಲಿ ಉಂಟಾಗುವ ಭಗ್ನಾವಶೇಷಗಳನ್ನು ಕಾಮಗಾರಿ ಸಂಪೂರ್ಣವಾದ ನಂತರ ಮುನ್ನ ಇದ್ದ ಯಥಾ ಸ್ಥಿತಿಯನ್ನು ಕಾಪಾಡಿಕೊಳ್ಳಬೇಕು. (During the construction of structures, the debris tackled area during excavation should be refilled).
5. ಸ್ವತಂತ್ರ ಮತ್ತು ತಡೆಹಿಡಿಯದ ಸಂಗ್ರಹಣಾ ಒಳಹರಿವಿಗೆ ಯಾವುದೇ ರೀತಿಯಲ್ಲಿಯೂ ಅಡ್ಡಿಯುಂಟಾಗಬಾರದು. (The inflow its independent and intercepted catchment shall not be obstructed).
6. ನಿರ್ಮಾಣದ ಸಮಯದಲ್ಲಿ ಮೂಲ ಕೆರೆಯ ಸಾಮರ್ಥ್ಯದಲ್ಲಿ ಯಾವುದೇ ವ್ಯತ್ಯಾಸವಾಗದಂತೆ ಮುನ್ನೆಚ್ಚರಿಕೆ ಕ್ರಮ ವಹಿಸುವುದು. (During the construction original tanl capacity if any, lost shall be restored).
7. ಕೆರೆಯ ಮೂಲ ಭಾಹ್ಯ ರೇಖೆಗಳಲ್ಲಿ ಯಾವುದೇ ವ್ಯತ್ಯಾಸವಾಗದಂತೆ ಮುನ್ನೆಚ್ಚರಿಕೆ ಕ್ರಮ ವಹಿಸುವುದು. (The capacity contours, if any disrupted shall be restored).
8. ಕೆರೆಯ ಸಾಮರ್ಥ್ಯವು ಪೂರ್ಣವಿದ್ದಾಗ, ಹೊರಹರಿವಿನ ಸಮುಯದಲ್ಲಿ ಅಗತ್ಯ ರಕ್ಷಣಾತ್ಮಕ ಕ್ರಮಗಳನ್ನು ಮುನ್ನೆಚ್ಚರಿಕೆಯಾಗಿ ತೆಗೆದುಕೊಳ್ಳತಕ್ಕದ್ದು. (Necessary protective works and precautionary measures shall be undertaken at the time of discharge, when the tank is upto its full capacity).

ತಮ್ಮ ವಿಶ್ವಾಸಿ,

ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು,
ಪಂಚಾಯತ್ ರಾಜ್ ತಾಂತ್ರಿಕ ಉಪ ವಿಭಾಗ,
ಬಂಗಾರಪೇಟೆ

ಕರ್ನಾಟಕ ಸರ್ಕಾರ

ಜಲಸಂಪನ್ಮೂಲ ಇಲಾಖೆ (ಸಣ್ಣ ನೀರಾವರಿ)

ಸಂಖ್ಯೆ: ಮುಸದ/ತಾಂ.ಸ-3/ಸ.ಇಂ-15/2017-18

ಮುಖ್ಯ ಇಂಜಿನಿಯರ್ ರವರ ಕಛೇರಿ.
ಸಣ್ಣ ನೀರಾವರಿ (ದಕ್ಷಿಣ) ಬೆಂಗಳೂರು.

- 4 MAY 2017

ಸರ್ಕಾರದ ಕಾರ್ಯದರ್ಶಿಗಳು,
ಜಲಸಂಪನ್ಮೂಲ ಇಲಾಖೆ (ಸಣ್ಣ ನೀರಾವರಿ),
ವಿಕಾಸಸೌಧ, ಬೆಂಗಳೂರು - ಇವರಿಗೆ.

ಮಾನ್ಯರೇ,

ವಿಷಯ:- NHAI-PIU-K'giri-Bangalore-Chennai Expressway from Km 11/450 to Km 74/870 and Km 82/150 to Km 83/350 under NHDP phase VI-Irrigation tanks and ponds along the project Highway-**issuing of NOC reg**

ಉಲ್ಲೇಖ: 1.NHAI ರವರ ಪತ್ರ ಸಂಖ್ಯೆ: NHAI/11011/07/1/2016/Vol-I/PIU-BNG(Exp)/209 Dated:06-04-2017.

2.ಕಾರ್ಯಪಾಲಕ ಇಂಜಿನಿಯರ್, ಸಣ್ಣ ನೀರಾವರಿ ವಿಭಾಗ, ಕೋಲಾರ ರವರ ಪತ್ರ ಸಂಖ್ಯೆ:-737 ದಿನಾಂಕ:30-03-2017.

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ಮೇಲ್ಕಂಡ ವಿಷಯಕ್ಕೆ ಸಂಬಂಧಪಟ್ಟಂತೆ, ಉಲ್ಲೇಖ(1)ರ ಪತ್ರದನ್ವಯ NHAI ರವರು NHAI-PIU-K'giri-Bangalore-Chennai Expressway ಯೋಜನೆ ಕಾಮಗಾರಿಯ ಪಂಕ್ತೀಕರಣವು ಕೋಲಾರ ಜಿಲ್ಲೆಯ ಸಣ್ಣ ನೀರಾವರಿ ಕೆರೆಗಳ ಮೇಲೆ ಹಾದುಹೋಗುತ್ತಿದ್ದು ಸದರಿ ಕಾಮಗಾರಿಗೆ ಇಲಾಖಾವತಿಯಿಂದ ನಿರಾಕ್ಷೇಪಣಾ ಪತ್ರವನ್ನು ಕೋರಿರುತ್ತಾರೆ. ಇಲಾಖೆಯವರು ನೀಡಿರುವ ಪಟ್ಟಿಯಲ್ಲಿ 15 ಕೆರೆಗಳಿದ್ದು, ಕೇವಲ ಮಡಿವಾಳ ದೊಡ್ಡ ಕೆರೆಯು ಸಣ್ಣ ನೀರಾವರಿ ಇಲಾಖಾ ವ್ಯಾಪ್ತಿಗೆ ಒಳಪಡುತ್ತಿದ್ದು, ಕಾರ್ಯಪಾಲಕ ಇಂಜಿನಿಯರ್ ರವರು ಸದರಿ ಕೆರೆಯನ್ನು ಪರಿವೀಕ್ಷಿಸಿ ನೀಡಿರುವ ವರದಿಯನ್ವಯ ಈ ಕೆಳಕಂಡ ಷರತ್ತುಗಳಿಗೊಳಪಟ್ಟು ನಿರಾಕ್ಷೇಪಣಾ ಪತ್ರವನ್ನು ನೀಡಬಹುದೆಂದು ಅಭಿಪ್ರಾಯ ಪಡಲಾಗಿದೆ.

1) ಸದರಿ ಕೆರೆಯ ನೀರು ನಿಲುಗಡೆ ಪ್ರದೇಶಕ್ಕೆ ಧಕ್ಕೆಯಾಗದಂತೆ ಮತ್ತು ನೀರಿನ ಸಾಮರ್ಥ್ಯವನ್ನು ಕಡಿಮೆ ಆಗದಂತೆ ವಿಚಿತ ಪಡಿಸಿಕೊಂಡು ಕಾಮಗಾರಿಯನ್ನು ನಿರ್ವಹಿಸುವುದು.
2) ಸದರಿ ಕೆರೆಗೆ ಹರಿದು ಬರುವ ನೀರಿಗೆ ಅಡಚಣೆ ಉಂಟು ಮಾಡಬಾರದು.
3) ಸಣ್ಣ ನೀರಾವರಿ ಮಾನದಂಡಗಳನ್ನು ಅನುಸರಿಸಿ ಕಾಮಗಾರಿಯನ್ನು ನಿರ್ವಹಿಸುವುದು.

ಸದರಿ ಮಾಹಿತಿಯನ್ನು ತಮ್ಮ ಅವಗಾಹನೆಗೆ ಸಲ್ಲಿಸುತ್ತಾ ಈ ಬಗ್ಗೆ ಮುಂದಿನ ಆದೇಶ ಕೋರಿದೆ.

ಅಡಕ:- 1)ಉಲ್ಲೇಖಿತ ಪತ್ರಗಳು
2)ನಕ್ಷೆ-1 ನಂ

ತಮ್ಮ ವಿಶ್ವಾಸಿ,
ಸಹಿ/-
ಮುಖ್ಯ ಇಂಜಿನಿಯರ್
ಸಣ್ಣ ನೀರಾವರಿ (ದಕ್ಷಿಣ) ಬೆಂಗಳೂರು.

1. ಪ್ರತಿಯನ್ನು ಅಧೀಕ್ಷಕ ಇಂಜಿನಿಯರ್, ಸಣ್ಣ ನೀರಾವರಿ ವೃತ್ತ, ಬೆಂಗಳೂರು ರವರಿಗೆ ಮಾಹಿತಿಗಾಗಿ ಕಳುಹಿಸಲಾಗಿದೆ.
2. ಪ್ರತಿಯನ್ನು ಕಾರ್ಯಪಾಲಕ ಇಂಜಿನಿಯರ್, ಸಣ್ಣ ನೀರಾವರಿ ವಿಭಾಗ, ಕೋಲಾರ ಇವರಿಗೆ ಮಾಹಿತಿಗಾಗಿ ಕಳುಹಿಸಲಾಗಿದೆ.
3. ಹೆಚ್ಚಿನ ಪ್ರತಿ.

ಮುಖ್ಯ ಇಂಜಿನಿಯರ್,
ಸಣ್ಣ ನೀರಾವರಿ (ದಕ್ಷಿಣ), ಬೆಂಗಳೂರು

ಕರ್ನಾಟಕ ಸರ್ಕಾರ

ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರ ಕಛೇರಿ ಪಂಚಾಯತ್ ರಾಜ್ ಇಂಜಿನಿಯರಿಂಗ್ ವಿಭಾಗ, ಕೋಲಾರ-563101.

ಇ-ಮೇಲ್ ವಿಳಾಸ: **eepredkolar1@gmail.com** ದೂರವಾಣಿ ಸಂಖ್ಯೆ: 08152-222570, ಫ್ಯಾಕ್ಸ್: 08152-222166

ಸಂಖ್ಯೆ: ಕಾಪಾಅ/ಪಂ.ರಾ.ಇಂ.ವಿ/ಕೋ/ಸ.ಇಂ-2/1310/2017-18 ದಿನಾಂಕ: 16-09-2017.

ರವರಿಗೆ,

SECON Private Limited,
Plot No.147, 7B Road,
Export Promotion Industrial Park (EPIP)
Whitefield, Bangalore - 560066 INDIA
Tel: +91-80-41197778
Fax: +91-80-41194277

ಮಾನ್ಯರೆ,

ವಿಷಯ: ಬೆಂಗಳೂರು-ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ಹೆದ್ದಾರಿ NHDP Phase-VI ಕಾಮಗಾರಿಗೆ ನಿರಪೇಕ್ಷಣಾ ಪತ್ರ ನೀಡುವ ಬಗ್ಗೆ (Formal No objection Certificate)

ಉಲ್ಲೇಖ: 1)ಮುಖ್ಯ ಇಂಜಿನಿಯರ್, ಪಂಚಾಯತ್ ರಾಜ್ ಇಂಜಿನಿಯರಿಂಗ್ ಇಲಾಖೆ, ಬೆಂಗಳೂರು ರವರ ಪತ್ರದ ಸಂಖ್ಯೆ:ಇಜಿಐಎಸ್/2016-17, ದಿನಾಂಕ: 10-06-2016.
2)ತಮ್ಮ ಕಛೇರಿ ಪತ್ರದ ಸಂಖ್ಯೆ: SPL/BCE-PDR/ZP/07-15/261 dt: 22-07-2015.
3)Egis International Letter dt: 30-05-2017.
4)ವಿಭಾಗ ಕಛೇರಿ ಪತ್ರದ ಸಂಖ್ಯೆ: 458/2017-18 ದಿ: 05-06-2017.
5)ಸಹಾಯಕ ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು ಪಂಚಾಯತ್ ರಾಜ್ ಇಂಜಿನಿಯರಿಂಗ್ ಉಪವಿಭಾಗ ಬಂಗಾರಪೇಟೆ ರವರ ಪತ್ರದ ಸಂಖ್ಯೆ: 262/2017-18 ದಿ: 14-09-2017.

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ಮೇಲ್ಕಂಡ ವಿಷಯಕ್ಕೆ ಸಂಬಂಧಪಟ್ಟಂತೆ, ಉಲ್ಲೇಖಿತ ಪತ್ರದಲ್ಲಿ ಬೆಂಗಳೂರು-ಚೆನ್ನೈ ಎಕ್ಸ್ ಪ್ರೆಸ್ ಹೆದ್ದಾರಿ NHDP Phase-VI ಕಾಮಗಾರಿ ನಡೆಸಲು ಉದ್ದೇಶಿಸಿರುವ ಜಾಗದಲ್ಲಿ ಈ ಇಲಾಖೆಗೆ ಸೇರಿದ ಕೋಲಾರ ಜಿಲ್ಲೆ ವ್ಯಾಪ್ತಿಯಲ್ಲಿ ಬರುವ ಬಂಗಾರಪೇಟೆ ತಾಲ್ಲೂಕಿನ ಜಿಲ್ಲಾ ಪಂಚಾಯತ್ ವ್ಯಾಪ್ತಿಗೆ ಸೇರಿದ ಕೆರೆ ವ್ಯಾಪ್ತಿಯಲ್ಲಿ ಈ ಕೆಳಕಂಡ ಕೆರೆಗಳು ಹಾದು ಹೋಗುತ್ತಿದ್ದು. ಸಂಬಂಧ ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿ ಪ್ರಾಧಿಕಾರಕ್ಕೆ ನಿಪೇಕ್ಷಣಾ ಪತ್ರವನ್ನು ನೀಡುವಂತೆ ಕೋರಿರುವುದು ಸರಿಯಷ್ಟೆ. ಅದರಂತೆ ಸದರಿ ಕೆರೆಗಳನ್ನು ಪರಿವೀಕ್ಷಣೆ ಮಾಡಲಾಗಿರುತ್ತದೆ.

Sl. No	Name of the Tank	Catchment Area Details	Sub mercisible area at full tank level in Ha	How many acres under Irrigation land
1	2	3	4	5
1	SULIKUNTE	6.00	5.00	7.00
2	NAGANATHAPURA	6.00	4.82	6.11
3	MUGALABELE	13.00	3.00	16.00
4	MADAMANGALA	48.00	6.50	33.00
5	MADIGARAHALLI	6.00	5.00	7.00
6	SIDDANAHALLI	19.00	5.00	14.00
7	BYASABELE	30.00	5.50	21.00
8	KUPPANAHALLI	11.00	5.00	9.00
9	BIRANDAHALLI	10.00	3.00	8.00
10	KARABELE	66.00	6.00	20.13
11	MARGAL	10.00	5.00	7.00
12	ITHANDAHALLI	37.00	5.00	27.00
13	KAVARANAHALLI	5.00	3.00	4.40
14	DODDUR KARAPANAHALLI	20.00	4.00	18.00
15	KRISHNARAJAPURA	8.00	7.50	8.00
16	GATTAKAMADENAHALLI	19.00	5.00	14.00
17	REDDYHALLI	77.00	5.00	24.19
18	PEDDYHALLI	77.00	5.00	24.19
19	THAMMENAHALLI	10.00	5.50	19.00

20	NAGASETTTIHALLI	90.00	10.50	65.24
21	HOSA(KOTTA)PALYA	8.00	5.50	5.00
22	PARISEPALLI	18.00	7.50	30.00
23	BETHAMANGALA	57.00	7.00	54.27
24	BYATARAYANAHALLI	21.00	6.00	24.00
25	DODDAKARI	24.00	6.00	12.00
26	DODDAKARI (M) KAMBAMPALLI	5.00	4.34	4.99
27	KULURU	11.00	6.00	6.00
28	NERNAHALLI	25.00	6.00	20.00
29	VADRAHALLI	48.00	6.00	14.00
30	PILLAGUNDLAHALLI	5.00	3.00	4.40
31	RAYASANDRA	26.00	5.00	22.00
32	VENGASANDRA	63.00	9.33	65.13
33	SUNDRAPALYA	6.00	4.50	8.00
34	N.G.HULKUR	5.00	3.00	4.40
35	KODIGEPALLI	6.00	4.50	5.94
36	KASARIGANAKUPPA	7.00	6.66	7.34
37	PUGANAHALLI	5.00	3.30	4.80

ಮುಂದುವರೆದು ಸದರಿ ವಿಷಯದ ಬಗ್ಗೆ ಸ್ಥಳ ಪರಿವೀಕ್ಷಣೆ ಮಾಡಿ ಈ ಕೆಳಕಂಡ ಷರತ್ತುಗಳೊಂದಿಗೆ ನಿಪೇಕ್ಷಣಾ ಪತ್ರ ಈ ಕೆಳಕಂಡ ಷರತ್ತುಗಳೊಂದಿಗೆ ನಿರಾಪೇಕ್ಷಣಾ ಪತ್ರವನ್ನು ನೀಡಲಾಗಿರುತ್ತದೆ.

1. ಜಿಲ್ಲಾ ಪಂಚಾಯತ್ ಕೆರೆಗಳ ಮುಳುಗಡೆ ಪ್ರದೇಶ ಹಾಗೂ ಶೇಖರಣಾ ಸಾಮರ್ಥ್ಯವನ್ನು ಕಾಯ್ದುಟ್ಟುಕೊಳ್ಳುವುದು. (Zilla Panchayath Tank holding capacity and submergence area will not going to be squeezed)
2. ಕೆರೆಗಳ ಏರಿಗಳ, ತೂಬು ಹಾಗೂ ಕೋಡಿಗಳ ಬದಲಾವಣೆಯನ್ನು ಮಾಡತಕ್ಕದ್ದಲ್ಲ (Component of the tank such as bund, sluice and water weir will not be changed).
3. ಕೆರೆಗಳ ಮಾಲೀಕತ್ವವನ್ನು ಯಾವುದೇ ಕಾರಣಕ್ಕೂ ಬದಲಾಯಿಸತಕ್ಕದ್ದಲ್ಲ. (The ownership pf the tank shall not be altered).
4. ಕಾಮಗಾರಿ ರಚನೆ/ ನಿರ್ಮಾಣದ ಸಂದರ್ಭದಲ್ಲಿ ಉಂಟಾಗುವ ಭಗ್ನಾವಶೇಷಗಳನ್ನು ಕಾಮಗಾರಿ ಸಂಪೂರ್ಣವಾದ ನಂತರ ಮುನ್ನ ಇದ್ದ ಯಥಾ ಸ್ಥತಿಯನ್ನು ಕಾಪಾಡಿಕೊಳ್ಳಬೇಕು. (During the construction of structures, the debris tackled area during excavation should be refilled).
5. ಸ್ವತಂತ್ರ ಮತ್ತು ತಡೆಹಿಡಿಯದ ಸಂಗ್ರಹಣಾ ಒಳಹರಿವಿಗೆ ಯಾವುದೇ ರೀತಿಯಲ್ಲಿಯೂ ಅಡ್ಡಿಯುಂಟಾಗಬಾರದು. (The inflow its independent and intercepted catchment shall not be obstructed).
6. ನಿರ್ಮಾಣದ ಸಮಯದಲ್ಲಿ ಮೂಲ ಕೆರೆಯ ಸಾಮರ್ಥ್ಯದಲ್ಲಿ ಯಾವುದೇ ವ್ಯತ್ಯಾಸವಾಗದಂತೆ ಮುನ್ನೆಚ್ಚರಿಕೆ ಕ್ರಮ ವಹಿಸುವುದು. (During the construction original tanl capacity if any, lost shall be restored).
7. ಕೆರೆಯ ಮೂಲ ಭಾಹ್ಯ ರೇಖೆಗಳಲ್ಲಿ ಯಾವುದೇ ವ್ಯತ್ಯಾಸವಾಗದಂತೆ ಮುನ್ನೆಚ್ಚರಿಕೆ ಕ್ರಮ ವಹಿಸುವುದು. (The capacity contours, if any disrupted shall be restored).
8. ಕೆರೆಯ ಸಾಮರ್ಥ್ಯವು ಪೂರ್ಣವಿದ್ದಾಗ, ಹೊರಹರಿವಿನ ಸಮಯದಲ್ಲಿ ಅಗತ್ಯ ರಕ್ಷಣಾತ್ಮಕ ಕ್ರಮಗಳನ್ನು ಮುನ್ನೆಚ್ಚರಿಕೆಯಾಗಿ ತೆಗೆದುಕೊಳ್ಳತಕ್ಕದ್ದು. (Necessary protective works and precautionary measures shall be undertaken at the time of discharge, when the tank is upto its full capacity).

ತಮ್ಮ ವಿಶ್ವಾಸಿ,

ಕಾರ್ಯಪಾಲಕ ಅಭಯಂತರರು,
ಪಂ.ರಾ.ಇಂ. ವಿಭಾಗ, ಕೋಲಾರ.

भारतीय राष्ट्रीय राजमार्ग प्राधिकरण
(सड़क परिवहन एवं राजमार्ग मंत्रालय)
National Highways Authority of India
(Ministry of Road Transport & Highways)
परियोजना कार्यान्वयन इकाई बेंगलूरु – एक्सप्रेसवे
Project Implementation Unit - Bengaluru (Expressway)
नं. ७१९, ११ क्रास, २० मैन, पद्मानाग नगर, बेंगलूरु ५६० ०७०
719, 11th Cross, 20th Main Padmanabha Nagar Bengaluru - 560 070.

BHARATMALA
ROAD TO PROPERITY

Phone 080-26694382
Email : piubangalore@nhai.org
piubngexpressway2016@gmail.com

NHAI/11019/Tanks/KNT/1/2015/PIU-BNG(EXP)/ 159 02.05.2019

To

The Principal Secretary to Government
Rural Development & Panchayath Raj Department
M.S. Building
Bangalore-560001

Sub: NHAI-PIU-Bangalore (Expressway) –**Bangalore-Chennai Expressway project in the state of Karnataka- Irrigation tanks and Ponds along the Project Highway-Request for No Objection Certificate-reg.**

Ref: 1. The Chief Engineer, Panchayath Raj Engineering Department, Bangalore letter no. CE/PRED/EE-1/TA-1/AE-8/2016-17 dt.26.07.2016 addressed to the Principal Secretary to Govt., Rural Development & Pan. Raj Dept., Bangalore
2. This office letter no. NHAI/11019/Tanks/KNT/1/2015/PIU-BNG(EXP)/731 dated 03.12.2018
3. This office letter no. NHAI/11019/Tanks/KNT/1/2015/PIU-BNG(EXP)/872 dated 09.01.2019

Sir,

This is with reference to the issuance of NOC for construction of Bangalore-Chennai Expressway adjoining the below mentioned tanks pertains to Panchayath Raj Engineering Department

Sl. No.	District/Taluk	Name of the Tank
1	Bangalore Rural / Hoskote	Jinnagara
		Vadigehalli
		Gangapura
2	Kolar/ Malur	Malliyappanahalli
		Hijuvanahalli
		Kuntanahalli

The Chief Engineer, Panchayath Raj Engineering Department, Bangalore vide letter dated 26.07.2016 had recommended for the issuance of NOC to the Principal Secretary to Govt., Rural Development & Panchayath Raj Dept., Bangalore subject to certain conditions(copy enclosed). However, NOC is yet to be issued.

As Bangalore-Chennai Expressway project is categorised under **High** Priority project and targeted to be awarded in the first quarter of 2019-20, it is requested that necessary action may please be taken for the issuance of NOC at the earliest.

Yours faithfully,
T Parvateesam 2/5/19
(T Parvateesam)
DGM (T) &Project Director
PIU-Bangalore (Expressway)

Encl: As Above.

Copy to: M/s Egis International in association with M/s Secon Pvt. Ltd- for information and necessary follow-up.

Ph : 080 28015401

Office of the Chief Engineer
Panchayath Raj Engineering Department
Grammabhyruddhi Bhavan
Anandrao Circle, Bangalore - 560 009.

ಮುಖ್ಯ ಇಂಜಿನಿಯರ್‌ರವರ ಕಛೇರಿ
ಪಂಚಾಯತ್ ರಾಜ್ ಇಂಜಿನಿಯರಿಂಗ್ ಇಲಾಖೆ
ಗ್ರಾಮೋದ್ಧಾರಭವನ, ಆನಂದ್ ರಾವ್ ವೃತ್ತ
ಬೆಂಗಳೂರು - 560 009.

Fax No. : Accounts : 080 28015413 EST : 080 28015414 Tech : 080 28015415

No.CE/PRED/EE-1/TA-1/AE-8/2016-17 Dated: 26 JUL 2016

To:

The Principle Secretary to Government,
Rural Development & Pan. Raj Department.
M.S. Building, Bangalore-560001

Sir,

Sub: NHAI-PIU-K'giri-Bangalore-Chennai Express-way from Km 11/450 to Km 74/870 and Km 82/150 to Km 83/350 under NHDP Phase VI - Irrigation tanks and Ponds along the Project Highway - Request for No Objection Certificate - Reg.

Ref: 1) Dy. General Manager (Tech) & Project Director, National Highways Authority of India, Krishnagiri office letter No. 1405 dated 20.07.2016.
2) Consultant M/s Elgis-BCEOM International S.A in association with M/s. Secon Pvt. Ltd., Secunderabad letter No.EINTL/HYD/BCE/ 26654/ 29016 dated 02.06.2016.

-ooo-

With reference to above cited letter under reference (1), the proposed Bangalore-Chennai Expressway is passing through the States of Tamil Nadu, Andhra Pradesh and Karnataka and the alignment had already been approved by the all 3 state Governments as stated in the letter. The below mentioned Zilla Panchayath tanks under the jurisdiction of this department are said to be located very close to Bangalore-Chennai Expressway and requested for NOC for the development of the said Expressway.

Sl. No.	District/Taluk.	Name of the Tank	Catchment area in Ha.	Atchkat in Ha
1	Bangalore Rural/ Hoskote	a) Jinagra [illegible]	28.00	39.38
		b) Vadigehalli [illegible]	31.00	27.50

...2

Sl. No.	District/Taluk	Name of the Tank	Catchment area in Ha.	Atchkat in Ha
2	Kolar/Malur	a) Gangapura - [illegible]	20.00	12.00
		b) Madiwala - [illegible]	33.00	19.04
		c) Maliyappanahalli - [illegible]	27.00	11.00
		d) Hijuvanahalli - [illegible]	27.67	11.20
		e) Kuntanahalli - [illegible]	28.09	11.41

In this Context **No objection Certificate** may be issued with the following conditions:

1) The Zilla Panchayath Tank holding capacity and submergence area should not be squeezed.
2) The component of the tank such as bund, sluice and waste weir should not be altered.
3) The ownership of the tank shall not be altered.
4) During the construction the debris which will be generated should cleared and restored out of the tank premises.,
5) The inflow from its independent and intercepted catchment shall not be obstructed.
6) During the construction, the original tank capacity, if any, lost shall be restored three time of loss capacity (by de-silting).
7) The capacity contours, if any disrupted shall be restored.
8) Necessary protective works and precautionary measures shall be undertaken at the time of discharge, when the tank is in full capacity.

Yours faithfully,

for Chief Engineer,
Panchayath Raj Engineering Department,
Bangalore.

O.C. approved by Chief Engineer

Dy. No. 4309
Date. 9/8/16

To Copy to Dy. General Manager (Tech) & Project Director, National Highways Authority of India, #259/1, Salem Main Road, Near KAKC Petrol Bunk, Krishnagiri (Tamil Nadu)-635 001 for information and necessary action.

INDEX MAP OF BANGALORE CHENNAI EXPRESSWAY (PHASE-I)

KARNATAKA

PHASE-I Ch:0+000 to Ch:71+000

Dod Ballapur

Srinivasapur

Devanahalli

Kolar

Mulbagal

Bangalore North

Hoskote

Bangarpet

Malur

K.G.F

Bangalore South

Anekal

Hosur

Santhipuram

Gudupalle

Ramak

NH-207

NH-7

NH-4

NH-219

PHASE-I START
CH:0+000

START OF PROJECT
CH:0+000

BANGALORE RURAL DISTRICT

KOLAR DISTRICT

MAJOR INTERCHANGE
CH+0+000

MAJOR INTERCHANGE
CH+52+085

SECONDARY INTERCHANGE
CH+68+600

SECONDARY INTERCHANGE
CH+24+130

KM:83+598

KM 75+300

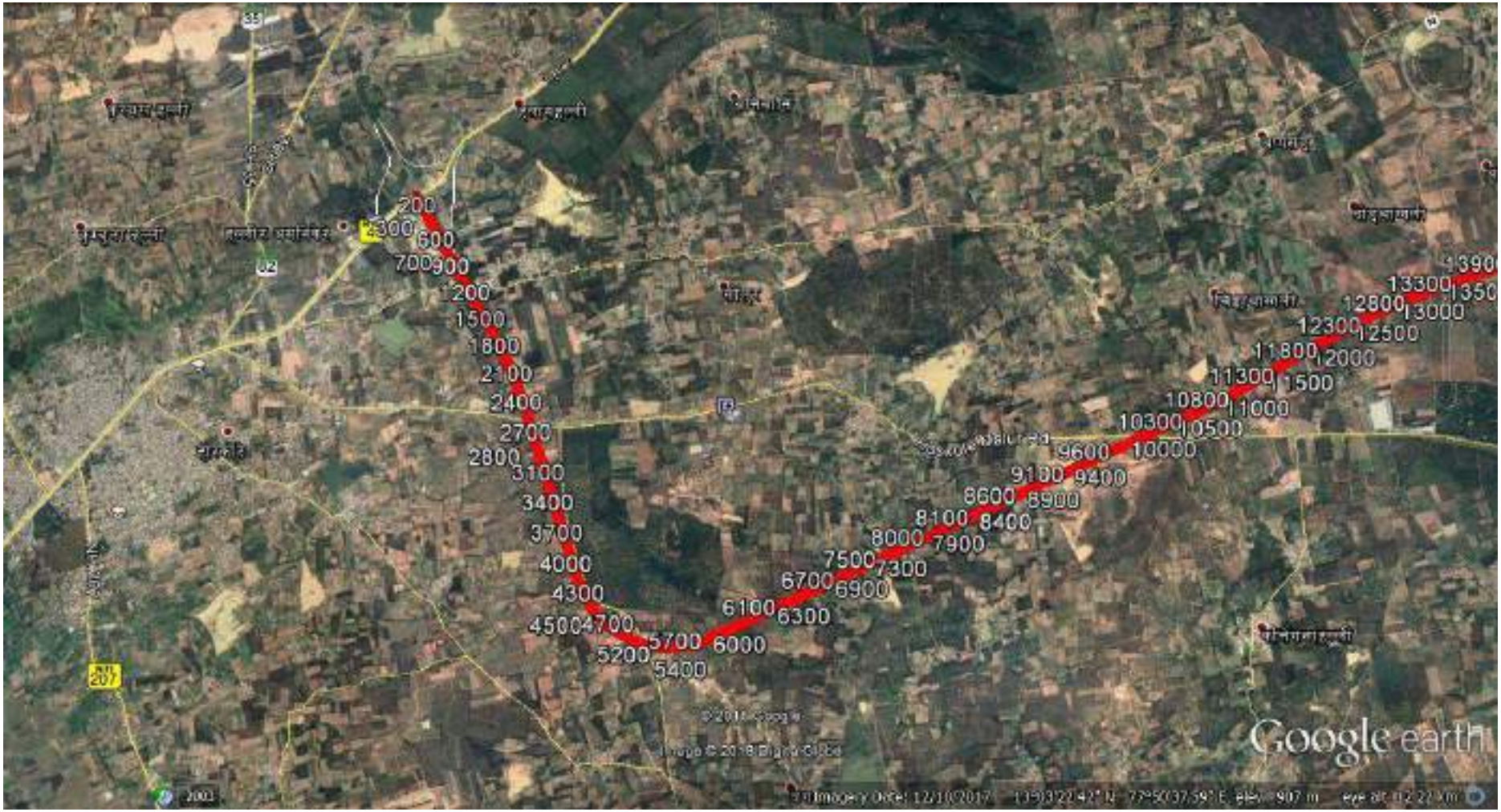
SPUR @ KM:52+085

CH:71+000
PHASE-I END

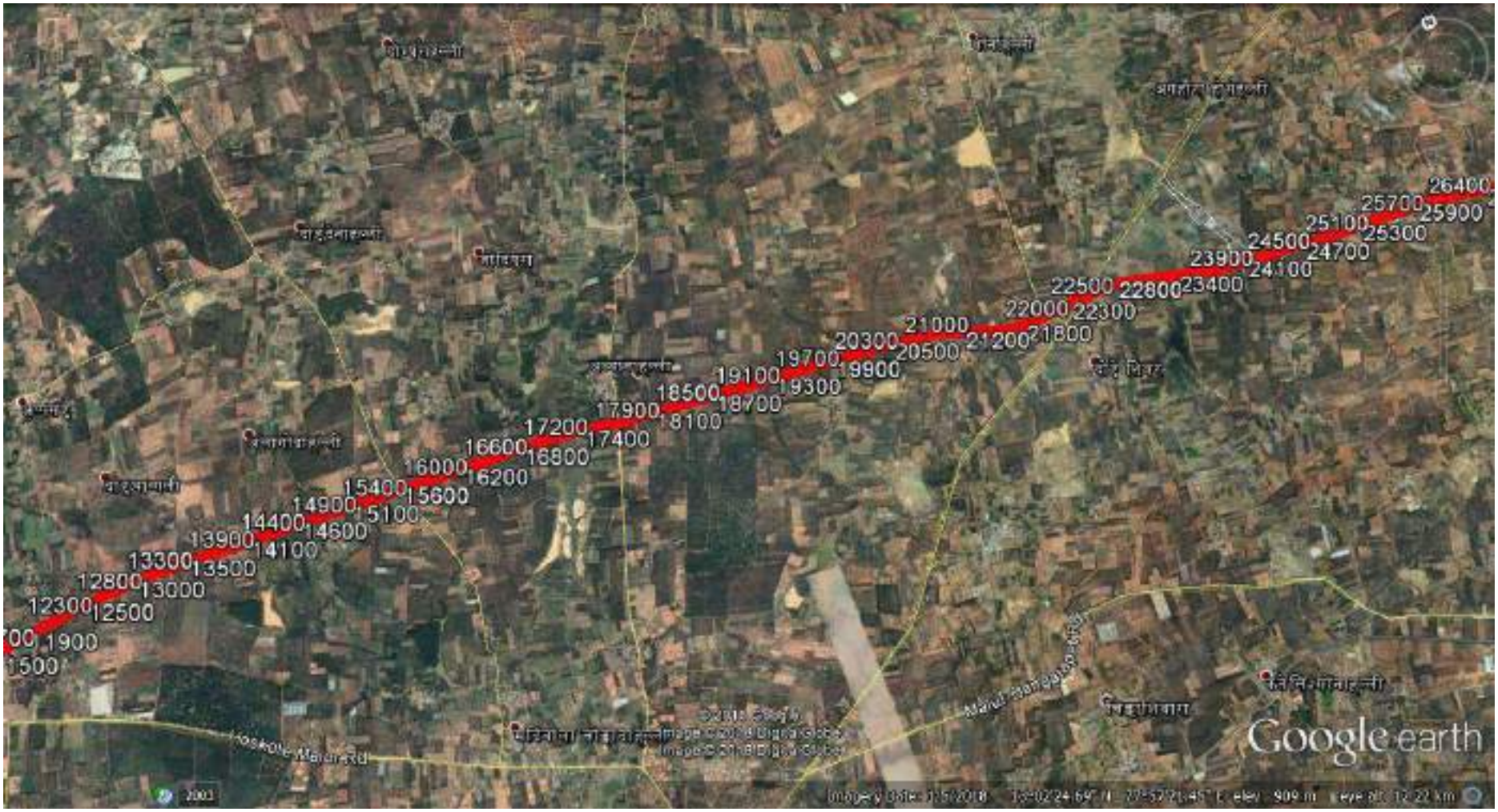
LEGEND:		CHAINAGE	
	BCE ALIGNMENT PHASE-I	FROM KM 0.000	TO KM 71.000
	SPUR ROAD		

ANNEXURE 2.3

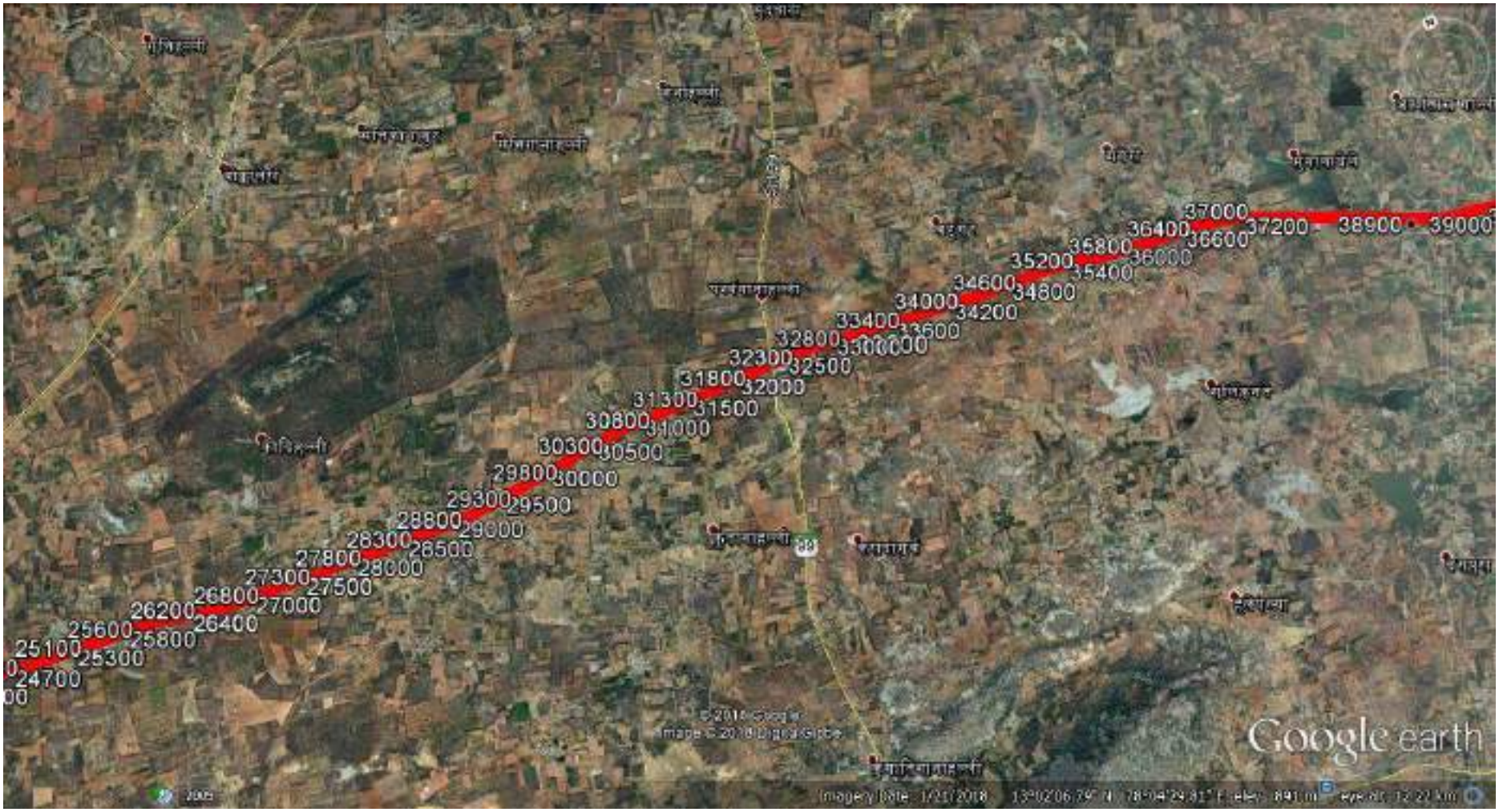
Phase-I Alignment on Google Earth from Km 0 –Km 13



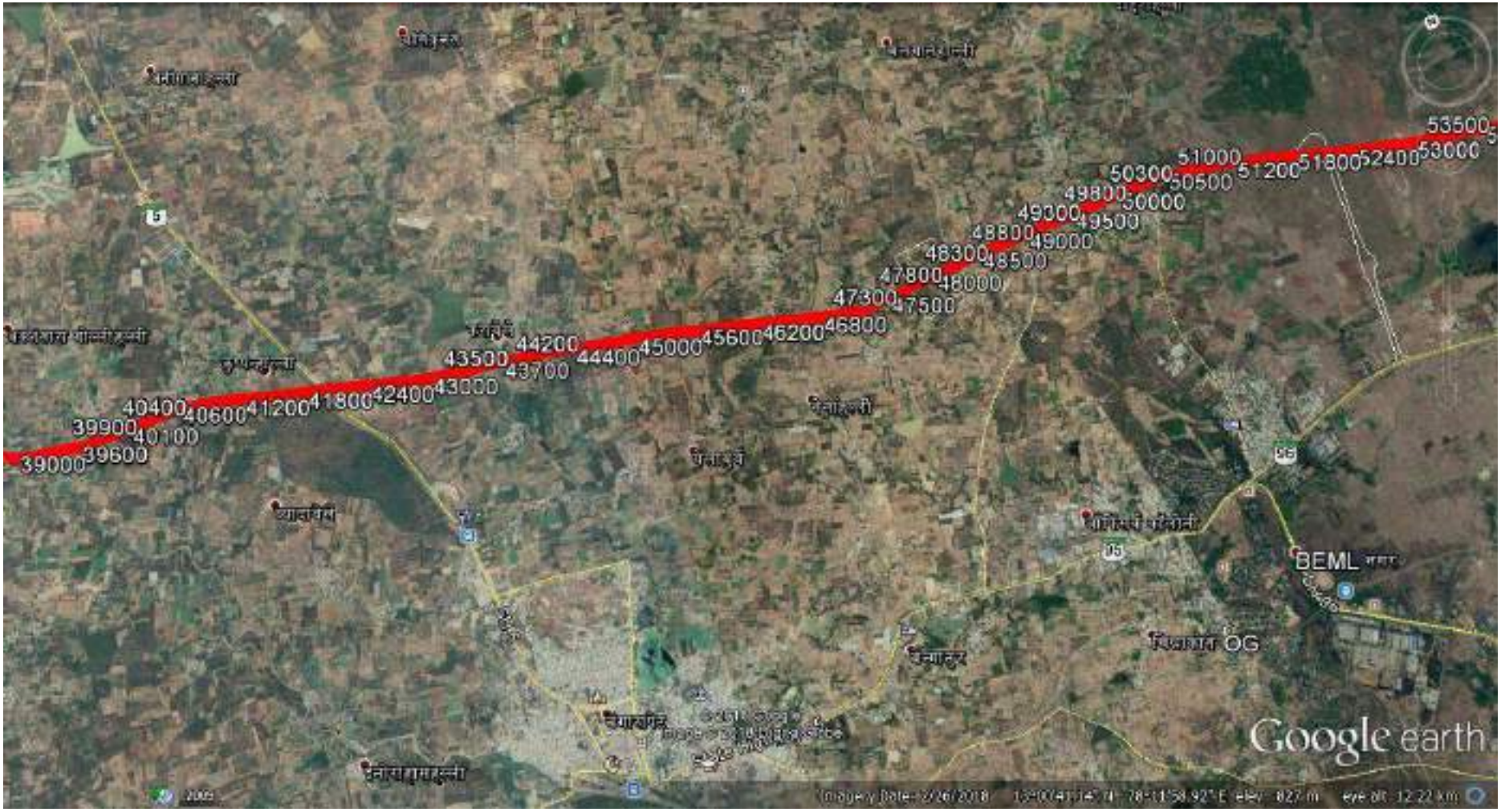
Phase-I Alignment on Google Earth from Km 13 –Km 26



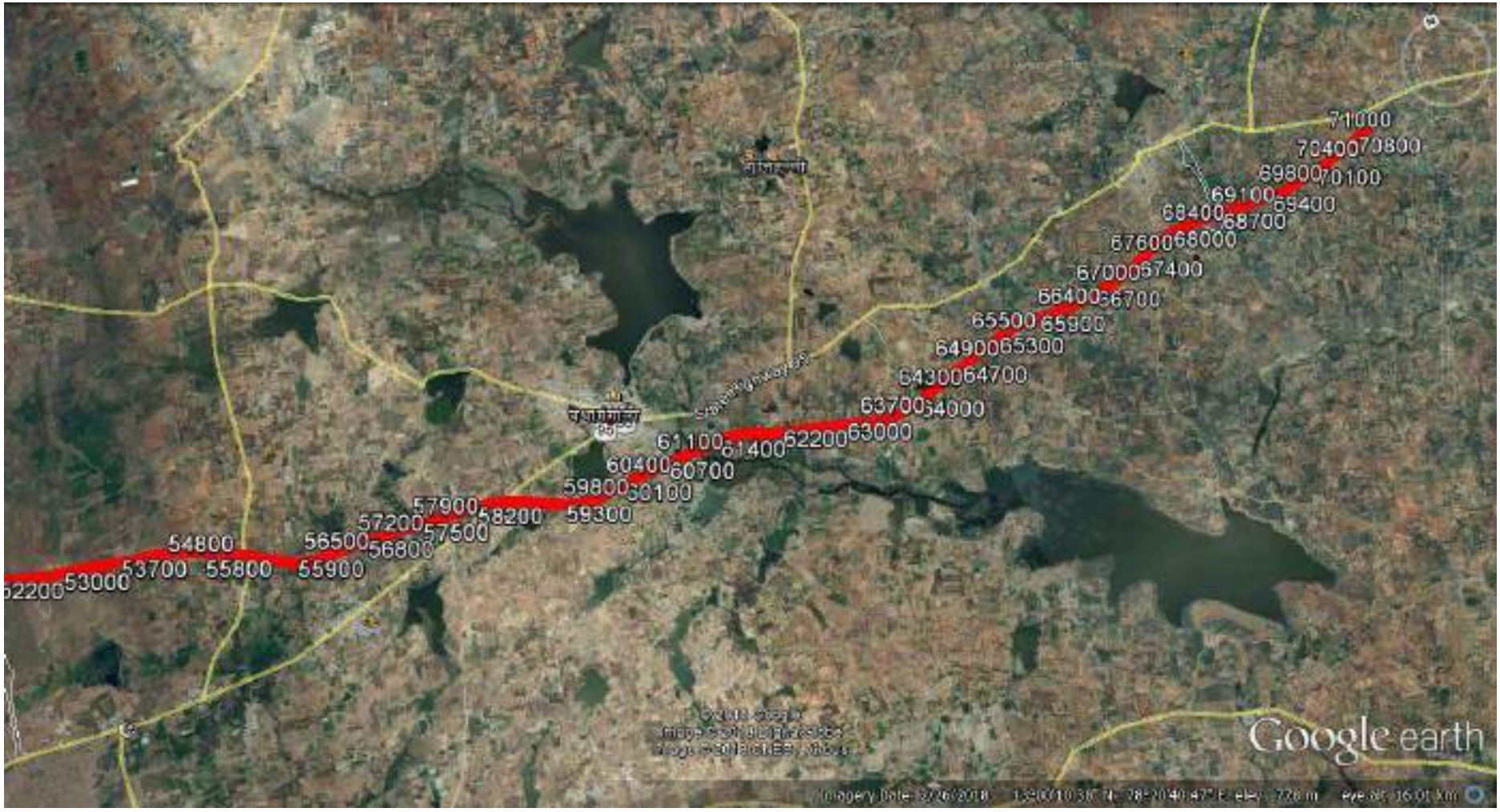
Phase-I Alignment on Google Earth from Km 26 –Km 39


24700
25100
25300
25600
25800
26200
26400
26800
27000
27300
27500
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35200
35400
35800
36000
36400
36600
37000
37200
38900
39000
Google earth

Phase-I Alignment on Google Earth from Km 39 –Km 53



Phase-I Alignment on Google Earth from Km 53 –Km 71



ANNEXURE 2.4

Typical Cross-section Schedules

Package 1: Main Expressway

S No.	Segment		Length (km)	Median width including Edge Strip (m)	Type	Remarks
	From (km)	To (km)				
1	-0.700	-0.280	0.420	21.0	Varying as per Dwg. No. BCE/ML/INT-0+000-001 & Drawing No: BCE/G:IC-01	
2	-0.280	-0.035	0.245	21.0		
3	-0.035	0.035	0.070	21.0	Type 13 & Drawing No: BCE/G:IC-01	
4	0.035	0.280	0.245	21.0	Varying as per Dwg. No. BCE/ML/INT-0+000-001 & Drawing No: BCE/G:IC-01	
5	0.280	0.530	0.250	21.0	Type 1	
6	0.530	1.024	0.494	21.0	Type 2	
7	1.024	1.037	0.013	21.0	VOP	Drawing No: BCE/G:VOP-01
8	1.037	1.530	0.494	21.0	Type 2	
9	1.530	1.694	0.164	21.0	Type 1	
10	1.694	1.706	0.012	21.0	LVUP	Drawing No: BCE/G:LVUP-01
11	1.706	1.840	0.134	21.0	Type 1	
12	1.840	1.880	0.040	21.0	MNB GIRDER	Drawing No: BCE/G:MNB-01
13	1.880	2.100	0.220	21.0	Type 1	
14	2.100	2.140	0.040	21.0	Type 6A	
15	2.140	2.180	0.040	21.0	MNB GIRDER	Drawing No: BCE/G:MNB-01
16	2.180	2.505	0.325	21.0	Type 6A	
17	2.505	2.535	0.030	21.0	VUP	Drawing No: BCE/G:VUP-01
18	2.535	2.600	0.065	21.0	Type 6A	
19	2.600	3.000	0.400	21.0	Type 1	
20	3.000	3.200	0.200	21.0	Type 4	
21	3.200	4.125	0.925	21.0	Type 1	
22	4.125	4.352	0.227	21.0	Type 5A	
23	4.352	4.364	0.012	21.0	VUP	Drawing No: BCE/G:VUP-02
24	4.364	4.415	0.051	21.0	Type 6A	
25	4.415	4.455	0.040	21.0	MNB GIRDER	Drawing No: BCE/G:MNB-01
26	4.455	4.500	0.045	21.0	Type 1	
27	4.500	4.725	0.225	21.0	Type 2	

S No.	Segment		Length (km)	Median width including Edge Strip (m)	Type	Remarks
	From (km)	To (km)				
28	4.725	4.750	0.025	21.0	Type 6A	
29	4.750	4.826	0.076	21.0	Type 6	
30	4.826	4.838	0.012	21.0	LVUP	Drawing No: BCE/G:LVUP-01
31	4.838	4.970	0.132	21.0	Type 6	
32	4.970	5.000	0.030	21.0	VUP	Drawing No: BCE/G:VUP-01
33	5.000	5.195	0.195	21.0	Type 6A	
34	5.195	5.205	0.009	21.0	MNB BOX	Drawing No: BCE/G:MNB-04
35	5.205	5.400	0.195	21.0	Type 6A	
36	5.400	5.500	0.100	21.0	Type 1	
37	5.500	6.050	0.550	21.0	Type 6	
38	6.050	6.085	0.035	21.0	Type 6A	
39	6.085	6.115	0.030	21.0	VUP	Drawing No: BCE/G:VUP-01
40	6.115	6.160	0.045	21.0	Type 6A	
41	6.160	6.202	0.042	21.0	Type 1	
42	6.202	6.218	0.016	21.0	MNB BOX	Drawing No: BCE/G:MNB-05
43	6.218	6.613	0.395	21.0	Type 1	
44	6.613	6.639	0.026	21.0	MNB GIRDER	Drawing No: BCE/G:PLC-01
45	6.639	7.027	0.388	21.0	Type 5A	
46	7.027	7.039	0.012	21.0	VUP	Drawing No: BCE/G:VUP-02
47	7.039	7.235	0.196	21.0	Type 1	
48	7.235	7.505	0.270	21.0	M J B GIRDER	Drawing No: BCE/G:MJB-01
49	7.505	8.314	0.809	21.0	Type 1	
50	8.314	8.326	0.012	21.0	LVUP	Drawing No: BCE/G:LVUP-01
51	8.326	8.739	0.413	21.0	Type 1	
52	8.739	8.751	0.012	21.0	VUP	Drawing No: BCE/G:VUP-02
53	8.751	9.162	0.411	21.0	Type 1	
54	9.162	10.114	0.952	21.0	Type 2	
55	10.114	10.146	0.032	21.0	VOP	Drawing No: BCE/G:VOP-02
56	10.146	10.775	0.629	21.0	Type 2	
57	10.775	10.939	0.164	21.0	Type 1	
58	10.939	10.951	0.012	21.0	VUP	Drawing No: BCE/G:VUP-02

S No.	Segment		Length (km)	Median width including Edge Strip (m)	Type	Remarks
	From (km)	To (km)				
59	10.951	10.971	0.020	21.0	Type 1	
60	10.971	10.981	0.009	21.0	MNB BOX	Drawing No: BCE/G:MNB-04
61	10.981	11.337	0.356	21.0	Type 1	
62	11.337	11.372	0.035	21.0	MNB GIRDER	Drawing No: BCE/G:MNB-02
63	11.372	11.644	0.273	21.0	Type 1	
64	11.644	11.656	0.012	21.0	VUP	Drawing No: BCE/G:VUP-02
65	11.656	11.833	0.176	21.0	Type 1	
66	11.833	11.958	0.125	21.0	M J B GIRDER	Drawing No: BCE/G:MJB-02
67	11.958	12.350	0.393	21.0	Type 6A	
68	12.350	13.160	0.810	21.0	Type 1	
69	13.160	13.168	0.009	21.0	MNB BOX	Drawing No: BCE/G:MNB-04
70	13.168	13.329	0.161	21.0	Type 5A	
71	13.329	13.341	0.012	21.0	VUP	Drawing No: BCE/G:VUP-02
72	13.341	13.700	0.359	21.0	Type 5A	
73	13.700	14.100	0.400	21.0	Type 1	Taper for Toll Plaza
74	14.100	15.100	1.000	21.0	Toll Plaza	Toll Plaza
75	15.100	15.500	0.400	21.0	Type 2	Taper for Toll Plaza
76	15.500	15.567	0.066	21.0	Type 2	
77	15.567	15.580	0.013	21.0	VOP	Drawing No: BCE/G:VOP-01
78	15.580	16.870	1.291	21.0	Type 2	
79	16.870	17.040	0.170	21.0	Type 1	
80	17.040	17.400	0.360	21.0	M J B GIRDER	Drawing No: BCE/G:MJB-03
81	17.400	17.600	0.200	21.0	Type 6	
82	17.650	17.710	0.060	21.0	Type 1	
83	17.600	17.650	0.050	21.0	Type 6A	
84	17.710	17.730	0.020	21.0	VUP	Drawing No: BCE/G:VUP-01
85	17.730	18.000	0.270	21.0	Type 1	
86	18.000	18.600	0.600	21.0	Type 2	
87	18.600	19.120	0.520	21.0	Type 1	
88	19.120	19.260	0.140	21.0	Type 6A	
89	19.260	19.504	0.244	21.0	Type 1	

S No.	Segment		Length (km)	Median width including Edge Strip (m)	Type	Remarks
	From (km)	To (km)				
90	19.504	19.516	0.012	21.0	LVUP	Drawing No: BCE/G:LVUP-01
91	19.516	19.851	0.335	21.0	Type 1	
92	19.851	19.863	0.012	21.0	VUP	Drawing No: BCE/G:VUP-02
93	19.863	20.119	0.256	21.0	Type 1	
94	20.119	20.133	0.014	21.0	MNB BOX	Drawing No: BCE/G:MNB-04
95	20.133	20.445	0.312	21.0	Type 1	
96	20.445	20.455	0.009	21.0	MNB BOX	Drawing No: BCE/G:MNB-04
97	20.455	20.980	0.525	21.0	Type 1	
98	20.980	21.105	0.125	21.0	M J B GIRDER	Drawing No: BCE/G:MJB-04
99	21.105	21.600	0.495	21.0	Type 6	
100	21.600	21.945	0.345	21.0	Type 6A	
101	21.945	21.975	0.030	21.0	VUP	Drawing No: BCE/G:VUP-01
102	21.975	22.000	0.025	21.0	Type 6A	
103	22.000	22.385	0.385	21.0	Type 1	
104	22.385	22.415	0.030	21.0	VUP	Drawing No: BCE/G:VUP-01
105	22.415	22.800	0.385	21.0	Type 6A	
106	22.800	23.315	0.515	21.0	Type 1	
107	23.315	23.345	0.030	21.0	MNB GIRDER	Drawing No: BCE/G:MNB-03
108	23.345	23.550	0.205	21.0	Type 1	
109	23.550	23.744	0.194	21.0	Type 6A	
110	23.744	23.756	0.012	21.0	VUP	Drawing No: BCE/G:VUP-04
111	23.756	24.125	0.369	21.0	Type 6A	
112	24.125	24.152	0.027	21.0	INTERCHANGE VOP	Drawing No: BCE/G:IC-02
113	24.152	24.200	0.049	21.0	Type 1	
114	24.200	24.500	0.300	21.0	Type 6A	
115	24.500	24.630	0.130	21.0	Type 6	
116	24.630	25.154	0.524	21.0	Type 1	
117	25.154	25.166	0.012	21.0	LVUP	Drawing No: BCE/G:LVUP-01
118	25.166	25.750	0.584	21.0	Type 1	
119	25.750	25.780	0.030	21.0	Type 5A	

S No.	Segment		Length (km)	Median width including Edge Strip (m)	Type	Remarks
	From (km)	To (km)				
120	25.780	25.792	0.012	21.0	LVUP	Drawing No: BCE/G:LVUP-01
121	25.792	25.950	0.158	21.0	Type 5A	
122	25.950	26.400	0.450	21.0	Type 1	
	Total Length (km)		**27.100**			

Package 1: Interchange

Interchange No. &C hainage (on BCE in Km)	Ramp No	Description	Lane Configuration	TCS Type
Main Expressway				
INT-01 & km 0.00	Loop-1	From Ch. 0.851 to 0.000 From Chennai (BCE) to Kolar (NH-4)	2 lane	Type 7
	Loop-2	From Ch. 0.945. to 0.000 From Bangalore (NH-4) to Chennai (BCE)	4 lane	Type 7A
	Loop-3	From Ch. 0.000 to 0.741 From Devanahalli (NH-207) to Bangalore (NH-4)	2 lane	Type 7
	Loop-4	From Ch. 0.610 to 0.000 From Kolar (NH-4) to Devanahalli (NH-207)	2 lane	Type 7
	Ramp-1	From Ch. 1.202 to 0.000 From Bangalore (NH-4) to Devanahalli (NH-207)	2 lane	Type 7
	Ramp-2	From Ch. 0.000 to 0.839 From Devanahalli (NH-207) to Kolar (NH-4)	2 lane	Type 7
	Ramp-3	From Ch. 1.100 to 0.000 From Kolar (NH-4) to Chennai (BCE)	2 lane	Type 7
	Ramp-4	From Ch. 0.934 to 0.000 From Chennai (BCE) to Bangalore (NH-4)	2 lane	Type 7
INT-02 & km 24.138	Loop-1 (Loop Ramp)	From Ch. 0.000 to 0.327 From Kolar (Kolar-Malur road) to Bangalore (BCE)	4 lane	Type 8
	Loop-2 (Loop Ramp)	From Ch. 0.000 to 0.634 From Kolar (Kolar-Malur road) to Bangalore (BCE)	2 lane	Type 7
	Ramp-1 (Semi-directional Ramp)	From Ch. 0.000 to 0.358 From Chennai (BCE) to Malur (Kolar-Malur road)	2 lane	Type 7
	Ramp-2 (Directional Ramp)	From Ch. 0.572 to 0.000 From Bangalore (BCE) to Malur (Kolar – Malur road)	2 lane	Type 7
	Ramp-3 (Directional Ramp)	From Ch. 0.000 to 0.661 From Kolar (Kolar – Malur road) to Chennai (BCE)	2 lane	Type 7

Package 2: Main Expressway

Sl. No.	Segment		Length (km)	Median width including Edge Strip (m)	Type	Remarks
	From (km)	To (km)				
1	26.400	27.000	0.600	21.0	Type 1	
2	27.000	27.010	0.011	21.0	MNB	Drawing No: BCE/G:MNB-04
3	27.010	27.224	0.214	21.0	Type 1	
4	27.224	27.254	0.030	21.0	MNB	Drawing No: BCE/G:MNB-01
5	27.254	28.050	0.796	21.0	Type 1	
6	28.050	28.120	0.070	21.0	Type 6A	
7	28.120	28.132	0.012	21.0	VUP	Drawing No: BCE/G:VUP-02
8	28.132	28.146	0.014	21.0	Type 6A	
9	28.146	28.154	0.008	21.0	MNB	Drawing No: BCE/G:MNB-04
10	28.154	28.196	0.043	21.0	Type 6A	
11	28.196	28.204	0.008	21.0	MNB	Drawing No: BCE/G:MNB-04
12	28.204	28.246	0.043	21.0	Type 6A	
13	28.246	28.254	0.008	21.0	MNB	Drawing No: BCE/G:MNB-04
14	28.254	28.300	0.046	21.0	Type 6A	
15	28.300	28.674	0.374	21.0	Type 6	
16	28.674	28.686	0.012	21.0	VUP	Drawing No: BCE/G:VUP-02
17	28.686	28.831	0.145	21.0	Type 6	
18	28.831	28.849	0.018	21.0	MNB	Drawing No: BCE/G:MNB-04
19	28.849	29.165	0.316	21.0	Type 6	
20	29.165	29.435	0.270	21.0	BRIDGE (IOCL CROSSING)	Drawing No: BCE/G:PLC-02
21	29.435	29.484	0.049	21.0	Type 5A	Connecting Road- Right
22	29.484	29.496	0.012	21.0	LVUP	Drawing No: BCE/G:LVUP-01
23	29.496	29.650	0.154	21.0	Type 6A	
24	29.650	29.840	0.190	21.0	Type 1	
25	29.840	30.300	0.460	21.0	Type 2	
26	30.300	30.615	0.315	21.0	Type 1	
27	30.615	30.795	0.180	21.0	MJB	Drawing No: BCE/G:MJB-01
28	30.795	30.970	0.175	21.0	Type 1	
29	30.970	31.304	0.334	21.0	Type 2	

Sl. No.	Segment		Length (km)	Median width including Edge Strip (m)	Type	Remarks
	From (km)	To (km)				
30	31.304	31.316	0.012	21.0	VOP	Drawing No: BCE/G:VOP-01
31	31.316	31.500	0.184	21.0	Type 2	
32	31.500	31.900	0.400	21.0	Type 1	
33	31.900	32.000	0.100	21.0	Type 6A	
34	32.000	32.250	0.250	21.0	Type 6	
35	32.250	32.312	0.062	21.0	Type 6A	
36	32.312	32.342	0.030	21.0	VUP	Drawing No: BCE/G:VUP-01
37	32.342	32.350	0.008	21.0	Type 6A	
38	32.350	33.100	0.750	21.0	Type 1	
39	33.100	33.556	0.456	21.0	Type 2	
40	33.556	33.568	0.012	21.0	VOP	Drawing No: BCE/G:VOP-01
41	33.568	33.800	0.232	21.0	Type 2	
42	33.800	34.000	0.200	21.0	Type 2	
43	34.000	34.114	0.114	21.0	Type 1	
44	34.114	34.126	0.012	21.0	LVUP	Drawing No: BCE/G:LVUP-01
45	34.126	34.650	0.524	21.0	Type 1	
46	34.650	34.950	0.300	21.0	Type 2	
47	34.950	35.031	0.081	21.0	Type 1	
48	35.031	35.039	0.009	21.0	MNB	Drawing No: BCE/G:MNB-03
49	35.039	35.216	0.177	21.0	Type 1	
50	35.216	35.238	0.021	21.0	MNB	Drawing No: BCE/G:MNB-04
51	35.238	35.395	0.157	21.0	Type 1	
52	35.395	35.645	0.250	21.0	MJB	Drawing No: BCE/G:MJB-02
53	35.645	35.900	0.255	21.0	Type 6	
54	35.900	36.202	0.302	21.0	Type 1	
55	36.202	36.216	0.013	21.0	MNB	Drawing No: BCE/G:MNB-03
56	36.216	36.446	0.231	21.0	Type 1	
57	36.446	36.458	0.011	21.0	MNB	Drawing No: BCE/G:MNB-03
58	36.458	36.762	0.304	21.0	Type 1	
59	36.762	36.774	0.012	21.0	LVUP	Drawing No: BCE/G:LVUP-01
60	36.774	37.100	0.326	21.0	Type 1	

Sl. No.	Segment		Length (km)	Median width including Edge Strip (m)	Type	Remarks
	From (km)	To (km)				
61	37.100	37.169	0.069	21.0	Type 6A	
62	37.169	37.229	0.060	21.0	Type 5A	Connecting Road- Left
63	37.229	37.241	0.012	21.0	VUP	Drawing No: BCE/G:VUP-02
64	37.241	37.321	0.080	21.0	Type 5A	Connecting Road- Right
65	37.321	37.350	0.029	21.0	Type 6A	
66	37.350	37.450	0.100	21.0	Type 1	
67	37.450	37.600	0.150	21.0	Type 6A	
68	37.600	37.775	0.175	21.0	Type 1	
69	37.775	37.785	0.009	21.0	MNB	Drawing No: BCE/G:MNB-03
70	37.785	38.275	0.490	21.0	Type 1	
71	38.275	38.390	0.115	21.0	Type 3	
72	38.390	38.537	0.147	21.0	Type 1	
73	38.537	38.549	0.012	21.0	LVUP	Drawing No: BCE/G:LVUP-01
74	38.549	38.900	0.351	21.0	Type 1	
75	38.900	39.206	0.306	21.0	Type 6	
76	39.206	39.246	0.040	21.0	MNB	Drawing No: BCE/G:MNB-02
77	39.246	39.550	0.304	21.0	Type 6	
78	39.550	39.604	0.054	21.0	Type 6A	
79	39.604	39.616	0.012	21.0	VUP	Drawing No: BCE/G:VUP-02
80	39.616	39.700	0.084	21.0	Type 6A	
81	39.700	40.589	0.889	21.0	Type 1	
82	40.589	40.601	0.012	21.0	LVUP	Drawing No: BCE/G:LVUP-01
83	40.601	40.793	0.192	21.0	Type 1	
84	40.793	40.835	0.042	Taper to 8 lane ROB Approach	Type 1	Taper section 4 lane to 8 lane for ROB at km 41.960
85	40.835	40.925	0.090		MJB	Drawing No: BCE/G:MJB-03
86	40.925	40.945	0.020		Type 1	Taper section 4 lane to 8 lane for ROB at km 41.960
87	40.945	40.955	0.009		MNB	Drawing No: BCE/G:MNB-09
88	40.955	40.980	0.025		Type 1	Taper section 4 lane to 8 lane for ROB at km 41.960
89	40.980	41.271	0.291	6.0	Type 13	ROB Approach (8 lane)
90	41.271	41.521	0.250	6.0	MJB	Drawing No: BCE/G:MJB-04

Sl. No.	Segment		Length (km)	Median width including Edge Strip (m)	Type	Remarks
	From (km)	To (km)				
91	41.521	41.909	0.388	6.0	Type 13	ROB Approach (8 lane)
92	41.909	42.011	0.102	6.0	ROB	Drawing No: BCE/G:ROB-01
93	42.011	43.651	1.640	6.0	Type 13	ROB Approach (8 lane)
94	43.651	43.681	0.030	Taper to 8 lane ROB Approach	Type 1	Taper section 4 lane to 8 lane for ROB at km 41.960
95	43.681	43.693	0.012		VUP	Drawing No: BCE/G:VUP-04
96	43.693	43.839	0.146		Type 1	Taper section 4 lane to 8 lane for ROB at km 41.960
97	43.839	44.250	0.411	21.0	Type 1	
98	44.250	44.350	0.100	21.0	MJB	Drawing No: BCE/G:MJB-05
99	44.350	44.613	0.263	21.0	Type 1	
100	44.613	44.717	0.104	21.0	Type 4	
101	44.717	45.027	0.310	21.0	Type 2	
102	45.027	45.039	0.012	21.0	VOP	Drawing No: BCE/G:VOP-01
103	45.039	45.593	0.554	21.0	Type 2	
104	45.593	45.870	0.277	21.0	Type 1	
105	45.870	46.035	0.165	21.0	MJB+VUP	Drawing No: BCE/G:MJB-06
106	46.035	46.350	0.315	21.0	Type 1	
107	46.350	46.450	0.100	21.0	Type 6	
108	46.450	46.550	0.100	21.0	Type 6A	
109	46.550	46.678	0.128	21.0	Type 1	
110	46.678	46.698	0.020	21.0	MNB	Drawing No: BCE/G:MNB-04
111	46.698	46.900	0.202	21.0	Type 1	
112	46.900	47.239	0.339	21.0	Type 6	
113	47.239	47.251	0.012	21.0	VUP	Drawing No: BCE/G:VUP-03
114	47.251	47.333	0.082	21.0	Type 6	
115	47.333	47.351	0.018	21.0	MNB	Drawing No: BCE/G:MNB-05
116	47.351	47.525	0.174	21.0	Type 6	
117	47.525	47.675	0.150	21.0	MJB	Drawing No: BCE/G:MJB-07
118	47.675	48.050	0.375	21.0	Type 1	
119	48.050	48.250	0.200	21.0	Type 4	
120	48.250	48.371	0.121	21.0	Type 2	

Sl. No.	Segment		Length (km)	Median width including Edge Strip (m)	Type	Remarks
	From (km)	To (km)				
121	48.371	48.482	0.111	21.0	Type 1	
122	48.482	48.494	0.012	21.0	LVUP	Drawing No: BCE/G:LVUP-02
123	48.494	48.918	0.423	21.0	Type 1	
124	48.918	48.935	0.017	21.0	MNB	Drawing No: BCE/G:MNB-04
125	48.935	49.214	0.279	21.0	Type 1	
126	49.214	49.226	0.012	21.0	VUP	Drawing No: BCE/G:VUP-02
127	49.226	49.400	0.174	21.0	Type 6A	
128	49.400	49.650	0.250	21.0	Type 6	
129	49.650	50.100	0.450	21.0	MJB	Drawing No: BCE/G:MJB-08
130	50.100	50.417	0.317	21.0	Type 6	
131	50.417	50.439	0.022	21.0	MNB	Drawing No: BCE/G:MNB-04
132	50.439	50.500	0.061	21.0	Type 6	
133	50.500	50.682	0.182	21.0	Type 1	
134	50.682	50.721	0.039	21.0	Type 4	
135	50.721	50.845	0.124	21.0	Type 2	
136	50.845	50.957	0.112	21.0	Type 3	
137	50.957	51.100	0.143	21.0	Type 1	
138	51.100	51.127	0.027	21.0	Type 6A	
139	51.127	51.141	0.015	21.0	MNB	Drawing No: BCE/G:MNB-03
140	51.141	51.262	0.120	21.0	Type 6A	
141	51.262	51.276	0.015	21.0	MNB	Drawing No: BCE/G:MNB-03
142	51.276	51.300	0.024	21.0	Type 6A	
143	51.300	51.422	0.122	21.0	Type 1	
144	51.422	51.758	0.336	21.0	Type 2	
145	51.758	52.038	0.280	21.0	Type 4	
146	52.038	52.068	0.030	21.0	Type 1	
147	52.068	52.103	0.035	21.0	INTERCHANGE (VUP)	Drawing No: BCE/G:IC-03
148	52.103	52.250	0.148	21.0	Type 1	
149	52.250	52.323	0.073	21.0	Type 6	
150	52.323	52.337	0.015	21.0	MNB	Drawing No: BCE/G:MNB-07
151	52.337	52.450	0.113	21.0	Type 6A	

Sl. No.	Segment		Length (km)	Median width including Edge Strip (m)	Type	Remarks
	From (km)	To (km)				
152	52.450	52.500	0.050	21.0	Type 6	
153	52.500	52.656	0.156	21.0	Type 1	
154	52.656	52.674	0.018	21.0	MNB	Drawing No: BCE/G:MNB-08
155	52.674	53.000	0.326	21.0	Type 1	
156	53.000	53.023	0.023	21.0	Type 6A	
157	53.023	53.043	0.020	21.0	MNB	Drawing No: BCE/G:MNB-04
158	53.043	53.050	0.007	21.0	Type 1	
159	53.050	53.109	0.059	21.0	Type 1	
160	53.109	53.137	0.028	21.0	MNB	Drawing No: BCE/G:MNB-06
161	53.137	53.181	0.044	21.0	Type 1	
162	53.181	53.209	0.028	21.0	MNB	Drawing No: BCE/G:MNB-06
163	53.209	53.284	0.075	21.0	Type 1	
164	53.284	53.324	0.040	21.0	Type 3	
165	53.324	53.459	0.135	21.0	Type 2	
166	53.459	53.500	0.041	21.0	Type 3	
	Total Length (km)		**27.100**			

Package 2: Interchange

Interchange No &Chainage (on BCE in Km)	Ramp No	Description	Lane Configuration	TCS Type
Main Expressway				
INT-03 & km 52.085	Loop-1 (Loop Ramp)	From Ch.0.000 to 0.306 From Kolar Gold Fields SH-95 (Bethmangala-Bangarpet road) to Chennai	4 lane	Type 8
	Loop-2 (Loop Ramp)	From Ch.0.000 to 0.719 From Kolar Gold Fields SH-95 (Bethmangala-Bangarpet road) to Chennai	2 Lane	Type 7
	Ramp-1 (Semi-directional Ramp)	From Ch.0.409 to 0.000 From Bangalore to Kolar Gold Fields SH-95 (Bethmangala-Bangarpet road)	2 lane	Type 7
	Ramp-2 (Directional Ramp)	From Ch.0.000 to 0.798 From Kolar Gold Fields SH-95 (Bethmangala-Bangarpet road) to Bangalore	2 lane	Type 7
	Ramp-3	From Ch.0.520 to 0.000	2 lane	Type 7

Interchange No &Chainage (on BCE in Km)	Ramp No	Description	Lane Configuration	TCS Type
	(Directional Ramp)	From Chennai to Kolar Gold Fields SH-95 (Bethmangala-Bangarpet road)		

Package 3: Main Expressway

Sl. No.	Segment		Length (km)	Median width including Edge Strip (m)	Type	Remarks
	From (km)	To (km)				
1	53.500	55.000	1.500	21.00	TYPE 1	
2	55.000	55.158	0.158	21.00	TYPE 6A	
3	55.158	55.172	0.014	21.00	MNB	Drawing No: BCE/G:MNB-04
4	55.172	55.235	0.063	21.00	TYPE 6A	
5	55.235	55.265	0.030	21.00	VUP	Drawing No: BCE/G:VUP-01
6	55.265	55.275	0.010	21.00	TYPE 6A	
7	55.275	55.742	0.467	21.00	TYPE 1	
8	55.742	55.850	0.108	21.00	TYPE 6A	
9	55.850	56.194	0.344	21.00	TYPE 6	
10	56.194	56.206	0.012	21.00	VUP	Drawing No: BCE/G:VUP-02
11	56.206	56.725	0.519	21.00	TYPE 1	
12	56.725	56.766	0.041	21.00	TYPE 6A	
13	56.766	56.794	0.029	21.00	MNB	Drawing No: BCE/G:MNB-05
14	56.794	56.850	0.056	21.00	TYPE 6A	
15	56.850	56.950	0.100	21.00	TYPE 6	
16	56.950	57.000	0.050	21.00	TYPE 6A	
17	57.000	57.104	0.104	21.00	TYPE 1	
18	57.104	57.116	0.012	21.00	LVUP	Drawing No: BCE/G:LVUP-01
19	57.116	57.266	0.150	21.00	TYPE 1	
20	57.266	57.300	0.034	21.00	TYPE 6A	
21	57.300	57.345	0.045	21.00	TYPE 6	
22	57.345	57.395	0.050	21.00	MNB	Drawing No: BCE/G:MNB-01
23	57.395	57.620	0.225	21.00	TYPE 6	
24	57.620	57.676	0.056	21.00	TYPE 6A	

Sl. No.	Segment		Length (km)	Median width including Edge Strip (m)	Type	Remarks
	From (km)	To (km)				
25	57.676	57.818	0.142	21.00	TYPE 1	
26	57.818	57.830	0.012	21.00	VUP	Drawing No: BCE/G:VUP-02
27	57.830	58.073	0.243	21.00	TYPE 6A	
28	58.073	58.250	0.177	21.00	TYPE 1	
29	58.250	58.420	0.170	21.00	TYPE 6	
30	58.420	58.450	0.030	21.00	VUP	Drawing No: BCE/G:VUP-01
31	58.450	58.544	0.094	21.00	TYPE 6A	
32	58.544	58.894	0.350	21.00	TYPE 1	
33	58.894	58.906	0.012	21.00	LVUP	Drawing No: BCE/G:LVUP-01
34	58.906	59.109	0.203	21.00	TYPE 1	
35	59.109	59.273	0.164	21.00	TYPE 6	
36	59.273	59.283	0.011	21.00	MNB	Drawing No: BCE/G:MNB-03
37	59.283	59.300	0.017	21.00	TYPE 6	
38	59.300	59.449	0.149	21.00	TYPE 5	Connecting Road- Left & Right
39	59.449	59.461	0.012	21.00	LVUP	Drawing No: BCE/G:LVUP-01
40	59.461	59.778	0.317	21.00	TYPE 5	Connecting Road- Left & Right
41	59.778	60.520	0.742	21.00	TYPE 1	
42	60.520	60.545	0.025	21.00	TYPE 1	
43	60.545	60.575	0.030	21.00	VUP	Drawing No: BCE/G:VUP-01
44	60.575	61.036	0.461	21.00	TYPE 1	
45	61.036	61.096	0.060	21.00	MNB	Drawing No: BCE/G:MNB-02
46	61.096	61.100	0.004	21.00	TYPE 6A	
47	61.100	61.712	0.612	21.00	TYPE 1	
48	61.712	61.825	0.113	21.00	TYPE 5A	Connecting Road- Right
49	61.825	61.837	0.012	21.00	LVUP	Drawing No: BCE/G:LVUP-01
50	61.837	62.144	0.307	21.00	TYPE 5A	Connecting Road Right
51	62.144	62.156	0.012	21.00	LVUP	Drawing No: BCE/G:LVUP-01
52	62.156	62.494	0.338	21.00	TYPE 5A	Connecting Road Right
53	62.494	62.506	0.012	21.00	LVUP	Drawing No: BCE/G:LVUP-01
54	62.506	62.700	0.194	21.00	TYPE 5A	Connecting Road- Left
55	62.700	63.000	0.300	21.00	TYPE 1	

Sl. No.	Segment		Length (km)	Median width including Edge Strip (m)	Type	Remarks
	From (km)	To (km)				
56	63.000	63.304	0.304	21.00	TYPE 5A	Connecting Road- Left
57	63.304	63.316	0.012	21.00	VUP	Drawing No: BCE/G:VUP-02
58	63.316	63.670	0.354	21.00	TYPE 5A	Connecting Road- Right
59	63.670	63.750	0.080	21.00	TYPE 1	
60	63.750	63.810	0.060	21.00	TYPE 6A	
61	63.810	64.038	0.227	21.00	TYPE 6	
62	64.038	64.163	0.125	21.00	MJB	Drawing No: BCE/G:MJB-01
63	64.163	64.200	0.038	21.00	TYPE 6	
64	64.200	64.457	0.257	21.00	TYPE 5A	Connecting Road- Right
65	64.457	64.487	0.030	21.00	VUP	Drawing No: BCE/G:VUP-01
66	64.487	64.718	0.231	21.00	TYPE 5A	Connecting Road- Left
67	64.718	64.850	0.132	21.00	TYPE 1	
68	64.850	65.527	0.677	21.00	TYPE 6A	
69	65.527	65.539	0.012	21.00	VUP	Drawing No: BCE/G:VUP-02
70	65.539	65.700	0.161	21.00	TYPE 6A	
71	65.700	66.405	0.705	21.00	TYPE 1	
72	66.405	66.417	0.012	21.00	LVUP	Drawing No: BCE/G:LVUP-01
73	66.417	66.650	0.233	21.00	TYPE 1	
74	66.650	66.916	0.266	21.00	TYPE 6A	
75	66.916	66.928	0.012	21.00	VUP	Drawing No: BCE/G:VUP-02
76	66.928	67.000	0.072	21.00	TYPE 6A	
77	67.000	67.658	0.658	21.00	TYPE 6	
78	67.658	67.688	0.030	21.00	VUP	Drawing No: BCE/G:VUP-01
79	67.688	68.016	0.328	21.00	TYPE 6	
80	68.016	68.607	0.591	21.00	TYPE 1	
81	68.607	68.634	0.027	21.00	INTERCHANGE (VOP)	Drawing No: BCE/G:IC-04
82	68.634	69.156	0.522	21.00	TYPE 1	
83	69.156	69.180	0.024	21.00	MNB	Drawing No: BCE/G:MNB-06
84	69.180	69.220	0.040	21.00	TYPE 6A	
85	69.220	69.400	0.180	21.00	TYPE 1	

Sl. No.	Segment		Length (km)	Median width including Edge Strip (m)	Type	Remarks
	From (km)	To (km)				
86	69.400	69.470	0.070	21.00	TYPE 6A	
87	69.470	69.500	0.030	21.00	VUP	Drawing No: BCE/G:VUP-01
88	69.500	69.630	0.130	21.00	TYPE 5A	Connecting Road- Right
89	69.630	69.750	0.120	21.00	TYPE 6A	
90	69.750	70.050	0.300	21.00	TYPE 6	
91	70.050	70.100	0.050	21.00	TYPE 6A	
92	70.100	70.230	0.130	21.00	TYPE 1	
93	70.230	70.881	0.651	21.00	TYPE 6	
94	70.881	71.000	0.119	21.00	TYPE 1	
	Total Length (m)		**17.500**			

Package 3: Interchange

Interchange No &Chainage (on BCE in Km)	Ramp No	Description	Lane Configuration	TCS Type
Main Expressway				
INT-04& km 68.620	Loop-1 (Loop Ramp)	From Ch.0.000 to 0.273 From Chennai to Bethamangala	4 lane	Type 8
	Loop-2 (Loop Ramp)	From Ch.0.000 to 0.656 From Chennai to Bethamangala	2 Lane	Type 7
	Ramp-1 (Semi-directional Ramp)	From Ch.0.000 to 0.650 From Bethamangala to Bangalore	2 lane	Type 7
	Ramp-2 (Directional Ramp)	From Ch.0.000 to 0.749 From Bethamangala to Chennai	2 lane	Type 7
	Ramp-3 (Directional Ramp)	From Ch.0.000 to 0.480 From Bangalore to Bethamangala	2 lane	Type 7

Annexure 3.1

LIST OF WATER RESOURCES

LIST OF TANKS					
S.no	**Chainages**	**Name of district**	**Name of taluk**	**Name of village**	**Name of tank**
1	4+435	Bangalore Rural	Hoskote	Jinnagara	Jinnagara
2	7+370	Bangalore Rural	Hoskote	vadigehalli	-
3	11+895	Kolar	Malur	Gangapura	gangapura
4	17+220	Kolar	Malur	Kondrahalli	Madivala
5	20+860	Kolar	Malur	Maliyappanahalli	Maliyappanahalli
6	30+705	Kolar	Malur	Kuntanahalli	Kuntanahalli
7	35+640	Kolar	Bangarpet	Naganthanapure	-
8	40+805	Kolar	Bangarpet	Kuppanahalli	-
9	41+396	Kolar	Bangarpet	Kuppanahalli	-
10	44+250	Kolar	Bangarpet	Maragal	-
11	45+945	Kolar	Bangarpet	Ithandahalli	-
12	47+600	Kolar	Bangarpet	Kavaranahalli	-
13	49+875	Kolar	Bangarpet	Krishna Rajapura	-
14	64+100	Kolar	Bangarpet	kooluru	-

Annexure 3.1

LIST OF WATER RESOURCES

List of Wells, Bore Wells

S.no	District	Taluk	Village name	Proposed chainage		Open Wells	Bore wells
				From	To		
1.	Bangalore Rural	Hoskote	Hullur Amanikere			0	0
2.	Bangalore Rural	Hoskote	Dandupalya			0	0
3.	Bangalore Rural	Hoskote	Kolathur	0+0	2+405	0	0
4.	Bangalore Rural	Hoskote	Kannurahalli	2+405	3+891	0	Bore well -15
5.	Bangalore Rural	Hoskote	Chimandahalli	3+891	4+325	0	Bore well -2
6.	Bangalore Rural	Hoskote	Jinnagara	4+325	4+822	0	0
7.	Bangalore Rural	Hoskote	Vagata	4+822	5+760	0	0
8.	Bangalore Rural	Hoskote	Chandrapura	5+762	6+345	0	0
9.	Bangalore Rural	Hoskote	Vadigehalli	6+345	7+703	0	0
10.	Bangalore Rural	Hoskote	Karibeerana Hosahalli	7+703	9+433	Open well-1	Bore well -7
11.	Bangalore Rural	Hoskote	Gonakanahalli	9+433	10+217	0	Bore well -7
12.	Bangalore Rural	Hoskote	Tirtahalli	10+217	11+63	0	0
13.	Kolar	Malur	Gangapura	11+63	12+803	0	Bore well -1
14.	Kolar	Malur	Channigarayapura	12+803	13+040	0	Bore well -3

Annexure 3.1

LIST OF WATER RESOURCES

S.no	District	Taluk	Village name	Proposed chainage		Open Wells	Bore wells
				From	To		
15.	Kolar	Malur	Hedaginabele	13+040	15+189	0	0
16.	Kolar	Malur	Bellavi	15+189	16+390	Open well-1	Bore well -2, Pump house -1
17.	Kolar	Malur	Kondorahalli	16+389	17+004	0	0
18.	Kolar	Malur	Abbe halli	17+008	18+704	Open well-1	Bore well -4, Pump house -1
19.	Kolar	Malur	Maleappanahalli	18+704	20+562	0	Bore well -1, Pump house -1
20.	Kolar	Malur	Chikkakadathur	20+562	20+862	0	0
21.	Kolar	Malur	Obelapura	20+862	21+797	0	0
22.	Kolar	Malur	Dodhashevara	21+797	22+002	0	0
23.	Kolar	Malur	Veradenahalli	22+003	23+169	0	Bore well -1, Pump house -1
24.	Kolar	Malur	Chikka Sabbenahalli	23+169	24+331	0	Bore well -4, Pump house -3
25.	Kolar	Malur	Agrahara			Open well-2	Bore well -6, Pump house -2
26.	Kolar	Malur	Dodda Sabbenahalli	24+331	24+525	0	0
27.	Kolar	Malur	Nambigana halli	24+525	26+173	0	Bore well -1, Pump house -2
28.	Kolar	Malur	Hijavana halli	26+173	28+060	0	0
29.	Kolar	Malur	Medara mangala	26+760	27+538	Open well-7	Bore well -11 , Pump house -2
30.	Kolar	Malur	Annepura	28+060	28+775	0	0
31.	Kolar	Malur	Karangutta	28+775	29+800	Open well-5	Bore well -7,Pump house -5

Annexure 3.1

LIST OF WATER RESOURCES

S.no	District	Taluk	Village name	Proposed chainage		Open Wells	Bore wells
				From	To		
32.	Kolar	Malur	Nakkanahalli	29+800	30+388	0	Bore well -3
33.	Kolar	Malur	Kuntanahalli	30+388	31+558	0	0
34.	Kolar	Malur	Karadagurki	31+558	33+518	0	Bore well -4, Pump house -2
35.	Kolar	Kolar	Swamigalahallahalli	32+221	33+505	0	0
36.	Kolar	Kolar	Vadagere	33+518	34+269	0	0
37.	Kolar	Bangarpet	Sulikunte	34+269	36+719	0	Bore well -3
38.	Kolar	Bangarpet	Naganathana pure	34+814	35+690	Open well-1	Bore well -2
39.	Kolar	Bangarpet	Mugalabele	36+719	37+129	0	0
40.	Kolar	Bangarpet	Madamangallas	37+129	39+239	0	Bore well -2
41.	Kolar	Bangarpet	Madigarahalli	38+239	39+239	0	Bore well -4
42.	Kolar	Bangarpet	Siddenahalli	39+144	40+028	0	Bore well -5
43.	Kolar	Bangarpet	Byadabele	40+028	40+257	Open well-1	Bore well -1
44.	Kolar	Bangarpet	Kuppana halli	40+257	41+725	0	0
45.	Kolar	Bangarpet	Birandahalli	41+725	42+910	Open well-1	Bore well -3
46.	Kolar	Bangarpet	Karabele	42+910	45+247	0	Bore well -3
47.	Kolar	Bangarpet	Maragal	43+227	45+247	0	Bore well -1
48.	Kolar	Bangarpet	Ithandahalli	45+247	48+228	Open well-1	Bore well -3

Annexure 3.1

LIST OF WATER RESOURCES

S.no	District	Taluk	Village name	Proposed chainage		Open Wells	Bore wells
				From	To		
49.	Kolar	Bangarpet	Kavarana halli	47+452	47+557	0	Bore well -6, Pump House-1
50.	Kolar	Bangarpet	Dhodooru Karapana halli	48+0	49+500	0	0
51.	Kolar	Bangarpet	Krishna Rajapura	49+500	52+409	0	Bore well -11, Pump House-4
52.	Kolar	Bangarpet	Gakamadanahalli	52+409	53+209	0	0
53.	Kolar	Bangarpet	Reddy halli	53+209	55+061	0	0
54.	Kolar	Bangarpet	Pededenapalli	54+929	55+936	0	0
55.	Kolar	Bangarpet	Tammanahalli	55+936	56+899	Open well-2	Bore well -11
56.	Kolar	Bangarpet	Naga shetti halli	56+899	57+264	0	0
57.	Kolar	Bangarpet	Kosapalya	57+264	58/556	0	0
58.	Kolar	Bangarpet	Parisapalli	58+556	59+369	0	0
59.	Kolar	Bangarpet	Byataranahalli	59+754	59+04	0	Bore well -4
60.	Kolar	Bangarpet	Dhodhakeri	61+850	62+797	0	0
61.	Kolar	Bangarpet	Betamangala	59+369	63+654	Open well-3	Bore well -10
62.	Kolar	Bangarpet	Dhaddakari majarakambampalli	63+054	63+375	Open well-2	Bore well -30
63.	Kolar	Bangarpet	Kooluru	63+375	64+692	0	0
64.	Kolar	Bangarpet	Nernahalli	64+662	64+662	Open well-3	Bore well -1
65.	Kolar	Bangarpet	Vaddera halli	64+692	66+082	0	0

Annexure 3.1

LIST OF WATER RESOURCES

S.no	District	Taluk	Village name	Proposed chainage		Open Wells	Bore wells
				From	To		
66.	Kolar	Bangarpet	Pillagonda halli	66+082	66+856	0	Bore well -5
67.	Kolar	Bangarpet	Rayasandra	66+856	67+755	over head tank-1	Bore well -5
68.	Kolar	Bangarpet	Venga sandra	67+755	70+786	0	Bore well -6, Pump House-1
69.	Kolar	Bangarpet	sundarapalya	70+786	71+000	0	Bore well -5

LIST OF RIVERS CROSSINGS THE PROJECT ROAD

Sl. No.	Chainage(Km)	Side from the Project Road	Water Resource
Bangalore-Chennai Expressway Alignment			
1	61.100	Crossing BCE	Palar River

LIST OF NALAHS ALONG THE PROJECT ROAD

Sl. No.	Chainage(Km)	Side from the Project Road	Water Resource Feature
1	2.212 to 2.215	Across	Stream
2	2.460 to 2.467	Across	Stream
3	2.506 to 2.514	Across	Stream
4	2.535 to 2.537	Across	Stream

Annexure 3.1

LIST OF WATER RESOURCES

Sl. No.	Chainage(Km)	Side from the Project Road	Water Resource Feature
6	5.851 to 5.865	Across	Nala
7	10.719 to10.725	Across	Nala
8	11.069 to11.129	Across	Nala
9	12.169 to12.174	Across	Nala
10	12.274 to12.278	Across	Nala
11	12.903 to 12.912	Across	Nala
12	14.354 to14.356	Across	Nala
13	14.449 to14.454	Across	Nala
14	14.556 to14.562	Right side	Nala
15	14.587 to14.664	Right side	Nala
16	18.432 to18.435	Across	Nala
17	18.867 to18.872	Across	Nala
18	19.866 to19.878	Across	Nala
19	20.191 to20.198	Across	Nala
20	20.416 to20.421	Across	Nala
21	21.037 to21.041	Across	Nala
22	21.252 to21.253	Across	Nala

Annexure 3.1

LIST OF WATER RESOURCES

Sl. No.	Chainage(Km)	Side from the Project Road	Water Resource Feature
23	23.068 to23.077	Across	Nala
24	26.970 to27.001	Across	Nala
25	28.076 to28.080	Across	Nala
26	28.523 to28.528	Right side	Nala
27	28.568 to28.587	Left side	Nala
28	30.388 to30.391	Across	Nala
29	30.489 to30.492	Across	Nala
30	34.761 to34.806	Across	Nala
31	34.968 to34.986	Left side	Nala
32	35.137 to35.141	Across	Nala
33	35.367 to35.390	Across	Nala
34	35.947 to35.959	Across	Nala
35	36.191 to36.200	Across	Nala
36	37.521 to37.528	Across	Nala
37	38.958 to38.983	Across	Nala
38	40.123 to40.125	Across	Nala
39	42.709 to42.712	Across	Nala

Annexure 3.1

LIST OF WATER RESOURCES

Sl. No.	Chainage(Km)	Side from the Project Road	Water Resource Feature
40	43.367 to43.370	Across	Nala
41	44.058 to44.065	Across	Nala
42	45.463 to45.469	Across	Nala
43	46.446 to46.463	Across	Nala
44	47.090 to47.120	Across	Nala
45	48.685 to48.700	Across	Nala
46	49.862 to49.874	Across	Nala
47	50.183 to50.204	Across	Nala
48	50.894 to50.906	Across	Nala
49	51.018 to51.049	Across	Nala
50	52.089 to52.102	Across	Nala
51	52.424 to52.439	Across	Nala
52	52.728 to52.735	Across	Nala
53	52.795 to52.806	Across	Nala
54	52.882 to52.898	Across	Nala
55	52.954 to52.969	Across	Nala
57	55.670 to55.675	Across	Nala

Annexure 3.1

LIST OF WATER RESOURCES

Sl. No.	Chainage(Km)	Side from the Project Road	Water Resource Feature
58	56.626 to56.631	Left side	Nala
59	57.108 to57.165	Across	Nala
60	59.040 to59.048	Across	Nala
61	59.198 to59.203	Across	Nala
62	59.301 to59.304	Across	Nala
63	59.760 to59.763	Across	Nala
64	61.653 to61.656	Across	Nala
65	61.839 to61.848	Across	Nala
66	61.894 to61.905	Across	Nala
67	62.729 to62.732	Right side	Nala
68	63.666 to63.676	Across	Nala
69	64.727 to64.732	Across	Nala
70	64.918 to64.923	Right side	Nala
71	65.474 to65.552	Across	Nala
72	65.880 to65.884	Across	Nala
73	68.620 to 68.624	Across	Nala
SPUR ALIGNMENT			

Annexure 3.1

LIST OF WATER RESOURCES

Sl. No.	Chainage(Km)	Side from the Project Road	Water Resource Feature
1	0.609 to 0.624	Across	Nala
2	0.740 to 0.742	Across	Nala
3	0.905 to 0.917	Across	Nala
4	1.391 to 1.400	Across	Nala
5	1.591 to 1.604	Across	Nala

Annexure 3.2

TANK LOCATION

S.no	Chainages	Location of Tanks in Karnataka
1	4+435	
2	7+370	

Annexure 3.2

TANK LOCATION

3	11+895	
4	17+220	

Annexure 3.2

TANK LOCATION

5	20+860	
6	30+705	

Annexure 3.2

TANK LOCATION

7	35+640	
8	40+805	

Annexure 3.2

TANK LOCATION

9	41.396	
10	44+250	

Annexure 3.2

TANK LOCATION

11	45+945	
12	47+600	

Annexure 3.2

TANK LOCATION

13	49+875	
14	64+100	

Annexure 3.3

List of Tree/Plant Species present in the Right of Way of Bangalore-Chennai Expressway-Phase-I

Sr. No.	Tree Species	Girth (m)	No of Trees
1	Acasia	0.50	1
		0.60	2
		0.65	1
		1.00	1
2	Ashoka	0.30	4
		0.40	30
		0.45	5
		0.50	29
		0.60	17
		0.65	12
3	Ala Tree	2.00	1
		2.20	1
		2.90	1
4	Arali	3.00	1
5	Athri Tree	1.00	1
		1.40	1
6	Attimara	0.65	1
7	Badam	0.65	3
		1.10	1
8	Basavaa Pada	0.60	3
9	Casuriza	0.30	9
		0.60	3
		0.65	4
		0.70	1
10	Cassia Javanica	0.65	1
11	Cheijjalu	0.80	1
12	Gul Mohar	0.65	4
		1.00	1
13	Hippe	0.50	1
		1.20	1
14	Honge	0.65	7
		0.70	1
		0.80	1
		0.85	1
		0.90	1
		1.00	1
		1.10	1
		1.20	3
		1.30	1
15	Jali	0.65	1
		1.00	4
		1.30	1
16	Jungle Wood	0.50	5
		0.65	2
		0.70	1

Sr. No.	Tree Species	Girth (m)	No of Trees
		0.80	1
		1.00	3
		1.20	1
17	Marjim	0.90	1
		1.20	1
		0.75	1
		0.70	1
		1.00	1
18	Mutuga	3.30	1
		0.90	1
		0.65	1
		1.00	1
		0.90	4
		0.60	2
19	Neem	0.50	30
		0.55	0
		0.60	16
		0.65	41
		0.70	3
		0.75	1
		0.80	1
		0.85	2
		0.90	3
		0.95	1
		1.00	11
		1.10	5
		1.20	6
		1.30	1
		1.40	1
		6.00	1
20	Nelli	0.50	4
		1.30	1
21	Nerale	1.00	1
		0.60	1
		0.80	1
		1.20	1
		0.70	1
22	Peltoforum	1.25	1
		2.60	1
		0.65	3
		0.70	1
23	Raintree	1.10	1
		1.20	3
		1.30	2
		3.00	1
24	Seemetangadi	0.50	7
25	Siboo	0.65	1
26	Silver	0.30	14
		0.35	16
		0.40	37

Sr. No.	Tree Species	Girth (m)	No of Trees
		0.40-0.65	10
		0.45	10
		0.50	47
		0.60	81
		0.65	54
		0.70	34
		0.75	7
		0.80	20
		0.85	2
		0.90	14
		1.00	23
		1.10	11
		1.15	1
		1.20	18
		1.30	6
		1.35	1
		1.40	2
27	Singapore Cherry	0.60	10
28	Small Bamboo	Clumps	36
29	Subabul	0.65	2
		1.20	1
		1.30	1
30	T.Bevu	0.55	1
		0.60	2
		0.65	4
		0.70	5
		0.80	2
		0.90	1
		1.00	8
		1.20	5
		1.25	1
		1.30	2
31	Tapala	0.65	3
32	Tekoma	0.80	2
33	Tore Mathi	0.60	1
		0.65	4
		0.70	1
		0.90	1
		1.00	1
		1.20	1
		1.30	1
34	Teak	0.30	277
		0.35	132
		0.40	81
		0.45	15
		0.50	103
		0.55	5
		0.60	125
		0.65	93
		0.70	44

Sr. No.	Tree Species	Girth (m)	No of Trees
		0.75	19
		0.80	31
		0.85	7
		0.90	9
		0.95	5
		1.00	28
		1.10	12
		1.15	1
		1.20	14
		1.25	1
		1.30	9
Total			**1862**

Horticulture Trees in Bangalore Rural District		
Sr.No.	**Name of Tree**	**Nos**
1	Anjir	4
2	Arecanut	26
3	Badam	2
4	Coconut	1108
5	Guava	493
6	Jack	18
7	Mango	1127
8	Nelli	5
9	Nerale	15
10	Nugge	5
11	Tamarind	34
	Total	**2837**

Horticulture Shrubs in Bangalore Rural District		
	Name of Shrub	**Nos**
1	Curry leaves	43
2	Lemon	23
3	Pomogranate	5
4	Rose	12220
5	Sapota	603
6	Seetaphal	3
	Total	**12897**

Climbers in Bangalore Rural District		
	Name of Climber	**Nos**
1	Grapes	**1389**

Girth Wise and Species wise List of Trees in Kolar District (Taluqawise)

Trees in Malur Taluqa -Kolar District in Phase-I			
Sr.No.	**Tree Species**	**Girth**	**No of Trees**
1	Acasia	0.65	2
2	Ashoka	0.50	1
3	Ala Tree	1.10	2
		1.20	2
		1.30	1
		1.40	4
4	Arali	0.50	1
		0.65	1
		1.10	1
		1.20	1
		1.30	1
		3.50	1
		4.00	1
5	Athri Tree	0.65	1
		0.70	3
		1.20	1
		1.25	1
		1.30	1
6	Bevu	0.50	2
7	Bage	0.65	1
		1.10	1
8	Dalbergia Sissoo	1.10	1
		1.20	2
9	Eachal	1.20	2
10	Hatti Tree	1.10	1
		3.00	1
11	Honge	0.50	17
		0.60	68
		0.65	26
		0.70	1
		0.80	1
		0.85	1
		0.90	1
		1.00	5
		1.10	1
		1.20	1
		1.30	1
		1.50	1
12	Jali	0.60	4
13	Jungle Wood	0.70	1
		0.80	1
14	Neem	0.50	13
		0.60	17
		0.65	38
		0.70	7
		0.75	1
		0.80	2

Trees in Malur Taluqa -Kolar District in Phase-I			
Sr.No.	**Tree Species**	**Girth**	**No of Trees**
		0.90	1
		1.00	8
		1.10	1
		1.20	3
		1.30	2
		1.40	1
		1.70	1
		2.30	1
15	Nelli	0.60	3
		0.65	5
16	Seemetangadi	0.60	34
	Seemaruba	0.50	1
17	Sampige	0.65	2
18	Silver	0.20-0.40	10
		0.30	1
		0.40	65
		0.45	26
		0.50	2
		0.55	1
		0.60	54
		0.65	43
		0.70	18
		0.75	10
		0.80	15
		0.85	2
		0.90	8
		0.95	4
		1.00	29
		1.10	12
		1.20	5
19	Big Bamboo	Clump	4
20	T.Bevu	0.45	5
		0.50	5
		0.60	1
		0.65	1
		1.20	1
21	Tamarind	4.50	1
22	Tapasi	0.60	3
		0.70	1
		0.80	1
		1.00	2
		1.20	2
23	Teak	0.30	25
		0.35	28
		0.40	26
		0.45	5
		0.50	15
		0.55	1

Trees in Malur Taluqa -Kolar District in Phase-I			
Sr.No.	**Tree Species**	**Girth**	**No of Trees**
		0.60	33
		0.65	29
		0.70	4
		0.75	2
		0.80	5
		0.85	2
		0.95	2
		1.00	6
24	Tore Mathi	0.50	1
Total			**824**

Trees in Kolar Taluqa -Kolar District in Phase-I			
Sr.No.	**Tree Species**	**Girth**	**No of Trees**
1	Arali	0.40	1
		0.50	1
		1.00	1
2	Hale	0.60	3
		0.65	6
		1.20	1
3	Hatti	0.80	1
4	Honge	0.50	1
		0.60	17
		0.65	27
		0.70	2
		1.00	8
		1.20	1
5	Neem	0.50	15
6	Sampige	0.70	1
7	Silver	0.65	1
		1.00	3
		1.20	1
8	T.Bevu	0.60	16
		0.65	5
9	Teak	0.40	1
Total			**113**

Trees in Bangarpet Taluqa -Kolar District in Phase-I			
Sr.No.	**Tree Species**	**Girth (m)**	**No of Trees**
1	Acasia	0.50	5
		0.60	5
		0.65	4
		1.00	1
2	Ala Tree	1.00	2
		1.20	1
		1.30	1
		3.00	1
		3.40	1

Trees in Bangarpet Taluqa -Kolar District in Phase-I			
Sr.No.	**Tree Species**	**Girth (m)**	**No of Trees**
		3.50	1
		3.80	1
3	Ankole	0.65	12
		0.80	1
4	Antwala	1.20	1
5	Arali	0.60	1
		0.65	3
		1.00	4
		1.20	1
		1.30	3
		1.35	1
		1.45	1
		1.50	3
		1.60	1
		2.00	2
		2.95	1
		3.00	1
		4.50	1
		5.00	4
		5.35	1
		5.50	1
6	Ashok	0.40	16
		0.50	2
		1.30	1
7	Athri Tree	0.65	2
		0.95	1
		1.00	2
		1.20	1
		1.40	1
8	Bage	0.60	2
		0.65	4
		0.70	3
		0.80	2
		0.95	1
		1.00	3
		1.10	2
		1.20	1
		1.30	2
9	Bamboo	Clumps	10
10	Bevu	0.50	2
11	Basari	0.80	1
		0.85	1
		1.30	1
		2.90	1
12	Bela	0.65	1
		0.90	4
13	Big Bamboo		18
14	Billi Jali	0.60	16
		1.00	1

Trees in Bangarpet Taluqa -Kolar District in Phase-I			
Sr.No.	**Tree Species**	**Girth (m)**	**No of Trees**
15	Bore Tree	0.65	4
		0.70	1
		0.80	1
		1.00	2
		1.20	1
16	Casurina	0.45	4
17	Chujjali	0.60	122
		0.65	8
		0.70	4
		0.80	1
		1.10	2
		1.20	2
		1.30	1
		1.50	1
18	Eachal	0.30	23
19	Gobbali	0.60	379
		0.65	84
		0.70	18
		0.75	2
		0.80	289
		0.90	3
		0.95	3
		1.00	16
		1.20	8
		1.30	2
		1.35	1
		1.40	1
		1.50	4
		1.80	1
		2.00	1
20	Gulmohar	1.40	2
21	Hale	0.60	6
		0.65	51
		0.70	2
		0.80	2
		0.90	2
		1.00	5
		1.20	2
22	Honge	0.10	1
		0.50	66
		0.60	329
		0.65	100
		0.70	13
		0.75	3
		0.80	17
		0.85	1
		0.90	2
		1.00	39
		1.10	5

Trees in Bangarpet Taluqa -Kolar District in Phase-I			
Sr.No.	**Tree Species**	**Girth (m)**	**No of Trees**
		1.20	11
		1.30	12
		1.35	1
		1.40	2
23	Jungle Wood	0.60	170
		0.65	15
		0.75	1
		0.80	3
		0.90	3
		1.00	4
		1.10	1
		1.20	3
		1.30	1
24	Kamara	1.45	1
25	Mahagani	0.65	7
26	Moosi	0.65	1
		0.75	1
		1.00	1
27	Mutuga	0.65	3
		0.70	2
		0.80	1
		1.00	2
		1.20	1
28	Neem	0.35	2
		0.40	2
		0.50	81
		0.55	3
		0.60	696
		0.65	378
		0.70	65
		0.75	11
		0.80	21
		0.85	4
		0.90	10
		1.00	45
		1.10	14
		1.20	19
		1.30	8
		2.20	1
29	Nelli	0.60	1
		0.65	7
		0.75	1
		1.00	1
30	Peltofarm	0.60	1
		1.20	1
31	Rain Tree	0.60	7
		1.10	1
		1.50	1
32	Sampige	0.60	1

Trees in Bangarpet Taluqa -Kolar District in Phase-I			
Sr.No.	**Tree Species**	**Girth (m)**	**No of Trees**
		0.75	1
		1.00	1
		1.50	1
33	Seemetangadi	0.50	40
		0.60	714
		0.65	53
		0.70	1
34	Sihe Hunse	0.60	42
		0.65	4
		0.70	1
		0.75	2
		0.80	5
		1.00	2
		1.10	3
		1.20	2
		3.00	1
35	Silver	0.35	9
		0.40	10
		0.45	42
		0.50	63
		0.60	52
		0.65	46
		0.70	19
		0.75	6
		0.80	5
		1.00	5
		1.10	1
		1.20	1
36	T.Bevu	0.35	2
		0.40	1
		0.50	11
		0.60	24
		0.65	24
		0.70	11
		0.75	2
		0.80	4
		0.90	2
		1.00	13
		1.10	2
		1.20	9
		1.25	1
		1.30	4
		1.40	1
		1.50	1
		1.70	1
30	Tapasi	0.60	6
		0.65	15
		0.70	11
		0.75	1

Trees in Bangarpet Taluqa -Kolar District in Phase-I			
Sr.No.	**Tree Species**	**Girth (m)**	**No of Trees**
		0.80	3
		0.85	1
		0.90	1
		1.00	6
		1.10	1
		1.20	3
		1.30	1
		1.50	1
		2.20	1
31	Teak	0.30	6
		0.35	38
		0.40	33
		0.45	11
		0.50	30
		0.55	2
		0.60	104
		0.65	152
		0.70	48
		0.75	26
		0.80	40
		0.85	12
		0.90	8
		0.95	6
		1.00	17
		1.10	10
		1.20	16
		1.30	6
		1.35	6
32	Tore Mathi	0.75	1
		1.20	1
		1.40	1
		1.50	1
33	Untvala	1.40	1
		2.00	1
Total			**5307**

Horticulture Trees in Kolar District		
Sr.No.	**Name of Tree**	**Nos**
1	Arecanut	9
2	Jack	30
3	Mango	6159
4	Musamlos	1
5	Nerale	144
6	Nugge	333
7	Tamarind	310
9	Adike	2

Horticulture Trees in Kolar District		
Sr.No.	**Name of Tree**	**Nos**
10	Anjura	1
11	Coconut	2809
12	Lakota	2
13	Lavanga	3
14	Leachi	2
	Total	**9805**

Horticulture Shrubs in Kolar District		
	Name of Shrub	**Nos**
1	Butter Fruit	2
2	Cashew	16
3	Curry leaves	44
4	Guava	381
5	Lemon	65
6	Musamlos	1
7	Pannirale	2
8	Pomogranate	16
9	Rose	1004
10	Sapota	707
11	Auspicer	1
12	Coffee	2
13	Custard Apple	22
14	Orange	5
15	Ramphal	7
	Total	**2275**

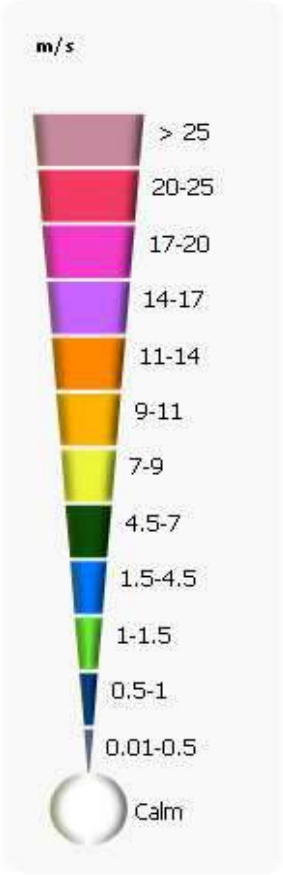
Climbers in Kolar District		
	Name of Climber	**Nos**
1	Beetle Leaves	**150**

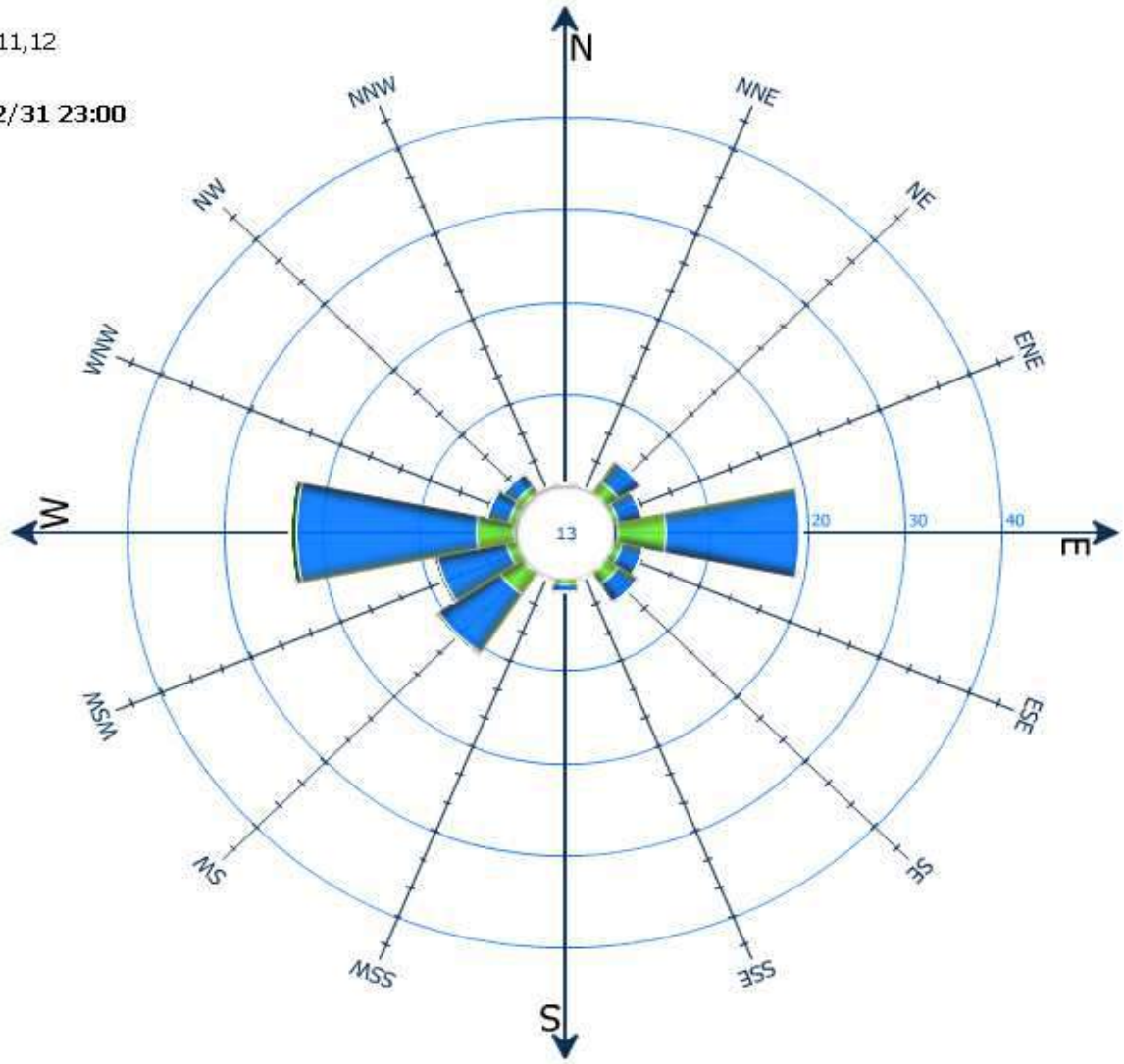
Annexure 3.4

Wind Rose Diagram of Bangalore at 08:30 Hrs

Latitude : 12 0'46"N
Longitude : 77 4'39"E
Elevation : 921.0 m

Month(s) : 01,02,03,04,05,06,07,08,09,10,11,12
Hour(s) : 03
Period : **1971/01/01 01:00 - 2000/12/31 23:00**



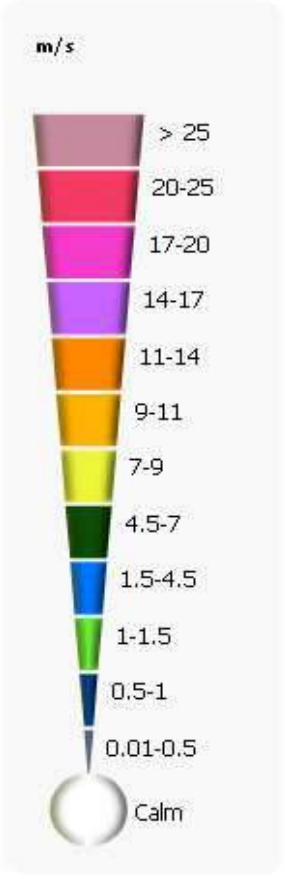


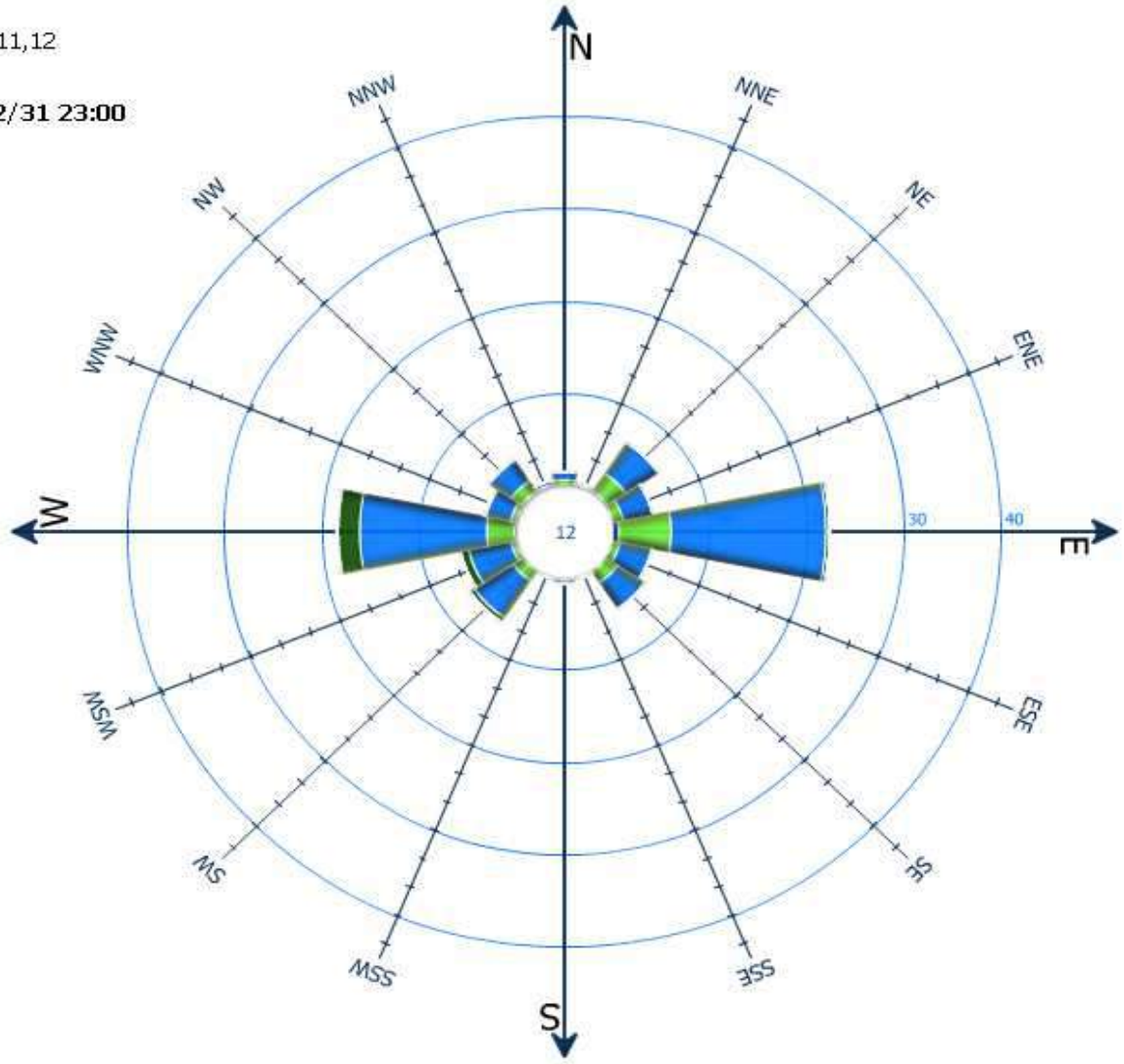
Annexure 3.4

Wind Rose Diagram of Bangalore at 17:30 Hrs

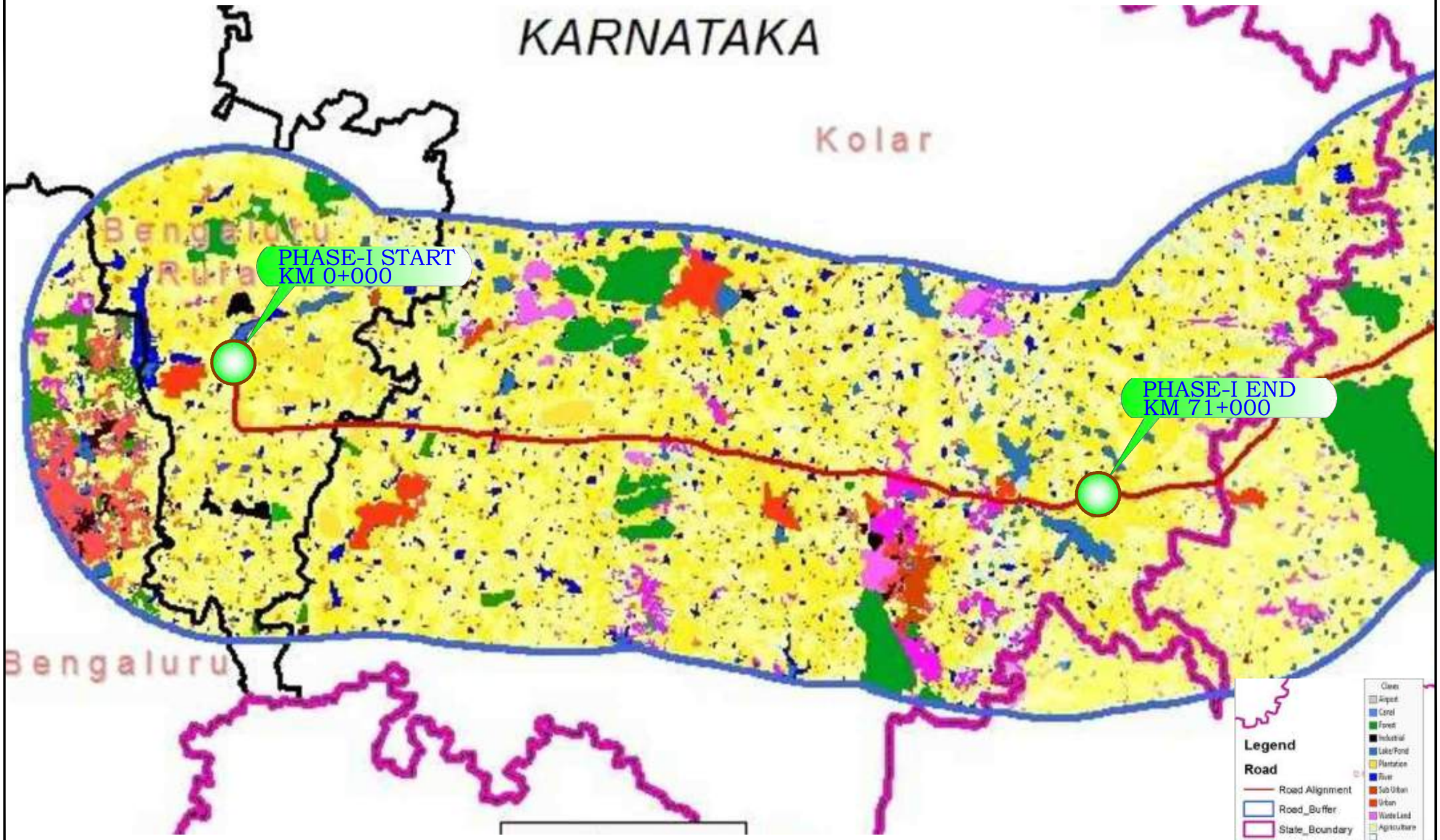
Latitude : 12 0'46"N
Longitude : 77 4'39"E
Elevation : 921.0 m

Month(s) : 01,02,03,04,05,06,07,08,09,10,11,12
Hour(s) : 12
Period : **1971/01/01 01:00 - 2000/12/31 23:00**





LAND USE MAP OF BANGALORE CHENNAI EXPRESSWAY PHASE-I



NO.	DESCRIPTION OF REVISIONS	DATE	BY

CONSULTANTS :

egis bceom International

SECON

IN ASSOCIATION WITH

PROJECT :

CONSULTANCY SERVICES
FOR THE PREPARATION OF FEASIBILITY CUM PRELIMINARY DESIGN REPORT FOR BANGALORE - CHENNAI EXPRESSWAY

CLIENT :

NATIONAL HIGHWAYS AUTHORITY OF INDIA
G-5 & G-6, SECTOR - 10, DWARKA, NEW DELHI - 110 045

SCALE:

TITLE:

BANGALORE-CHENNAI EXPRESSWAY

LAND USE PLAN PHASE-I

DRG. NO.: EIRH1KN001/BCE/Landmap -01

REV. R0

Annexure 3.6

List of District and Talul/Mandal wise Project Villages in Phase-I

Sl. No.	Name of the Village	Name of the Taluk/Mandal	Name of the District	Chainage in Km	
				From	To
1	Kolatturu	Hoskote	Bangalore Rural	0/000	2/405
2	Dandupalya	Hoskote	Bangalore Rural	Inter Connecting Road Villages	
3	Hulluru amanikere	Hoskote	Bangalore Rural		
4	Kannuralli	Hoskote	Bangalore Rural	2/405	3/891
5	Chimandahalli	Hoskote	Bangalore Rural	3/891	4/325
6	Jinnagara	Hoskote	Bangalore Rural	4/325	4/900
7	Vagata	Hoskote	Bangalore Rural	4/900	5/813
8	Chandrapura	Hoskote	Bangalore Rural	5/813	6/397
9	Vadagenahalli	Hoskote	Bangalore Rural	6/397	7/755
10	Karibeeranahosahalli	Hoskote	Bangalore Rural	7/755	9/483
11	Gonakanahalli	Hoskote	Bangalore Rural	9/483	10/268
12	Thiratahalli	Hoskote	Bangalore Rural	10/268	11/348
13	Thaggalihosahalli	Hoskote	Bangalore Rural	11/348	11/682
14	Gangapura	Malur	Kolar	11/682	12/855
15	Channigarayapura	Malur	Kolar	12/855	13/092
16	Hedaginabele	Malur	Kolar	13/092	15/241
17	Bellavi	Malur	Kolar	15/241	16/440
18	Kondrahalli	Malur	Kolar	16/440	17/055
19	Abbenahalli	Malur	Kolar	17/055	18/756
20	Maliyappanahalli	Malur	Kolar	18/756	20/614
21	Chikkakadathuru	Malur	Kolar	20/614	20/914
22	Obalapura	Malur	Kolar	20/914	21/849
23	Doddashivara	Malur	Kolar	21/849	22/053
24	Varadenahalli	Malur	Kolar	22/053	23/221
25	Chikkasabbenahalli	Malur	Kolar	23/221	24/383
26	Agrahara	Malur	Kolar	Inter Connecting Road Village	
27	Doddasabbenahalli	Malur	Kolar	24/383	24/577
28	Nambiganahalli	Malur	Kolar	24/577	26/225
29	Hijuvanahalli	Malur	Kolar	26/225	28/112
30	Nidaramangala	Malur	Kolar	AT CHAINAGE 26/858	
31	Anepura	Malur	Kolar	28/112	28/827
32	Karamgutte	Malur	Kolar	28/827	29/852
33	Nakkanahalli	Malur	Kolar	29/852	30/440
34	Kuntanahalli	Malur	Kolar	30/440	31/609
35	Karadugurki	Malur	Kolar	31/609	32/273
				33/557	33/569
36	Swamigalagollahalli	Malur	Kolar	32/273	33/557
37	Vadagere	Kolar	Kolar	33/569	34/321
38	Sulikunte	Bangarpet	Kolar	34/321	34/865
				35/741	36/771
39	Naganathapura	Bangarpet	Kolar	34/865	35/741
40	Mugalabele	Bangarpet	Kolar	36/771	37/180
41	Madamangala	Bangarpet	Kolar	37/180	38/291
42	Madigarahalli	Bangarpet	Kolar	38/291	39/196
43	Siddanahalli	Bangarpet	Kolar	39/196	40/080
44	Byadabele	Bangarpet	Kolar	40/080	40/309
45	Kuppanahalli	Bangarpet	Kolar	40/309	41/773
46	Birandahalli	Bangarpet	Kolar	41/773	42/940
47	Karabele	Bangarpet	Kolar	42/940	43/258
				43/296	43/436

Annexure 3.6

List of District and Talul/Mandal wise Project Villages in Phase-I

Sl. No.	Name of the Village	Name of the Taluk/Mandal	Name of the District	Chainage in Km	
				From	To
48	Maragal	Bangarpet	Kolar	43/258	43/296
				43/436	45/277
49	Ithandahalli	Bangarpet	Kolar	45/277	47/481
				47/587	48/250
50	Kavaranahalli	Bangarpet	Kolar	47/481	47/587
51	Doddurukarapanahalli	Bangarpet	Kolar	48/250	52/438
52	Krishnarajapura	Bangarpet	Kolar	Inter Connecting Road Villages	
53	Gattakamadenahalli	Bangarpet	Kolar	52/438	53/239
54	Reddyhalli	Bangarpet	Kolar	53/239	54/958
				54/981	55/090
55	Pedampalli	Bangarpet	Kolar	54/958	54/981
				55/090	55/960
56	Thammenahalli	Bangarpet	Kolar	55/960	56/929
57	Nagasettihalli	Bangarpet	Kolar	56/929	57/295
58	Hosa(kotta)palya	Bangarpet	Kolar	57/295	58/586
59	Parisepalli	Bangarpet	Kolar	58/586	59/399
60	Bethamangala	Bangarpet	Kolar	59/399	59/785
				59/933	61/880
				62/082	62/119
				62/467	62/713
				62/828	63/084
61	Byatarayanahalli	Bangarpet	Kolar	59/785	59/933
62	Doddakari	Bangarpet	Kolar	61/880	62/082
				62/119	62/467
				62/713	62/828
63	Doddakari(m)kamban	Bangarpet	Kolar	63/084	63/406
64	Kuluru	Bangarpet	Kolar	63/406	64/722
65	Vadrahalli	Bangarpet	Kolar	64/722	66/112
66	Pillagundlahalli	Bangarpet	Kolar	66/112	66/886
67	Rayasandra	Bangarpet	Kolar	66/886	67/789
68	Vengasandra	Bangarpet	Kolar	67/789	70/816
69	Sundrapalya	Bangarpet	Kolar	Inter Connecting Road Village	
70	N.G.hulkur	Bangarpet	Kolar	70/816	71/000

ANNEXURE-4.1

IRRIGATION TANKS AFFECTING IN THE PROPOSED ALIGNMENT														
KARNATAKA-PHASE-I														
Irrigation Tanks Details													Mitigation Measures	
S.no	**Chainages**	**Name of district**	**Name of taluk**	**Name of village**	**Name of tank**	**Catchment area sq/km a) free b) combined**	**Ayacut in "ha"**	**Usage**	**Ownership**	**Total area(m2)**	**Affected area(m2)**	**Affected length of the water body (m)**	**Proposed length of bridge (m)**	**Proposed Span Arrangement (length x no of span)**
1	4+435	Bangalore Rural	Hoskote	Jinnagara	Jinnagara	40	39.38	Irrigation	Panchayath raj engineering department.	-	2756	-	40	2 X 20
2	7+370	Bangalore Rural	Hoskote	vadigehalli	-	-	-	-	Panchayath raj engineering department.	172035.1	20505	260	270	9 X 30
3	11+895	Kolar	Malur	Gangapura	gangapura	-	12	Irrigation	Panchayath raj engineering department.	-	2929	85	100	5 X 25
4	17+220	Kolar	Malur	Kondrahalli	Madivala	33	19.04	Irrigation	Panchayath raj engineering department.	566779.57	22155	339	360	12 X 30
5	20+860	Kolar	Malur	Maliyappanahalli	Maliyappanahalli	27	11	Irrigation	Panchayath raj engineering department.	23841.915	11364	88	125	5 X 25
6	30+705	Kolar	Malur	Kuntanahalli	Kuntanahalli	28.19	11.41	Irrigation	Panchayath raj engineering department.	29773.554	only Bund is affecting	160	180	6 X 30
7	35+640	Kolar	Bangarpet	Naganthanapure	-	-	-	Irrigation	Minor irrigation	44374.737	9900	346	400	16 X 25
8	40+805	Kolar	Bangarpet	Kuppanahalli	-	-	-	Irrigation	Minor irrigation	98641.924	2266	83	90	3 X 30
9	41+396	Kolar	Bangarpet	Kuppanahalli	-	-	-	Irrigation	Minor irrigation	14802	4007	202	250	10 X 25
10	44+250	Kolar	Bangarpet	Maragal	-	-	-	Irrigation	Minor irrigation	170081.53	only Bund is affecting	97	100	4 X 25
11	45+945	Kolar	Bangarpet	Ithandahalli	-	-	-	Irrigation	Minor irrigation	295629.07	6789	131	150	5 X 30
12	47+600	Kolar	Bangarpet	Kavaranahalli	-	-	-	Irrigation	Minor irrigation	48183.354	8226	144	175	5 X 30
13	49+875	Kolar	Bangarpet	Krishna Rajapura	-	-	-	Irrigation	Minor irrigation	112211.83	only Bund is affecting	433	450	15 X 30
14	64+100	Kolar	Bangarpet	Kooluru	-	-	-	Irrigation	Minor irrigation	22154.946	474	112	150	5 X 30

Annexure 4.2

List of Habitations within 400m Either Side of the BCE Alignment

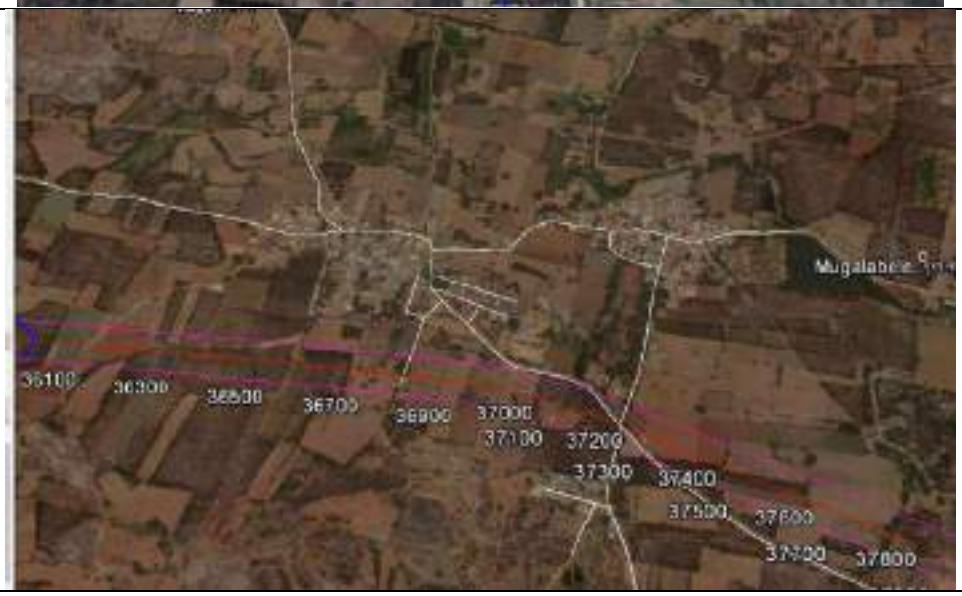
S.No	Name of the Settlement	Distance(m)	Chainage	Side	Length
1	Kolathur	107	1+000	L.H.S	350m
2	Karibeerana hosahalli	173	8+700	R.H.S	350m
3	Thaggali hosahalli	206	10+900	L.H.S	450m
4	Bellavi	87	14+800	R.H.S	200m
5	Abbenahalli	167	17+700	L.H.S	300m
6	Kanivana halli	197	19+800	R.H.S	350m
7	Vardenahalli	25	21+100	R.H.S	200m
8	Dodda Shivara	136	22+200	R.H.S	300m
9	Nambigana halli	95	25+100	L.H.S	350m
10	Hijuvanahalli	126	27+700	L.H.S	160m
11	Anepura	86	28+400	L.H.S	290m
12	Mugalabele	90	36+800	L.H.S	450m
		333	37+200	L.H.S	350m
13	Siddanahalli	194	39+800	L.H.S	350m
14	Karabele	103	43+700	L.H.S.	350m
15	Doddurkarpanhalli	43	50+200	R.H.S	350m
16	Ghattakamadenahalli	308	55+300	R.H.S	350m
17	Bethamangala	206	60+500	L.H.S	800m
18	Doddakari	35	62+000	L.H.S	200m
19	Koolur	40	65+500	R.H.S	150m
20	Gopenahalli	120	69+500	R.H.S	250m
21	N.G Hulkur	150-380	71+000	R.H.S & L.H.S	360m L.H.S 350 m R.H.S.

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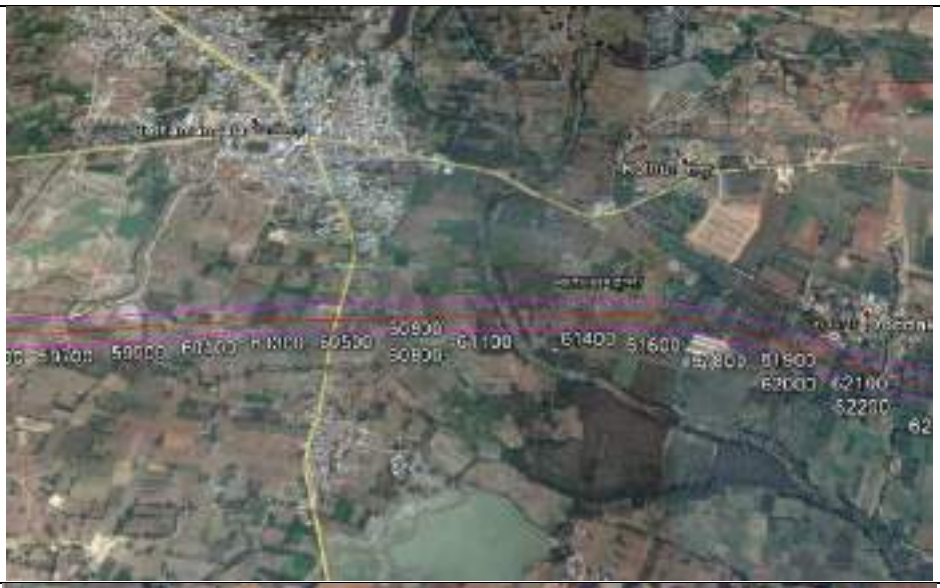
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10 & 11	 27600 27600 27700 27800 27900 28000 28100 28200 28300 28400 28400
12	 36100 36300 36500 36700 36900 37000 37100 37200 37300 37400 37500 37600 37700 37800

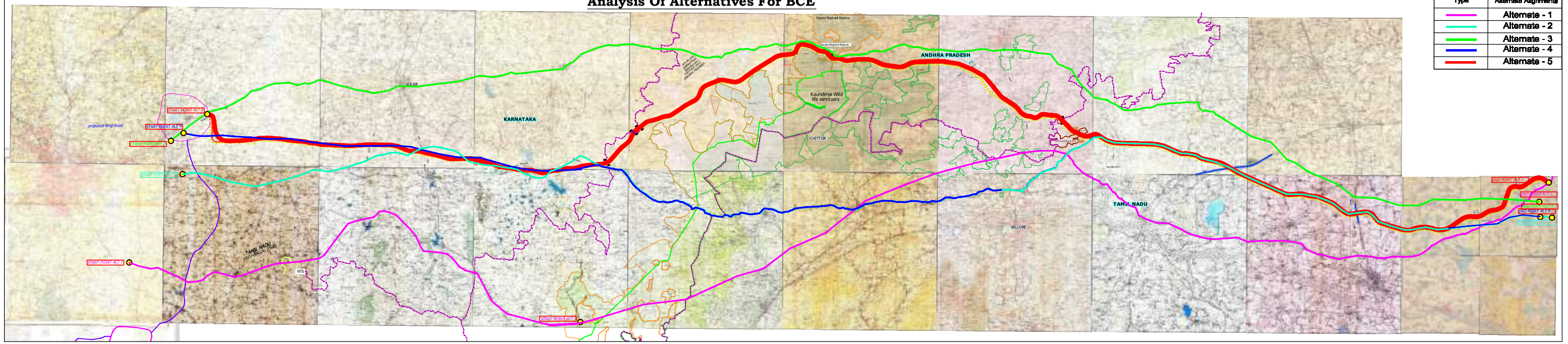
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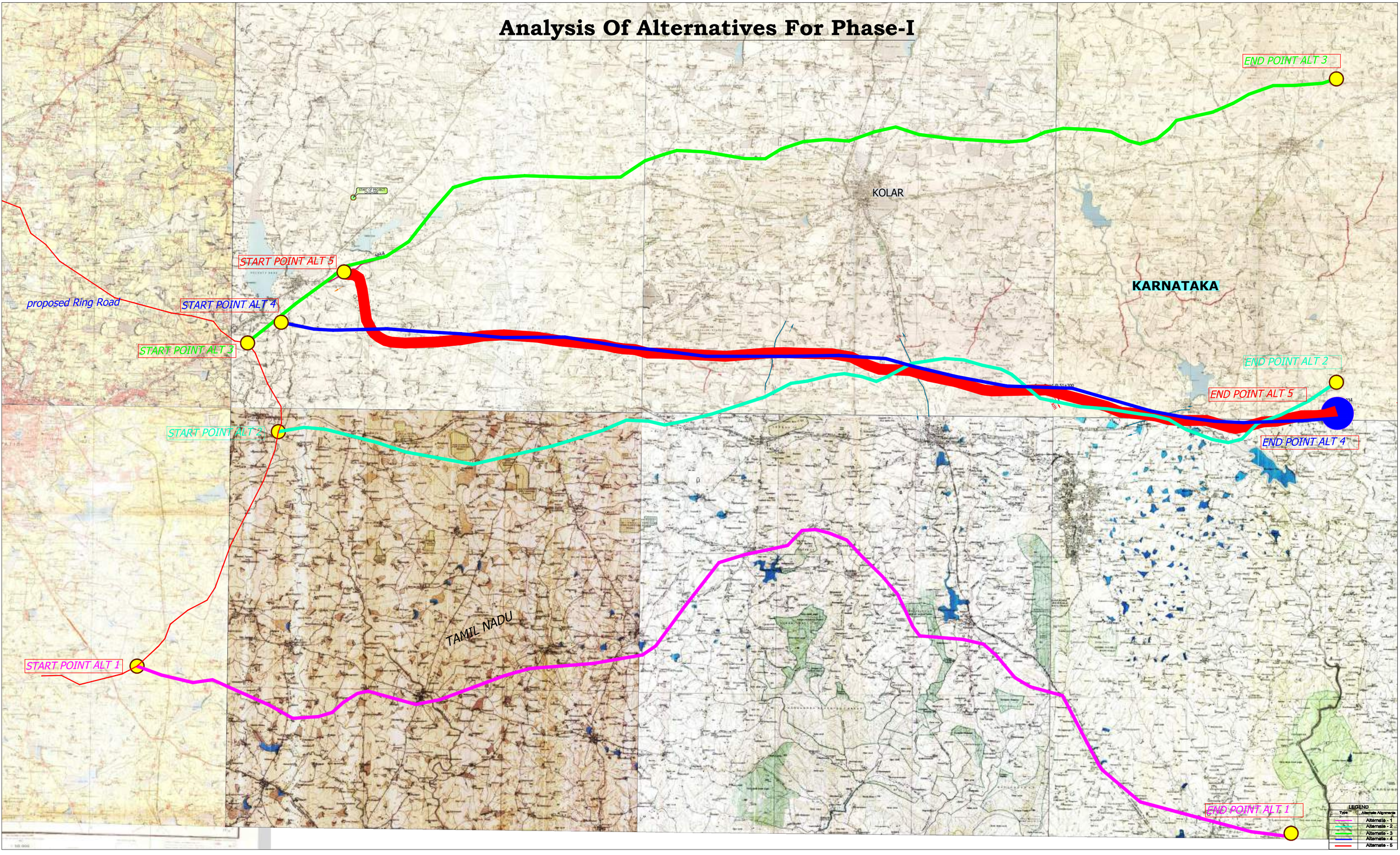
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21	

Analysis Of Alternatives For BCE



LEGEND	
Type	Alternate Alignments
	Alternate - 1
	Alternate - 2
	Alternate - 3
	Alternate - 4
	Alternate - 5

Analysis Of Alternatives For Phase-I



ANNEXURE – 6.1

NATIONAL AMBIENT AIR QUALITY STANDARDS

Sl. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Method of Measurement
(1)	Sulphur Dioxide (SO_2) $\mu g/m^3$	Annual*	50	20	Improved West and Geake Method Ultraviolet Fluorescence
		24 hours**	80	80	
(2)	Oxides of Nitrogen (NO_x) $\mu g/m^3$	Annual*	40	30	Jacob & Hochheiser Modified (Na-Arsenite) Method Chemiluminescence
		24 hours**	80	80	Gas Phase Chemiluminescence
(3)	Particulate Matter (Size less than 10 µm) or PM_{10} $\mu g/m^3$	Annual*	60	60	Gravimetric TOEM Beta attenuation
		24 hours**	100	100	
(4)	Particulate Matter (Size less than 2.5 µm) or $PM_{2.5}$ $\mu g/m^3$	Annual*	40	40	Gravimetric TOEM Beta attenuation
		24 hours**	60	60	
(5)	Ozone (O_3) $\mu g/m^3$	8 hours**	100	100	UV Photometric Chemiluminescence Chemical Method
		1 hour**	180	180	
(6)	Lead (Pb) $\mu g/m^3$	Annual*	0.5	0.5	ASS/ ICP Method after sampling on EPM 2000 or equivalent Filter paper ED – XRF using Teflon filter
		24 hours**	1.0	1.0	
(7)	Carbon Monoxide (CO) mg/m^3	8 hours**	02	02	Non Dispersive Infra Red (NDIR) Spectroscopy
		1 hour**	04	04	
(8)	Ammonia (NH_3) $\mu g/m^3$	Annual*	100	100	Chemiluminescence Indophenol blue method
		24 hours**	400	400	
(9)	Benzene (C_6H_6) $\mu g/m^3$	Annual*	05	05	Gas Chromatography based continuous analyzer Adsorption and Desorption followed by GC analysis
(10)	Benzo (a) pyrene (BaP) – Particulate phase only, ng/m^3	Annual*	01	01	Solvent extraction followed by HPLC/GC analysis
(11)	Arsenic (As) ng/m^3	Annual*	06	06	AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

Sl. No.	Pollutant	Time Weighted Average	Concentration in Ambient Air		
			Industrial, Residential, Rural and Other Area	Ecologically Sensitive Area (notified by Central Government)	Method of Measurement
(12)	Nickel (Ni) ng/m^3	Annual*	20	20	AAS/ICP method after sampling on EPM 2000 or equivalent filter paper

*Annual Arithmetic mean of minimum 104 measurements in a year at a particular site taken twice a week 24 hourly at uniform interval.

**24 hourly or 08 hourly or 01 hourly monitored values, as applicable, shall be complied with 98% of the time in a year. 2% of the time, they may exceed the limits but not on two consecutive days of monitoring.

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

ANNEXURE – 6.2

NATIONAL AMBIENT NOISE MONITORING STANDARDS

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

Note-:

1. Day time shall mean from 6 a.m. to 10 p.m.

2. Night time shall mean from 10 p.m. to 6 a.m.

3. Silence Zone is an area comprising not less than 100 meters around hospitals, education institutions, courts, religious places or any other area, which is declared as such by Competent Authority.

4. Mixed categories of areas may be declared as one of the four above-mentioned categories by the Competent Authority.

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

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

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

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

ANNEXURE – 6.3

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

S. No.	Parameters	Desirable Limit	Max. Permissible Limits in the absence of alternate source
Essential Characteristics:			
1.	Colour	5	25
2.	Odour	Unobjectionable	Unobjectionable
3.	Taste	Agreeable	Agreeable
4.	Turbidity, NTU	5	10
5.	pH Value	6.5 to 8.5	No relaxation
6.	Total Hardness (as $CaCO_3$), mg/l	300	600
7.	Iron as Fe, mg/l	0.3	1.0
8.	Chloride as Cl, mg/l	250	1000
9.	Residual free Chlorine, mg/l	0.2	-
Desirable Characteristics			
10.	Dissolved Solids, mg/l	500	2000
11.	Calcium as Ca, mg/l	75	200
12.	Copper as Cu, mg/l	0.05	1.5
13.	Manganese as Mn, mg/l	0.10	0.3
14.	Sulphate as SO_4, mg/l	200	400
15.	Nitrate as NO_3, mg/l	45	100
16.	Fluoride as F, mg/l	1.0	1.5
17.	Phenolic Compounds as C_6H_5OH, mg/l	0.001	0.002
18.	Mercury as Hg, mg/l	0.001	No relaxation
19.	Cadmium as Cd, mg/l	0.01	No relaxation
20.	Selenium as Se, mg/l	0.01	No relaxation
21.	Arsenic as As, mg/l	0.05	No relaxation
22.	Cyanide as CN, mg/l	0.05	No relaxation
23.	Lead as Pb, mg/l	0.05	No relaxation
24.	Zinc as Zn, mg/l	5.0	15.0
25.	Anionic detergent as MBAS, mg/l	0.2	1.0
26.	Chromium as Cr^{6+}, mg/l	0.05	No relaxation
27.	Polynuclear aromatic hydro carbon as PAH, g/l	-	-
28.	Mineral Oil, mg/l	0.01	0.03
29.	Pesticide, mg/l	Absent	0.001
30.	Radioactive materials: Alpha Emitters, Bq/l	-	0.1

S. No.	Parameters	Desirable Limit	Max. Permissible Limits in the absence of alternate source
	Beta Emitters, Bq/l	-	1.0
31.	Alkalinity, mg/l	200	600
32.	Aluminum as Al, mg/l	0.03	0.2
33.	Boron, mg/l	1.0	5.0

ANNEXURE – 6.4

USE BASED CLASSIFICATION OF SURFACE WATERS IN INDIA

Designated-Best-Use	Class of water	Criteria
Drinking Water Source without conventional treatment but after disinfections	A	i. Total Coliforms Organism MPN/100ml shall be 50 or less ii. pH between 6.5 and 8.5 iii. Dissolved Oxygen 6mg/l or more iv. Biochemical Oxygen Demand 5 days 20°C 2mg/l or less
Outdoor bathing (Organized)	B	i. Total Coliforms Organism MPN/100ml shall be 500 or less ii. pH between 6.5 and 8.5 iii. Dissolved Oxygen 5mg/l or more iv. Biochemical Oxygen Demand 5 days 20oC 3mg/l or less
Drinking water source after conventional treatment and disinfections	C	i. Total Coliforms Organism MPN/100ml shall be 5000 or less ii. pH between 6 to 9 iii. Dissolved Oxygen 4mg/l or more iv. Biochemical Oxygen Demand 5 days 20oC 3mg/l or less
Propagation of Wild life and Fisheries	D	i. pH between 6.5 to 8.5 ii. Dissolved Oxygen 4mg/l or more iii. Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	i. pH between 6.0 to 8.5 ii. Electrical Conductivity at 25oC micro mhos/cm Max.2250 iii. Sodium absorption Ratio Max. 26 iv. Boron Max. 2mg/l

Source: Guidelines for Water Quality Management – CPCB 2008.

Village Wise Details of Affected Households Structures (BCE- PACKAGE-I)

Sl. No.	Name of Village	Name of Taluka	Name of District	Name of Head of the Household	Name of Father of head of the Household	Ownership status	Type of Structure	Type of Loss	Social Category
						1. Title Holder, 2. Encroacher, 3 Squatter	I. Kutcha II. Semi-pucca ,III. Pucca IV. Thatched V. Wooden	Commercial (1), Residential (2), Resi + Comm (3), Boundry Wall(4), Other(5), Agriculture Land (6)	1. SC 2. ST 3. OBC 4. General 5. Others
1	Dandupalya	Hoskote	Bangalore Rural	Mr. Wajid Pasha	Mr. Syed Saleem Pasa	1	IV	2	4
2	Dandupalya	Hoskote	Bangalore Rural	Mr. Syed Saleem Pasha	-	1	II	1	3
3	Dandupalya	Hoskote	Bangalore Rural	Govindamma	H.M. Chandrapa	1	II	1	4
4	Dandupalya	Hoskote	Bangalore Rural	Mr. K.C. Pellamadappa	Chikka Maddappa	1	IV	2	1
5	Vadigehalli	Hoskote	Bangalore Rural	Miss. Subbamma	Mr. Angadi Kariyappa	1	III	1	1
6	Vadigehalli	Hoskote	Bangalore Rural	Mr. M. Manjunath	-	1	II	1	4
7	Karibeeranahosahalli	Hoskote	Bangalore Rural	Appaswamy Gowda and Others	-	1	III	1	4
8	Karibeeranahosahalli	Hoskote	Bangalore Rural	Ms. Chetan Trust Sheela	Mr. Subhakar	1	II	2	3
9	Gonakanahalli	Hoskote	Bangalore Rural	Mr. Hullurappa	Mr. Kadappa	1	III	1	4
10	Gonakanahalli	Hoskote	Bangalore Rural	Mr. Chikka Muniyappa	Pathappe and Others	1	III	1	3
11	Gonakanahalli	Hoskote	Bangalore Rural	Mr. Ramanna	Mr. Hullurappa	1	II	1	3
12	Gonakanahalli	Hoskote	Bangalore Rural	Ms. Mallamma	Nyanappa	1	IV	2	4
13	Gonakanahalli	Hoskote	Bangalore Rural	Ms. Sadat Wajid	Abdul M Saheb	1	I	2	4
14	Gonakanahalli	Hoskote	Bangalore Rural	Ms. Sadat Wajid	Abdul M Saheb (Nursery)	1	I	2	1
15	Tirtahalli	Hoskote	Bangalore Rural	Venkateshappa	Doddappa	1	II	1	4
16	Tirtahalli	Hoskote	Bangalore Rural	C. Muniswamy Reddy	Chikka Muniyappa Reddy	1	IV	2	4
17	Kannurahalli	Hoskote	Bangalore Rural	Vinaya Plalai	-	1	I	2	1
18	Kannurahalli	Hoskote	Bangalore Rural	Vinay Jha Pllay		1	I	2	3
19	Kannurahalli	Hoskote	Bangalore Rural	Venkatarao		1	I	2	3
20	Kannurahalli	Hoskote	Bangalore Rural	Ms. Pratibha Pichika	Mr. Prakash Rao	1	I	2	4
21	Kannurahalli	Hoskote	Bangalore Rural	Mr. Akash Raj	mr. Padmaraj P. Naik	1	I	2	1
22	Kannurahalli	Hoskote	Bangalore Rural	Bajaji Layout		1	I	2	4
23	Kannurahalli	Hoskote	Bangalore Rural	Ms. Raghupathy Doddy	Mr. Subbaiah Reddy and Others	1	I	2	4
24	Kannurahalli	Hoskote	Bangalore Rural	Mr. C.R. Kemparaj	C. Ramaswamy	1	II	1	3
25	Kannurahalli	Hoskote	Bangalore Rural	Mr. M. Anantramaiaha	Mr. M. Munaveerappa	1	II	1	4
26	Chimandahalli	Hoskote	Bangalore Rural	Mr. N.V. Babu	Mr. B. Narayanappa	1	IV	2	1
27	Jinnagara	Hoskote	Bangalore Rural	Mr. K.C. Shamuel	Myathiv Samual	1	III	1	1
28	Jinnagara	Hoskote	Bangalore Rural	Muniratnaiah	Lingappa	1	I	2	4
29	Jinnagara	Hoskote	Bangalore Rural	Mr. Krishnakumar Agrawal	Mr. Ramchandra Agrawal (LPG Cylinder Factory	1	IV	2	4
30	Tirtahalli	Hoskote	Bangalore Rural	C. Muniswamy Reddy	Chikka Muniyappa Reddy	1	IV	2	1
31	Kulathur	Hoskote	Bangalore Rural	Syad Saleem Pasha	Late Syad Ameer Jan Alias Sultan	1	IV	2	4
32	Kulathur	Hoskote	Bangalore Rural	Emerald Building	-	1	IV	2	3
33	Kulathur	Hoskote	Bangalore Rural	Shailaja D'souza Misha D' Souza		1	II	1	1
34	Kulathur	Hoskote	Bangalore Rural	Md. Ejas Sait	Md. Hussain Sait	1	IV	1	4
35	Kulathur	Hoskote	Bangalore Rural	Ms. Evelyn Mr. Pereira	Joseph S/o F.C. Pereira	1	I	2	3
36	Kulathur	Hoskote	Bangalore Rural	Pramabai	Pavan Kumar	1	I	2	1
37	Kulathur	Hoskote	Bangalore Rural	Pramabai	Pavan Kumar	1	IV	2	4
38	Kulathur	Hoskote	Bangalore Rural	Narayana Swami	Chikkamuniswami	1	III	1	4
39	Kulathur	Hoskote	Bangalore Rural	Anjanappa	Chikkamuniswami	1	III	1	4
40	Kulathur	Hoskote	Bangalore Rural	Narayana Swami	Chikkamuniswami	1	III	1	1

Sl. No.	Name of Village	Name of Taluka	Name of District	Name of Head of the Household	Name of Father of head of the Household	Ownership status	Type of Structure	Type of Loss	Social Category
						1. Title Holder, 2. Encroacher, 3 Squatter	I. Kutcha II. Semi-pucca, III. Pucca IV. Thatched V. Wooden	Commercial (1), Residential (2), Resi + Comm (3), Boundry Wall(4), Other(5), Agriculture Land (6)	1. SC 2. ST 3. OBC 4. General 5. Others
41	Kulathur	Hoskote	Bangalore Rural	A. Papanna	Chinnappa alias Abbayappa	1	III	1	4
42	Kulathur	Hoskote	Bangalore Rural	K.M. Nagaraj	Marinanjundappa	1	III	1	4
43	Kulathur	Hoskote	Bangalore Rural	Devanna	Late Ramaih	1	II	1	3
44	Kulathur	Hoskote	Bangalore Rural	K.M. Krishnappa	Marinanjundappa	1	I	2	4
45	Kulathur	Hoskote	Bangalore Rural	K.V.Ravikumar	Venkatshamaiaha K.N	1	IV	2	1
46	Kulathur	Hoskote	Bangalore Rural	K.V.Subramma	K.V. Vengatasamaiya	1	V	2	4
47	Kulathur	Hoskote	Bangalore Rural	K. Ravikumar	K.V. Vengatasamaiya	1	V	2	3
48	Kulathur	Hoskote	Bangalore Rural	K.E. Nagaraj	Chikkerappa	1	IV	2	4
49	Kulathur	Hoskote	Bangalore Rural	Tausif	Feroz Pasha	1	II	1	1
50	Kulathur	Hoskote	Bangalore Rural	K.E.Krishnappa	Chikkerappa	1	IV	2	4
51	Kulathur	Hoskote	Bangalore Rural	B.S.Shriprakash	B.L.Shriramaiaha	1	I	2	4
52	Kulathur	Hoskote	Bangalore Rural	Munivenkatappa	Muniyappa	1	I	2	1
53	Kulathur	Hoskote	Bangalore Rural	Muniyappa	Irappa	1	I	2	3
54	Kulathur	Hoskote	Bangalore Rural	K.M.Nagaraj	Marinanjundappa	1	III	1	3
55	Kulathur	Hoskote	Bangalore Rural	K.E. Nagaraj	Chikkerappa	1	III	1	4
56	Kulathur	Hoskote	Bangalore Rural	Ms. Anjanappa	Mr. Gudiyappa	1	III	1	2
57	Kulathur	Hoskote	Bangalore Rural	Devanna	Ramaiaha	1	III	1	4
58	Kulathur	Hoskote	Bangalore Rural	Pilamuniyappa and K.N. Anjanappa	Narayanappa	1	IV	2	4
59	Kulathur	Hoskote	Bangalore Rural	K.M. Krishnappa	Marinanjundappa	1	IV	2	4
60	Kulathur	Hoskote	Bangalore Rural	K. Munegawda	Bachappa	1	IV	2	4
61	Kulathur	Hoskote	Bangalore Rural	K.E.Krishnappa	Chikkerappa	1	IV	2	3
62	Kulathur	Hoskote	Bangalore Rural	Ms. Muniyamma	Muniyappa alias Nollunu	1	IV	2	4
63	Kulathur	Hoskote	Bangalore Rural	Ms. Muniyamma	Muniyappa alias Nollunu	1	II	1	1
64	Kulathur	Hoskote	Bangalore Rural	Pilamuniyappa	Narayanappa	1	II	1	4
65	Kulathur	Hoskote	Bangalore Rural	Anjanappa K.N.Harish	Narayanappa	1	II	1	3
66	Kulathur	Hoskote	Bangalore Rural	R. Harish	K.H. Ramaiah	1	II	1	4
67	Kulathur	Hoskote	Bangalore Rural	Jabbar Baig	Late Md. Baig	1	II	1	4
68	Kulathur	Hoskote	Bangalore Rural	G. Shashikant	Gangappa	1	IV	2	1
69	Kulathur	Hoskote	Bangalore Rural	G. Shashikant	Gangappa	1	III	1	4
70	Kulathur	Hoskote	Bangalore Rural	Hanumanathappa	Munishamappa	1	III	1	3
71	Kulathur	Hoskote	Bangalore Rural	Krishnappa and Doddabyregowda	Venkatashamappa	1	IV	2	4
72	Kulathur	Hoskote	Bangalore Rural	S.H. Kamalpasha	Late Syed Ismail	1	I	2	1
73	Kulathur	Hoskote	Bangalore Rural	K.V.Venkatrama	K.V. Narayanappa	1	I	2	4
74	Kulathur	Hoskote	Bangalore Rural	Narayanaswamy	Chikkabahappa	1	II	1	1
75	Kulathur	Hoskote	Bangalore Rural	Byrappa	Uttanallapa	1	III	1	3
76	Kulathur	Hoskote	Bangalore Rural	Ms. V. Saraswatamma	B. Venkateshmurthy	1	II	1	4
77	Kulathur	Hoskote	Bangalore Rural	Chakradhar	Venkateshrallu	1	II	1	4
78	Kulathur	Hoskote	Bangalore Rural	Doddamuniyappa	Kenchappa	1	II	1	3
79	Kulathur	Hoskote	Bangalore Rural	Doddamuniyappa	Kenchappa	1	II	1	1
80	Kulathur	Hoskote	Bangalore Rural	K. Muniyappa	Kenchappa	1	II	1	3
81	Kulathur	Hoskote	Bangalore Rural	Ms. Ratnamma	Late Jayaram	1	II	1	4
82	Kulathur	Hoskote	Bangalore Rural	Ms. Sanamma	Late Kenchappa	1	III	1	3
83	Kulathur	Hoskote	Bangalore Rural	Chikkamumunishamappa	Hanumntrayappa	1	III	1	1
84	Kulathur	Hoskote	Bangalore Rural	Ms. Sampangiamma	Krishnappa	1	III	1	4
85	Kulathur	Hoskote	Bangalore Rural	Venkatraju	Hanumntrayappa	1	IV	2	1

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86	Kulathur	Hoskote	Bangalore Rural	Ms. Rantanamma	Jayaramaiiah	1	IV	2	3
87	Kulathur	Hoskote	Bangalore Rural	K.N.Chandragowda	Munibirappa	1	III	1	4
88	Kulathur	Hoskote	Bangalore Rural	Ms. Vijayamma	M. Krishanappa	1	IV	2	1
89	Kulathur	Hoskote	Bangalore Rural	Devappa	Ramaiah	1	IV	2	4
90	Kulathur	Hoskote	Bangalore Rural	Doddappaiaha	Chikkanjappa	1	IV	2	1
91	Kulathur	Hoskote	Bangalore Rural	Ms. M.S.Swarna	K. Muniyappa	1	IV	2	4
92	Kulathur	Hoskote	Bangalore Rural	H.Prakash	Hanumantegowda	1	III	1	4
93	Kulathur	Hoskote	Bangalore Rural	N.Subaraidu	N.Subaraju	1	III	2	2
94	Kulathur	Hoskote	Bangalore Rural	H.Prakash	Krishnamurthy	1	III	2	4
95	Kulathur	Hoskote	Bangalore Rural	Venkateshwar		1	III	1	1
96	Kulathur	Hoskote	Bangalore Rural	H.Prakash	Hanumantegowda	1	I	2	3
97	Kulathur	Hoskote	Bangalore Rural	Manjunath	Muniyappa	1	IV	2	4
98	Kulathur	Hoskote	Bangalore Rural	B.Raghu Pathi		1	II	2	4
99	Kulathur	Hoskote	Bangalore Rural	Ravikumar		1	II	2	1
100	Kulathur	Hoskote	Bangalore Rural	R Kesava Murthy		1	II	2	1
101	Kulathur	Hoskote	Bangalore Rural	M.V.Nagaraj		1	II	2	4
102	Sulikunte	Bangarpet Volume I	Kolar	Baggana	Timmanna	1	II	5	3
103	Sulikunte	Bangarpet Volume I	Kolar	Keishanappa	Timmanna	1	II	5	4
104	Sulikunte	Bangarpet Volume I	Kolar	R.Vishnu	Ramakrishanappa	1	III	2	4
105	Sulikunte	Bangarpet Volume I	Kolar	Shantaram	Munivenkatappa	1	IV	5	1
106	Magalabele	Bangarpet Volume I	Kolar	G.Narayanappa	Gidappa	1	IV	5	4
107	Mugalabele	Bangarpet Volume I	Kolar	M.V.Nagaraj	Venkataramappa	1	IV	5	4
108	Madarnangala S.	Bangarpet Volume I	Kolar	G. Narayanappa	Gidappa	1	III	2	3
109	Madarnangala S.	Bangarpet Volume I	Kolar	M.V. Nagaraj	Venkatramappa	1	III	2	4
110	Madarnangala S.	Bangarpet Volume I	Kolar	P.Srinivas Gowda	Pillappa	1	II	5	3
111	Madarnangala S.	Bangarpet Volume I	Kolar	K.Srinivasappa		1	III	1	4
112	Madarnangala S.	Bangarpet Volume I	Kolar	Narayanappa	Doddamunishamappa	1	III	2	1
113	Madarnangala S.	Bangarpet Volume I	Kolar	P.Srinivas Gowda	Pillappa	1	I	5	4
114	Madarnangala S.	Bangarpet Volume I	Kolar	Srinivas Gowda	Dodda Muniyappa	1	III	2	3
115	Madarnangala S.	Bangarpet Volume I	Kolar	Raghu		1	IV	5	4
116	Madarnangala S.	Bangarpet Volume I	Kolar	K.M Chandrashakher	Nanjareddy	1	IV	5	3
117	Siddanahalli	Bangarpet Volume I	Kolar	Ramakka	Mariappa	1	III	2	4
118	Madigarahalli	Bangarpet Volume I	Kolar	Nanjappa	Narayanappa	1	III	2	4
119	Madigarahalli	Bangarpet Volume I	Kolar	Subanna	Narayanappa	1	II	5	4
120	Madigarahalli	Bangarpet Volume I	Kolar	Venkataramanappa	Appianna	1	III	2	1
121	Kuppanahalli	Bangarpet Volume I	Kolar	Venkateshappa	Muniverkatappa	1	II	5	4
122	Kuppanahalli	Bangarpet Volume I	Kolar	K.Chowdappa	Venkataramanappa	1	III	1	4
123	Kuppanahalli	Bangarpet Volume I	Kolar	K.M.Srinivas		1	III	2	3
124	Kuppanahalli	Bangarpet Volume I		K.M.Rajanna		1	II	5	4
125	Kuppanahalli	Bangarpet Volume I	Kolar	Venkatappa		1	III	1	1
126	Kuppanahalli	Bangarpet Volume I	Kolar	K.V.Rajagopal	K.M.Venktarama	1	II	5	4
127	Kuppanahalli	Bangarpet Volume I	Kolar	K.V.Rajagopal		1	II	5	4
128	Kuppanahalli	Bangarpet Volume I	Kolar	K.L.Srinivas		1	II	5	4
129	Kuppanahalli	Bangarpet Volume I	Kolar	Kempanna	Muniyappa	1	II	5	4
130	Krishnarajapura	Bangarpet Volume I	Kolar	Anwar Hussain & others		1	II	5	4

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131	Krishnarajapura	Bangarpet Volume I	Kolar	Shamid Begam	Kalantha	1	II	5	1
132	Krishnarajapura	Bangarpet Volume I	Kolar	Aftab Hussain		1	IV	5	4
133	Birandahill	Bangarpet Volume I	Kolar	Parvathamma & Others		1	III	1	4
134	Birandahill	Bangarpet Volume I	Kolar	Narayanswamy		1	II	5	4
135	Birandahill	Bangarpet Volume I	Kolar	Doddappa		1	III	2	4
136	Karabele	Bangarpet Volume I	Kolar	L.Ravikumar	Laxman	1	III	5	4
137	Maragal	Bangarpet Volume I	Kolar			1	III	2	2
138	Maragal	Bangarpet Volume I	Kolar	Rabia		1	III	2	4
139	Maragal	Bangarpet Volume I	Kolar	Muniyappa		1	III	2	4
140	Maragal	Bangarpet Volume I	Kolar			1	II	5	3
141	Maragal	Bangarpet Volume I	Kolar	Govindappa	Venkataramanna	1	IV	5	4
142	Maragal	Bangarpet Volume I	Kolar	Munishamappa	Chokappa	1	IV	5	1
143	Maragal	Bangarpet Volume I	Kolar	Gouramma		1	III	2	4
144	Maragal	Bangarpet Volume I	Kolar	Venkatesh gowda	Narayanappa	1	III	1	3
145	Maragal	Bangarpet Volume I	Kolar	Gouramma	Venkataram	1	II	5	1
146	Maragal	Bangarpet Volume I	Kolar	Chennappa		1	II	5	4
147	Maragal	Bangarpet Volume I	Kolar	B.Venkatesh Gowda		1	III	5	4
148	Ithandahalli	Bangarpet	Kolar	B.M Munivenkappa	Doddamuni Venkatappa	1	IV	5	1
149	Ithandahalli	Bangarpet	Kolar	M.Krishanappa	Muniswamy Gowda	1	III	5	3
150	Ithandahalli	Bangarpet	Kolar	C.Muniyappa	Chikka Muniyappa	1	II	5	1
151	Ithandahalli	Bangarpet	Kolar	C.Muniyappa	Gopanna	1	II	5	4
152	Ithandahalli	Bangarpet	Kolar	Sannegowda	Timmanna	1	II	5	3
153	Ithandahalli	Bangarpet	Kolar	Venkatesh gowda	Laxmegowda & Muniyamma	1	II	5	4
154	Ithandahalli	Bangarpet	Kolar	Mariyamma	Venkatesh gowda	1	II	5	2
155	Ithandahalli	Bangarpet	Kolar	G.M.Venkatesh	G.Muniyappa	1	II	5	3
156	Ithandahalli	Bangarpet	Kolar	Chinnappa	Appayanna	1	I	5	4
157	Ithandahalli	Bangarpet	Kolar	Munivenkatappa	Muniyappa	1	II	5	1
158	Byatarayanahalli	Bangarpet	Kolar	Md.Ayub	Usman	1	II	5	4
159	Byatarayanahalli	Bangarpet	Kolar	Narayanappa	Munishan	1	III	1	1
160	Kulur	Bangarpet	Kolar	Anjaneya Temple		1	III	2	4
161	Kulur	Bangarpet	Kolar	Venktaramappa	Dekkappa	1	V	5	4
162	Kulur	Bangarpet	Kolar	Muniyappa	Venkataramappa	1	V	5	3
163	Kulur	Bangarpet	Kolar	Irappa	Chenappa	1	IV	5	2
164	Kulur	Bangarpet	Kolar	Jayantamma	Govindappa	1	III	2	4
165	Kulur	Bangarpet	Kolar	K.Subramani	K.S.Krishnappa	1	III	2	3
166	Kulur	Bangarpet	Kolar	K.Subramanya	K.K.Krishnappa	1	III	2	1
167	Kulur	Bangarpet	Kolar	R.K.Rangaswamy		1	III	2	4
168	Kulur	Bangarpet	Kolar	Rajanna	K.V.Shamanna	1	III	1	3
169	Kulur	Bangarpet	Kolar	K.V.Sripati	Venkatappa	1	III	5	4
170	Kulur	Bangarpet	Kolar	K.V.Sripati	Venkatappa	1	III	2	4
171	Kulur	Bangarpet	Kolar	Govind Achari		1	III	2	1
172	Parisepalli	Bangarpet	Kolar	Kvishwanath N. Ganesh		1	III	5	3
173	Parisepalli	Bangarpet	Kolar	Aslow Ahamad	C. Hyder	1	III	1	4
174	Parisepalli	Bangarpet	Kolar	N.Venugopal	Narayanappa	1	IV	5	2
175	Bethamangala	Bangarpet	Kolar	Tippanna	Mani	1	IV	5	4

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176	Bethamangala	Bangarpet	Kolar	As per RTC		1	III	5	4
177	Bethamangala	Bangarpet	Kolar	B.M.Shantimurthy	Munishami	1	III	5	3
178	Bethamangala	Bangarpet	Kolar	M.V Venkatappa		1	III	1	4
179	Bethamangala	Bangarpet	Kolar	Jaisimha Krishaapp	N.V. Krishanappa	1	IV	5	1
180	Bethamangala	Bangarpet	Kolar	Ramakrishanappa	Muiyappa	1	IV	5	1
181	Bethamangala	Bangarpet	Kolar	Prasanna	Nanjundgowda	1	IV	5	4
182	Bethamangala	Bangarpet	Kolar	G.P Hulkur		1	IV	5	3
183	Bethamangala	Bangarpet	Kolar	Chandrappa	Gangappa	1	IV	5	1
184	Bethamangala	Bangarpet	Kolar	Radhamma	Nanjundappa	1	IV	5	4
185	Bethamangala	Bangarpet	Kolar	Narayanswami	Venkatramappa	1	IV	5	3
186	Bethamangala	Bangarpet	Kolar	Shanaramma	Ramappa	1	IV	5	1
187	Bethamangala	Bangarpet	Kolar	Krishnappa	Narsappa	1	IV	5	4
188	Bethamangala	Bangarpet	Kolar	S.Nagachari	Bhatta Chari	1	IV	5	3
189	Bethamangala	Bangarpet	Kolar	Nagesh	Hanmegowda	1	IV	5	2
190	Bethamangala	Bangarpet	Kolar	R,Janardhan Naidu	Ramanath gowda	1	IV	5	4
191	Bethamangala	Bangarpet	Kolar	Subramani	Natham Krishanappa	1	II	5	4
192	Bethamangala	Bangarpet	Kolar	Chandrappa	Venkataramappa	1	II	5	4
193	Doddakari	Bangarpet	Kolar	Jaisimha Krishnappa		1	II	5	3
194	Doddakari	Bangarpet	Kolar	Muniyappa	Muniswamy (K.M.Srinivas)	1	II	5	4
195	Doddakari	Bangarpet	Kolar	Naraseenappa	Naramuniswamy & Others	1	II	5	4
196	Doddakari	Bangarpet	Kolar	Munivenkate gowda	Narayan gowda	1	IV	5	1
197	Doddakari	Bangarpet	Kolar	Venkataramappa	chennappa	1	IV	5	4
198	Doddakari	Bangarpet	Kolar	Narayanaswamy	Venkataramappa	1	III	2	1
199	Doddakari	Bangarpet	Kolar	Arun Kumar	Ramappra	1	III	2	4
200	Doddakari	Bangarpet	Kolar	Manjunath	Venkatappa	1	II	5	1
201	Doddakari	Bangarpet	Kolar	Manjunath	Venkatappa		I	5	4
202	Doddakari	Bangarpet	Kolar	Yellappa	Muniyappa	1	II	5	4
203	Doddakari	Bangarpet	Kolar	Venkataramappa	Bangodappa	1	II	5	3
204	Doddakari	Bangarpet	Kolar	Munnegowda	Munishamigowda	1	II	5	4
205	Doddakari	Bangarpet	Kolar	Narayanswamy	Naraseenappa	1	II	5	2
206	Doddakari	Bangarpet	Kolar	K.K.Prakash	Narakrishanappa	1	II	5	3
207	Doddakari	Bangarpet	Kolar	Subramani		1	III	2	4
208	Doddakari	Bangarpet	Kolar	Nanjudagowda	Muniswamy	1	III	2	1
209	Doddakari	Bangarpet	Kolar	Irappa	Chennappa	1	III	2	4
210	Doddakari	Bangarpet	Kolar	Venkataramappa	Chennappa	1	III	2	1
211	Vaddarahalli	Bangarpet	Kolar	Rajegowda	Yeregowda	1	III	2	4
212	Vaddarahalli	Bangarpet	Kolar	Shivanna	Ramkrishna shetty	1	III	2	3
213	Pedadampalli	Bangarpet	Kolar	Emallamma	R.Vasu	1	II	5	2
214	Pedadampalli	Bangarpet	Kolar	Gouramma		1	I	5	4
215	Pedadampalli	Bangarpet	Kolar	K.Babu	Krishnappa	1	III	2	3
216	Doddakari Majara Kambampalli	Bangarpet	Kolar	Ms. Padmavati	Nagaraj	1	III	2	3
217	Doddakari Majara Kambampalli	Bangarpet	Kolar	Chenanna Reddy	Subba Reddy	1	III	2	4
218	Doddakari Majara Kambampalli	Bangarpet	Kolar	Chennaswamy	Muniswamy	1	II	5	4
219	Pilla Gondlahalli	Bangarpet	Kolar	Balasubramanium		1	III	2	1
220	Rayasandra	Bangarpet	Kolar	Tipanna	Simpanna	1	III	2	4

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221	Rayasandra	Bangarpet	Kolar	Anandappa	Hanumantappa	1	III	2	1
222	Rayasandra	Bangarpet	Kolar	Jayapradha	Manjunath	1	III	2	4
223	Rayasandra	Bangarpet	Kolar	Peddanna	Chikkanna & Others	1	III	5	3
224	Rayasandra	Bangarpet	Kolar	Srinappa	Kallappa	1	II	5	4
225	Rayasandra	Bangarpet	Kolar	Venkateshapp		1	I	5	1
226	Rayasandra	Bangarpet	Kolar	Jayaramappa	Guddannu	1	III	2	4
227	Sundrapalya	Bangarpet	Kolar	Azgar	Shekh Amir	1	I	5	3
228	Sundrapalya	Bangarpet	Kolar	As per RTC		1	III	2	4
229	Sundrapalya	Bangarpet	Kolar	Gunashekh Ramma	K.V.Jairam Reddy	1	III	5	4
230	Sundrapalya	Bangarpet	Kolar	Ms. Sujata Reddy	Sampanagl Reddy	1	III	5	2
231	Sundrapalya	Bangarpet	Kolar	Ms. Sujata Reddy		1	IV	5	3
232	Vengasandra	Bangarpet	Kolar	Ram Rao		1	III	2	4
233	Vengasandra	Bangarpet	Kolar	Appukutti		1	IV	5	1
234	Vengasandra	Bangarpet	Kolar	Seenappa	Venkatrammappa	1	IV	5	4
235	Vengasandra	Bangarpet	Kolar	Rajappa		1	III	5	1
236	Vengasandra	Bangarpet	Kolar	Krishnappa		1	III	2	3
237	Vengasandra	Bangarpet	Kolar	Venkatrammappa		1	IV	5	4
238	Vengasandra	Bangarpet	Kolar	B.P.Gopal	Thimmraiappa	1	II	5	2
239	Vengasandra	Bangarpet	Kolar	Hanamappa	Venkatrammappa	1	V	5	3
240	N.G.Hulkur	Bangarpet	Kolar	Vinayak		1	III	5	4
241	N.G.Hulkur	Bangarpet	Kolar	Hemant Kumar	H.K.Shrinivasaiya	1	III	2	1
242	N.G.Hulkur	Bangarpet	Kolar	H.K.Kondaramma	Kabarappa	1	III	5	4
243	N.G.Hulkur	Bangarpet	Kolar	Podandaram	Kabarappa	1	III	2	3
244	N.G.Hulkur	Bangarpet	Kolar	Podanadaram		1	III	2	4
245	N.G.Hulkur	Bangarpet	Kolar	Narayanappa	Chennappa	1	IV	5	1
246	Kabaranahalli	Bangerpet	Kolar	Baichappa	Muniyappa	1	IV	5	2
247	Kabaranahalli	Bangerpet	Kolar	Narayanamma	Rammappa	1	III	2	4
248	Kabaranahalli	Bangerpet	Kolar	Padmamma	Sriniwas	1	IV	5	3
249	Kabaranahalli	Bangerpet	Kolar	Muniyappa	-	1	IV	5	4
250	Kabaranahalli	Bangerpet	Kolar	Muniyappa	Tammanna	1	IV	5	1
251	Kabaranahalli	Bangerpet	Kolar	Ramkrishnappa	-	1	IV	5	4
252	Kabaranahalli	Bangerpet	Kolar			1	III	2	1
253	Dodduru Karapahalli	Bangarpet	Kolar	Narayanappa	Muniswamy	1	III	2	4
254	Dodduru Karapahalli	Bangarpet	Kolar	Narayanappa	Muniswamy	1	III	5	4
255	Dodduru Karapahalli	Bangarpet	Kolar	Rukamaniamma		1	IV	5	3
256	Dodduru Karapahalli	Bangarpet	Kolar	Ashwatappa	Annaiaha	1	II	5	4
257	Dodduru Karapahalli	Bangarpet	Kolar	Srinivasappa	Shankarappa	1	IV	5	4
258	Dodduru Karapahalli	Bangarpet	Kolar	Srinivasappa		1	III	2	4
259	Dodduru Karapahalli	Bangarpet	Kolar	B.Bettappa	Devarappa	1	IV	5	1
260	Dodduru Karapahalli	Bangarpet	Kolar	G.D. Ranganath		1	IV	5	4
261	Dodduru Karapahalli	Bangarpet	Kolar	T.Ramappa	Timappa	1	IV	5	4
262	Dodduru Karapahalli	Bangarpet	Kolar	T.Ramappa		1	IV	5	2
263	Dodduru Karapahalli	Bangarpet	Kolar	Narayanamma	Muniyappa	1	IV	5	4
264	Dodduru Karapahalli	Bangarpet	Kolar	K.R Sreedhar	K.V Ramkrishna	1	III	2	3
265	Dodduru Karapahalli	Bangarpet	Kolar	M.Amaresh	Munivenkatappa	1	III	2	4

Sl. No.	Name of Village	Name of Taluka	Name of District	Name of Head of the Household	Name of Father of head of the Household	Ownership status	Type of Structure	Type of Loss	Social Category
						1. Title Holder, 2. Encroacher, 3 Squatter	I. Kutcha II. Semi-pucca, III. Pucca IV. Thatched V. Wooden	Commercial (1), Residential (2), Resi + Comm (3), Boundry Wall(4), Other(5), Agriculture Land (6)	1. SC 2. ST 3. OBC 4. General 5. Others
266	Dodduru Karapahalli	Bangarpet	Kolar	Sriramappa	Venkatappa	1	IV	5	1
267	Gangapura	Malur	Kolar	Srinivas Babu	Muni Reddy	1	IV	5	4
268	Gangapura	Malur	Kolar	Doddapilla Reddy	Pappa Reddy	1	IV	5	1
269	Hedaginabela	Malur	Kolar	Munirappa	Muniyappa	1	IV	5	4
270	Hedaginabela	Malur	Kolar	M.C Pushva	Ravikumar	1	IV	5	4
271	Hedaginabela	Malur	Kolar	C. Narayanswamy	Chennappa & Others	1	IV	5	3
272	Hedaginabela	Malur	Kolar	Ramesh R.Patil	Ravilal A.Manani	1	IV	5	3
273	Hedaginabela	Malur	Kolar	Ravilal Manani		1	IV	5	4
274	Hedaginabela	Malur	Kolar	Nanjubda Achari		1	III	2	1
275	Bellavi	Malur	Kolar	GP-Toranahalli		1	IV	5	4
276	Kondarahalli	Malur	Kolar	K.Basaiaha	Chikkanna	1	III	2	3
277	Kondarahalli	Malur	Kolar	Ramakrishnappa	Siddappa & Others	1	III	2	4
278	Kondarahalli	Malur	Kolar	Kattappa alias Lakshmiaha	Doddasidappa	1	III	2	1
279	Kondarahalli	Malur	Kolar	S.A.Marriappa	Channaveerappa & Others	1	III	5	4
280	Obalapura	Malur	Kolar	_	_	1	III	5	4
281	Obalapura	Malur	Kolar	Siddappa	Buddappa & Others	1	III	2	2
282	Maliyappanahalli	Malur	Kolar	Muninarayanappa	Rama swamy	1	III	5	4
283	Maliyappanahalli	Malur	Kolar	chikkananjundappa	Nutve Nanjappa	1	II	5	4
284	Chikka Kadaturu	Malur	Kolar	Venkatarammappa	Jamappa	1	II	5	4
285	Agrahara	Malur	Kolar	Gopalappa	Subanna	1	III	2	3
286	Chikka Sabbenahalli	Malur	Kolar	S.R.Manjunath	S.V Ramaiaha	1	IV	5	4
287	Chikka Sabbenahalli	Malur	Kolar	Gopal	S.V Ramaiaha	1	III	2	1
288	Chikka Sabbenahalli	Malur	Kolar	Bachappa	Muunivenkatappa	1	III	2	4
289	Chikka Sabbenahalli	Malur	Kolar	C.Venkatesh		1	IV	5	3
290	Chikka Sabbenahalli	Malur	Kolar	S.A.Nagraj	S.V Appaiaha	1	III	5	4
291	Chikka Sabbenahalli	Malur	Kolar	C.Narayanswamy	Chowdappa	1	IV	5	4
292	Chikka Sabbenahalli	Malur	Kolar	C.Venkatesh	Chowdappa	1	IV	5	4
293	Chikka Sabbenahalli	Malur	Kolar	Narayanswamy	Tippanna	1	IV	5	4
294	Chikka Sabbenahalli	Malur	Kolar	Narayanswamy	Tippanna	1	IV	5	4
295	Chikka Sabbenahalli	Malur	Kolar	Srinivas		1	III	2	1
296	Chikka Sabbenahalli	Malur	Kolar	Najamma & Others		1	III	5	4
297	Chikka Sabbenahalli	Malur	Kolar	Najamma & Others		1	IV	5	4
298	Dodda Shivara	Malur		Horticulture Department		1	IV	5	3
299	Dodda Sabbenahalli	Malur	Kolar	Dharamegowda	Ramachandrappa	1	III	2	4
300	Nambiganahalli	Malur	Kolar	Srinivas	Narayanappa	1	II	5	2
301	Hijuvanahalli	Malur	Kolar	Muniyamma	Venkataramappa	1	IV	5	4
302	Hijuvanahalli	Malur	Kolar	Muniyamma	Venkataramappa	1	III	5	4
303	Hijuvanahalli	Malur	Kolar	Laxmamma	Irallappa	1	III	2	4
304	Hijuvanahalli	Malur	Kolar	Chandrayappa(Krishnappa)		1	II	5	1
305	Hijuvanahalli	Malur	Kolar	Ventaswamy	Giddappa & Others	1	III	2	4
306	Hijuvanahalli	Malur	Kolar	Akkyamma	Irappa(Subramani)	1	III	5	1
307	Hijuvanahalli	Malur	Kolar	Subramani	Muniyappa	1	II	5	4
308	Anepura	Malur	Kolar	Late Muni Venkatappa	venkatappa	1	III	2	3
309	Anepura	Malur	Kolar	Akkaiamma	Mottappa	1	II	5	4
310	Anepura	Malur	Kolar	Chikka Kondappa	Venkatappa	1	III	5	1

Sl. No.	Name of Village	Name of Taluka	Name of District	Name of Head of the Household	Name of Father of head of the Household	Ownership status	Type of Structure	Type of Loss	Social Category
						1. Title Holder, 2. Encroacher, 3 Squatter	I. Kutcha II. Semi-pucca, III. Pucca IV. Thatched V. Wooden	Commercial (1), Residential (2), Resi + Comm (3), Boundry Wall(4), Other(5), Agriculture Land (6)	1. SC 2. ST 3. OBC 4. General 5. Others
311	Anepura	Malur	Kolar	Krishnappa	Kondappa	1	III	2	4
312	Anepura	Malur	Kolar	Srinivas	Kondappa	1	III	5	4
313	Anepura	Malur	Kolar	Srinivas	Kondappa	1	III	5	1
314	Anepura	Malur	Kolar	Venkateshappa	Irappa	1	III	2	4
315	Anepura	Malur	Kolar	venkatappa		1	III	5	1
316	Anepura	Malur	Kolar	H.Govind Gowda	Hanumappa	1	III	2	4
317	Anepura	Malur	Kolar	H.Govind Gowda	Hanumappa	1	III	5	4
318	Anepura	Malur	Kolar	Konchappa	Doddanmma & Others	1	II	5	4
319	Anepura	Malur	Kolar	Yellappa	Mallappa	1	IV	5	2
320	Abbenahalli	Malur	Kolar	Puttapppa	Basappa	1	IV	5	4
321	Abbenahalli	Malur		Pillappa	Maridevaru	1	III	5	1
322	Abbenahalli	Malur	Kolar	Ashwatamma	Muni Chowdana Bovi	1	III	5	1
323	Abbenahalli	Malur	Kolar	Chennamma	Iranna Bovi	1	II	5	4
324	Vadagere	Kolar	Kolar	G.Prashanth		1	IV	5	4
325	Vadagere	Kolar	Kolar	V.Ramachandra		1	IV	5	4
326	Vadagere	Kolar	Kolar	Kampa Raju		1	IV	5	3
327	Abbenahalli	Malur	Kolar	Veerbhadrappa	Gangadarappa	1	II	5	3
328	Varadenahalli	Malur	Kolar	K.K.Kambali Kamala	S.N.Raghunath	1	IV	5	4
329	Varadenahalli	Malur	Kolar	K.M.Prafula	S.N.Raghunath	1	II	5	4
330	Varadenahalli	Malur	Kolar	Veerbhadrachari	Nanjundaachari	1	III	5	1
331	Varadenahalli	Malur	Kolar	Munni Narayanappa	Changappa	1	III	2	1
332	Varadenahalli	Malur	Kolar	Gundappa	Kempanna	1	III	5	4
333	Varadenahalli	Malur	Kolar	A.M.Raju	Appaiaha	1	IV	5	3
334	Karangutte	Malur	Kolar	Krishnoji Rao	Raj Rao	1	III	2	4
335	Karangutte	Malur	Kolar	Chowdappa	Sonappa	1	II	5	2
336	Kuntanahalli	Malur	Kolar	Seenappa	Munichamappa	1	II	5	4
337	Kuntanahalli	Malur	Kolar	Seenappa	Munishamappa	1	III	2	3
338	Karadagurki	Malur	Kolar	Bairappa	Tippanna(K.B.veerappa s/o Biraappa	1	III	5	4
339	Karadagurki	Malur	Kolar	Muniyappa	Chikka Muniyappa	1	IV	5	1
340	Karadagurki	Malur	Kolar	Venkateshappa	Dodda Appaiaha	1	II	5	4
341	Swamigala Gollahalli	Kolar	Kolar	Jayamma	Anjanappa	1	III	5	4
342	Vadagere	Kolar	Kolar	Anjanappa	Munivenkatappa	1	IV	5	4
343	Vadagere	Kolar	Kolar	Sri Vinayaka		1	IV	5	4
344	Vadagere	Kolar	Kolar	Jagadesh Appa		1	IV	5	1

ANNEXURE-7.2

District and Village wise break-up of land required for acquisition

Sl. No.	District	Taluk	Village	Acquired Land Area in Ha.		
				Total	Govt	Private
1	2	3	4	5	6	7
1	Bangalore Rural	Hosakote	Dandupalya	0.510	0.000	0.510
2			Kolathur	59.580	0.000	59.580
3			Hullur Amanikere	0.549	0.000	0.549
4			Kannurahalli	13.956	0.345	13.611
5			Chimandahalli	3.918	0.000	3.918
6			Jinnagara	4.907	3.774	1.133
7			Vagata	9.727	0.000	9.727
8			Chandrapura	5.347	0.000	5.347
9			Vadigehalli	16.227	7.608	8.619
10			Gonakanahalli	7.560	0.884	6.676
11			Karibeerana Hosahalli	15.884	0.034	15.851
12			Tiratahalli	9.656	0.261	9.394
13			Thaggli Hosahalli	3.497	0.184	3.313
14	Kolar	Malur	Gangapura	11.140	1.544	9.596
15			Channigarayapura	1.988	0.000	1.988
16			Hedaginabele	18.617	0.122	18.494
17			Bellavi	11.291	0.749	10.542
18			Kondarahalli	5.443	0.000	5.443
19			Abbenahalli	15.510	1.053	14.457
20			Maliyappanahalli	17.022	1.682	15.340
21			Chikka Kadaturu	2.859	0.000	2.859
22			Obalapura	9.127	0.000	9.127
23			Dodda Shivara	1.896	1.118	0.778
24			Varadenahalli	10.238	0.592	9.646
25			Agrahara	1.944	0.010	1.934
26			Chikka Sabbenahalli	16.999	0.316	16.683
27			Dodda Sabbenahalli	4.043	0.067	3.976
28			Nambiganahalli	14.919	0.000	14.919
29			Hijuvanahalli (Part)	1.016	0.000	1.016
30	Kolar	Malur	Hijuvanahalli (Part)	15.560	0.658	14.902
31			Nidaramangala	0.783	0.000	0.783
32			Anepura	6.736	0.798	5.937
33			Karangutte	8.339	0.043	8.295
34			Nakkanahalli	5.103	0.000	5.103
35			Kuntanahalli	10.465	0.267	10.197
36			Karadagurki	7.389	0.000	7.389
37		Kolar	Swamigala Gollahalli	11.032	0.000	11.032

Sl. No.	District	Taluk	Village	Acquired Land Area in Ha.		
				Total	Govt	Private
1	2	3	4	5	6	7
38			Vadagere	6.600	0.000	6.600
39			Sulikunte	14.685	0.639	14.046
40			Naganathapura	9.263	0.834	8.429
41			Mugalabele	3.601	0.000	3.601
42			Madamangala S.	10.348	0.776	9.572
43			Madigarahalli	8.027	0.358	7.669
44			Siddanahalli	8.772	0.446	8.326
45			Byadabele	1.738	0.000	1.738
46			Kuppanahalli	13.442	0.587	12.855
47		Bangarpet	Birandahalli	10.773	0.770	10.004
48			Karabele	3.893	0.403	3.491
49			Maragal	18.337	1.477	16.860
50			Ithandahalli	41.633	1.297	40.337
51			Kavaranahalli	11.452	2.252	9.200
52			Dodduru Karapanahalli	51.337	4.177	47.160
53			Krishnarajapura	3.666	1.179	2.487
54			Gattakamadenahalli	7.873	0.000	7.873
55			Reddyhalli (Part)	2.125	0.000	2.125
56			Reddyhalli (Part)	16.089	0.010	16.079
57			Pedadampalli	7.838	0.293	7.545
58			Thammenahalli	9.296	0.435	8.861
59			Nagashettyhalli	3.820	0.000	3.820
60			Hosapalya	11.504	1.629	9.875
61			Parisepalli	7.801	0.293	7.507
62			Bethamangala	28.051	1.532	26.520
63			Byatarayanahalli	1.282	0.000	1.282
64	Kolar	Bangarpet	Doddakari	6.806	1.443	5.363
65			Doddakari Majara Kambampalli	3.096	0.563	2.532
66			Kulur	13.510	0.468	13.042
67			Vaddarahalli	12.486	0.190	12.296
68			Pillagondalahalli	7.892	0.114	7.778
69			Rayasandra	9.660	0.782	8.879
70			Sundrapalya	4.915	0.026	4.889
71			Vengasandra	31.691	1.648	30.043
72			N G Hulkur (Part)	0.006	0.000	0.006
Total Phase-I				**764.080**	**46.730**	**717.350**

ANNEXURES 7.3

ಫ್ಯಾಕ್ಸ್ / Fax - 080-25586321
ಈಮೇಲ್ / E-mail : ho@kspcb.gov.in
ವೆಬ್‌ಸೈಟ್ / Website : http://kspcb.gov.in

☎ 25581383, 25589112
25589151, 25588270
25588142, 25586520

ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಮಂಡಳಿ
Karnataka State Pollution Control Board

"ಪರಿಸರಭವನ", 1 ರಿಂದ 5ನೇ ಮಹಡಿಗಳು, ನಂ.49, ಚರ್ಚ್‌ಸ್ಟ್ರೀಟ್, ಬೆಂಗಳೂರು - 560 001, ಕರ್ನಾಟಕ, ಭಾರತ
"Parisara Bhavana", 1st to 5th Floor, # 49, Church Street, Bengaluru - 560 001, Karnataka, INDIA

(In quick Pollution Control)
NO PCB/CNP-19/GEN/19/ 1310 Date: 25 MAY 2019

To

The Director
Ministry of Environment Forests & Climate Change,
Government of India
Paryavaran Bhawan, CGO Complex
Lodhi Road
New Delhi - 110 003.

Sir,

Sub. Environmental Public Hearing in respect of M/s National Highway Authority of India (Ministry of Road Transport and Highway) has proposed Phase-I of 8 Lane Bangalore Chennai Expressway which starts from east of Bangalore at Km 30/200 of NH-4 for proposed (0.00 km to 11.662 Km) and ends at near N G Hulkur Village, Bangarpet Taluk for proposed (11.628 to 71.00) in Kolar District for proposed 71.00 Km. The total length of the proposed Bangalore Chennai Expressway in Phase-I is 73.050 km – reg

Ref. 1. TOR letter F. No.10-15/2018-IA.III dated 14.05.2018 dated 14.05.2018.
2 Project authorities letter dated 20.12.2018
3 Public Hearing held on 28.02.2019.
4. Letter from Regional Senior Environmental Officer, KSPCB, Bangalore East enclosing the proceedings of environmental public hearing, vide No. 72 dated 26.04.2019

<<<<>>>>

With reference to the TOR letter cited under reference (1) and as per the request of M/s National Highway Authority of India (NHAI) vide reference (2) KSPCB has conducted public consultation/public hearing on 28.02.2019 in respect of the Kolar District as per the procedure mentioned in EIA Notification, 2006 (as amended till date)

The proceedings of Environmental Public Hearing in English and Kannada, list of Participants and other documents along with CD of video recording are enclosed for further needful in the matter.

Yours faithfully

Sd/-

MEMBER SECRETARY.

Encls: 1. EPH Proceedings with enclosures
2. CD.

COPY TO:
1. The Deputy Commissioner, Kolar District, Kolar, for information.
2. DGM (T) & Project Director, PIU – Bangalore Expressway, National Highway Authority of India, (Ministry of Road Transport & Highways), # 718, 11th Cross, 20th Main, Padmanabha Nagar, Bengaluru – 560 070 for information
3. The Regional Officer, KSPCB, Kolar, for information

MEMBER SECRETARY.

PROCEEDINGS OF ENVIRONMENTAL PUBLIC HEARING HELD AT "SYED PALACE AUDITORIUM, NATIONAL HIGHWAY, DANDU PALYA, NEAR MVJ COLLEGE, BENGALURU RURAL DISTRICT" ON 28.02.2019 AT 11.00 AM WITH RESPECT TO PROPOSED PROJECT PHASE -1 OF 8-LANE BENGALURU CHENNAI EXPRESSWAY WHICH STARTS FROM EAST OF BENGALURU AT KM 301.200 OF NH4 FOR PROPOSED (0.00 KM TO 11.682 KM) OF KOLATHURU VILLAGE IN THE STATE OF KARNATAKA BY NATIONAL HIGHWAYS AUTHORITY OF INDIA (MINISTRY OF ROAD TRANSPORT AND HIGHWAYS).

1.	**Venue of Public Hearing**	:	**Syed Palace Auditorium, National Highway, Dandu Palya, Near MVJ College, Bengaluru Rural District**
2.	**Officers Present**	:	**Annexure – 1**
3.	**Representatives of the Project**	:	**Annexure – 2**
4.	**Name of the Public Participants**	:	**Annexure – 3**

PREAMBLE:

M/s. NATIONAL HIGHWAYS AUTHORITY OF INDIA (Ministry of Road Transport & Highways) has proposed phase-I of 8 lane Bengaluru Chennai Express Way which starts from East of Bengaluru at km 301.200 of NH-4 of Hoskote Taluk (0.00 km to 11.682 km) and ends at near N G Hulkur Village , Bangarpet Taluk (11.682 to 71.00) in Kolar District for proposed 71.00 km. The total length of the proposed Bengaluru Chennai Expressway in Phase-1 is 73.050 km in the state of Karnataka. The length of proposed National Highway is 11.682 km in Bengaluru Rural District. As per notification the Ministry of Environment & Forest, GOI, SO No.1533, dtd: 14.09.2006, M/s. National Highway Authority of India has obtained Environmental Clearance for proposed Expressway project from the Ministry of Environment & Forest, GOI, New Delhi, as per the EIA Notification dtd: 14.09.2006 (as amended) on 01.12.2009 and also it is mandatory to conduct Environmental Public Hearing (District wise). Accordingly the Public hearing was conducted at Bengaluru Rural District.

Ministry of Environment & Forest has issued the Terms of Reference (TOR) for this project to conduct Environmental Impact Assessment (EIA) studies. Accordingly the Project proponent have

prepared draft EIA (Environmental Impact Assessment) report and Executive Summary of the said Project both in Kannada and English. In accordance with EIA notification, 2006 the said reports were submitted to Member Secretary, Karnataka State Pollution Control Board, Bangalore. As per MF. GOI terms of reference letter No. F.No. 10-15/2018-IA.III dated 14.05.2018 and request of the project proponent vide their letter No.NHAI/11016/MOEF & F (Phase-1)/1/2018/PIU-BNG (EXP)/791. dtd: 28.12.2018, Environmental Public Hearing notifications were published in leading newspapers of Karnataka State i.e. "Prajavani" (Kannada) on 27.01.2019 and "The Hindu" (English) on 27.01.2019. The notifications were published by inviting suggestions, views, comments and objections of interested bonafide residents, environmental groups and others located at project site and likely to be affected by the proposed project within 30 days from the date of publication of the Notification. Also, the draft Environmental Impact Assessment (EIA) report and executive summaries in Kannada and English were kept in the following designated places.

1. Office of the Deputy Commissioner, Jilladalitha Bhavan, Beerasandra Gramq, Kundana Hobli, Devanahalli Taluk. Bangalore Rural District,
2. Chief Executive Officer, Zilla Panchayat. Bangalore Rural District,
3. District Industries Centre, Bangalore Rural District,
4. District Urban Development cell, Bangalore Rural District
5. Town Municipal Council Office. Hoskote
6. Regional Office- Hoskote. Karnataka State Pollution Control Board, Nisarga Bhavan, Ground Floor. Shivanagar. Bengaluru – 560 010.
7. Ministry of Environment & Forest & Climate Change. South Zone Office, E-3/240, Kendriya Sadan, 4th Floor, E & F Wings. 17th Main Road, 2nd Block, Koramangala, Bangalore-560 034.
8. Helpdesk, KSPCB, Ground Floor, No.49, Parisara Bhavan, Church Street, Bangalore – 560001. Bangalore for Public reference.

The Environmental Public Hearing was organized on 28.02.2019 at **Syed Palace Auditorium, National Highway Dandu Palya. Near MVJ College, Bengaluru Rural District.** Sri. K. V.

Shivakumar, Environmental Officer, Regional Office-Hoskote, Karnataka State Pollution Control Board, extended a warm welcome to Smt. S. Ramya, KAS, Additional Deputy Commissioner, **Bengaluru Rural District**, Shri M. Laxman, Senior Environmental Officer, KSPCB, Zonal Office-Bangalore East, Smt. G R Harishilpa, Special Land Acquisition Officer, Bengaluru Chennai Express Way, Shri T. Parvateesam, Project Director, NHAI, Bangalore, all the public, all the officials of different departments, elected representatives and press. Sri. K V Shivakumar, Environmental Officer, briefly explained the need for Environmental clearance from Ministry of Environment and Forest, Government of India and Environmental Public hearing as per EIA Notification and also informed that, accordingly publicity was given in newspapers 30 days in advance and explained the procedure of the public hearing. He also informed about the documents were kept in prescribed locations as per EIA notification 2006. He requested Smt. S Ramya, KAS, Additional Deputy Commissioner, Bengaluru Rural District to Chair the Public Hearing meeting. He requested the Public to interact and discuss about the project and to present all their submissions either in written or orally, which would be part of both written record and video graphied. A brief presentation was made by the project proponent informing public about, the details of proposed project. A Brief power point presentation in kannada was presented by project proponent. After brief presentation, the meeting was opened for discussions to the public/participants.

The following are the opinions and the suggestions expressed by the public/participants/press members.

1. Sri. Harish, Kolathur Village, Hoskote Taluk, Bengaluru Rural District, requested to create job opportunities to residents of Kolathur Village as maximum land losers are from the said village. He also requested for hospital facility to the Kolathur Village from the project proponent.

   The Chairman informed that, job opportunities will be created during formation of Road and localities will be given preference for jobs during road formation. The Project Director, NHAI, Bengaluru, informed that, road is being proposed as a part of Chennai

Bengaluru industrial corridor which will help industrial development in the area through which job opportunities will be created to local people.

2. Sri. Krishnamurthy, Kolathur Village, Hoskote Taluk, Bengaluru Rural District, informed that he has developed a residential layout adjacent to proposed expressway. He informed that, few full sites and part of few sites were acquired for road purpose because of which he could not sell the remaining portion of partially acquired sites. He requested for to suitable compensation for such sites. He also requested for road connectivity to his layout.

   The chairman informed that, such issues may occur during acquisition process and informed him to submit a representation to SLAO office. Chairman also informed that, road connectivity will be provided to layout through existing roads.

3. Sri. Anjenappa, Koluthur Village, Hoskote Taluk, Bengaluru Rural District, demanded for higher compensation for the land acquired in Kolathur village limits as present value is 8 – 10 Crores per acre.

   The Chairman informed to submit representation to SLAO office.

4. Sri Hnumanthagowda Kolathur Village, Hoskote Taluk, Bengaluru Rural District, requested for fixation of compensation based on the guidance value and also not to delay dispersal of compensation.

   Chairman informed that, the compensation will be fixed based on the present guidance value and also informed that, action will be taken for speedy dispersal of compensation to land losers.

5. Sri. Shekar Kolathur Village, Hoskote Taluk. Bengaluru Rural District, informed that Government is forced to give interest for compensation value for the delayed period which is loss of Government revenue and requested for timely dispersal of compensation amount.

   Chairman informed that, steps will be taken for speedy dispersal of compensation amount.

The gathering informed that, they do not have any environmental issues due to proposed Chennai Bengaluru Expressway and support proposed Chennai Bengaluru Expressway.

The Chairman requested gatherings to submit representations on land acquisition issues to SLAO office which will be addressed and also requested to give representation on any future problem which may be arrised due to proposed expressway to DC office.

In conclusion, the Chairman Smt. S Ramya, KAS, Additional Deputy Commissioner, Bengaluru Rural District informed that, the proposed expressway is a part of Chennai Bengaluru Industrial Corridor and helps overall economical development of the area. Madam also informed that, the project will take care of mitigation measures during construction and operation phase to minimize environmental problems in the project area. She also assured that, the issues related to compensation will be addressed. Chairman thanked gathering for co-operation for success[u] completion of public hearing.

Sri. T. Parvateesam, Project director, NHAI, Bengaluru concluded public hearing with vote of thanks.

Date:

Place:

Deputy Commissioner,
Begaluru Rural District
Chairman of the Public Hearing Committee,
Begaluru Rural District.

1. Sri. Harish, Kolathur Village, Hoskote Taluk, Bengaluru Rural District.
2. Sri. Krishnamurthy, Kolathur Village, Hoskote Taluk, Bengaluru Rural District.
3. General Public of Hoskote
4. Sri. Anjenappa, Koluthur Village, Hoskote Taluk, Bengaluru Rural District.

ANNEXURE-I

List of Officers Present

1. Chairman, Additional Deputy Commissioner, Bengaluru Rural District.
2. Senior Environmental Officer, KSPCB, Bangalore East.
3. Environmental Officer, KSPCB. RO-Hoskote.
4. Special Land Acquisition Officer.

ANNEXURE-II

List of Representatives of the Project

1. Sri. T. Parvatesam, Project Director, NIAL, Bengaluru
2. Sri. Suchan Kumar K.P, Project Consultant.
3. Sri. Mohammed Rafi Uddin Malik, Project Consultant.

ANNE XURE-III

List of Public Participants

Sl. No.	Name of the participant	Village name
1	Prakash	Kolathur
2	Muniyappa	Dandupalya
3	Venugopal	Kolathur
4	K. V. Ravi shankar	Kolathur
5	Venkatesh	Kolathur
6	K.N. Murali	Kolathur
7	Abhishek Tomar	Louis Berges
8	Rajappa	Dandupalya
9	Veerappa	Kolathur
10	H.K.G.S.S. Babu	Dandupalya
11	R Harish	Kolathur
12	Hanumanthegowda	Kolathur
13	K. Munegowda	Kolathur
14	Devyana	Kolathur
15	K.B. Jaiprakashnarayan	Kolathur
16	Mahesh	Kolathur
17	Ramesh G	Kolathur
18	K. E. Krishnappa	Kolathur
19	R Narayaswamy	Kolathur
20	Anjanappa	Kolathur
21	V. Shivakumar	Yamalur
22	Mohan	Hoskote
23	G. Hemanth Kumar	Bengaluru Rural
24	K.H. Krishnamurthy	Kolathur
25	Navdeesh	Kolathur
26	Prakash. H	Kolathur
27	Anand K.N	Kolathur
28	Nagaraj	Kolathur
29	K. T. Krishnappa	Kolathur
30	K. M. Chandre Gowda	Kolathur
31	Karthik. D	Kolathur

ಕರ್ನಾಟಕ ನೀರಾವರಿ ನಿಗಮ ನಿಯಮಿತ

(ಭಾರತ ಸರ್ಕಾರ ಉದ್ಯಮ)

ಇಂದಿರಾಪಥ ಕೆಳಸೇತುವೆ ಕೆಳಗೆ, ಕೊಪ್ಪಾ, ಚಿಕ್ಕಮಗಳೂರು ನಗರ ಸಂ ಚಿಕ್ಕಮಗಳೂರು

ದೂ: 08263 - 272485 ಫ್ಯಾಕ್ಸ್ ಸಂ. 08263 - 275186 ಇ-ಮೇಲ್

ಇ-ಮೇಲ್: ee_krnlgrbc4ckd@rediffmail.com

ಇ-ಪ್ರಕಟಣೆ ಆಹ್ವಾನಿಸಿದ ಟೆಂಡರ್ ಸೂಚನೆಯ ಸಂಖ್ಯೆ: 7417(1) ಮತ್ತು

ಈ ಕಛೇರಿಯ ಅಧಿಸೂಚನೆ ಸಂಖ್ಯೆ: ಕಾರ್ಯಪಾ ಎ-4/ಟಿಂಡರ್/ 2018-19/04 ದಿನಾಂಕ: 23-01-2019. ಮೇಲಿನ ಅಧಿಸೂಚನೆಯಲ್ಲಿನ ಆಹ್ವಾನಿಸಿದ ಟೆಂಡರ್ ಅಧಿಸೂಚನೆಯಂತೆ 23-01-2019 ರಂದು 4 ನಿತ ನೀರಾವರಿ ಸಮುದಾಯಗಳಿಗೆ LUMP RN KEY ಆಧಾರಿತ ಹೊಸ ಇ-ಪ್ರೊಕ್ಯೂರ್‌ಮೆಂಟ್ ಮೋಡ್‌ಲಿಟಿಯನ್ನು ಹೊರತುಪಡಿಸಿ, ತಾಂತ್ರಿಕ ಕಾರಣಾಂತರಗಳಿಂದ ಈ ಮುಂದಿನ ಅಧಿಸೂಚನೆಯನ್ನು ಹೊರಡಿಸಲಾಗಿದೆ.

ಸದರಿ ಇಂದಿನ ಸಂ. 2631ನ & 2631ನ ಸಂಖ್ಯೆಗಳಲ್ಲಿ ಪ್ರಕಟಿಸಿದಂತೆ ಆಸಕ್ತಿಯುಳ್ಳ General Conditions for Eligible Tenderers (VII) ರಲ್ಲಿನ ತಾಂತ್ರಿಕ ಅರ್ಹತಾ ನಿಬಂಧನೆಯನ್ನು ಪರಿಷ್ಕರಿಸಿ ಇದರಲ್ಲಿ ಇಂದಿನ ಸಂ. 2631ನ ಪ್ರಕಟಿಸಿದಂತೆ ಇ-ಪ್ರೊಕ್ಯೂರ್‌ಮೆಂಟ್‌ನಲ್ಲಿ General Conditions for Eligible Tenderers (VII) ರಲ್ಲಿನ ತಾಂತ್ರಿಕ ಅರ್ಹತಾ ನಿಬಂಧನೆಯನ್ನು ಪರಿಷ್ಕರಿಸಿ ಇದರಲ್ಲಿ ಇಂದಿನ ಸಂ. 2631ನ, 2631ನ & 2631ನ ಸಂಖ್ಯೆಗಳಲ್ಲಿ ಪ್ರಕಟಿಸಿದಂತೆ ಇ-ಪ್ರೊಕ್ಯೂರ್‌ಮೆಂಟ್‌ನಲ್ಲಿ Document / Evidence to be uploaded from the Bidder ಕ್ರಮ: 7 ರಲ್ಲಿನ ತಾಂತ್ರಿಕ ಅರ್ಹತಾ ನಿಬಂಧನೆಯನ್ನು ಪರಿಷ್ಕರಿಸಿ ಮಾರ್ಪಾಡಿಸಲಾಗಿದೆ.

ಹೆಚ್ಚಿನ ಮಾಹಿತಿಗಾಗಿ ಈ ಕೆಳಗೆ ಸಹಿ ಮಾಡಿರುವ ಕಛೇರಿಯ ದೂರವಾಣಿ ಸಂಖ್ಯೆ 08263-272485 ರಂದು ಕೆಲಸ ಸಮಯದಲ್ಲಿ ಪಡೆದುಕೊಳ್ಳಬಹುದು ಮತ್ತು ಇ-ಪ್ರಕಟಣೆಯನ್ನು ವೀಕ್ಷಿಸಬಹುದಾಗಿದೆ. (https://www.eproc.karnataka.gov.in) ನೋಡಿಕೊಳ್ಳುವುದು.

ಸಹಿ/- ಕಾರ್ಯಪಾಲಕ ಅಭಿಯಂತರರು,
ಕೆನಿನಿ, ಭದ್ರಾವತಿ ವಿಭಾಗ-4, ಚಿಕ್ಕಮಗಳೂರು.

(Government of Karnataka)

URAL WATER SUPPLY AND SANITATION
PARTMENT HASSAN DIVISION HASSAN

R NOTIFICATION NO:04/2018-19 DATED : .019 POSTPONED TENDER NOTIFICATION DATED: 25-01-2019

Governor of Karnataka, The Executive Engineer Rural upply & Sanitation Department Hassan Division as Invited the Tender for the works Mention Below, Water supply Schemes in Holenarasipura Taluk (Total Total estimated cost Rs.130.00 Lakhs Indent 2.Operation and Maintance of Multi Village Water cheme to 48 Floride effected Vallages in Arsikere nd another 10 Villages and Including 12 Enroute f Belur Taluk (Total 70 Villages) of Hassan District 17689. Estimate costing Rs 263.41 Lakhs. Above ders are invited in Two Cover System in E-Procurment Tender Details are available in www.eprocurement. gov.in The tender is postponed, dates are as below. ctor can obtained details from dated.31-01-2019. s also Obtain Details In Office till Dated: 08-02- hin the Office Hour. The pre-bid meeting is invited on -02-2019 at 11.00AM at Venue Office of the Executive Rural drinking water and sanitation dept Hassan Hassan, Near N.R Circle. Zilla panchayath building he Bidder should Submit the tender with EMD within 11-02-2019 before 5.30PM The Technical bid will Dated :13-02-2019 after 11.00AM. The financial bid hnically Qualified bidder will open on dated 18-02- 11.00 A.M. The Executive Engineer as reserved the ht to Cancel all the tender or anyone tender without y reason.

Sd/- Executive Engineer Rural drinking water and sanitation Dept. Hassan division, Hassan.

HCA/2018-19/298

KARNATAKA STATE POLLUTION CONTROL BOARD

No.49, "Parisara Bhavana" 1st to 5th Floor, Church Street, Bengaluru - 560 001 Karnataka, INDIA.
Ph: 25621383, 25581112, 25586620 Fax: 080-25586621
E-mail: hoi@kspcb.gov.in Website : http://kspcb.gov.in

No.PCB/ENP-1NGEM1/2625 DATE : 25-01-2019

ENVIRONMENTAL PUBLIC HEARING NOTIFICATION

National Highways Authority of India (Ministry of Road Transport and Highways) has proposed Phase-I of 8 Lane Bangalore Chennai Expressway which starts from east of Bangalore at Km 301.200 of NH-4 for proposed (0.00 Km to 11.682 Km) and ends at near N.G. Hulkur Village, Bangarpet taluk, (11.628 to 71.00) in Kolar District for proposed 71.00Km. The total length of the proposed Bangalore Chennai Expressway in Phase-I is 73.050 Km. The said project authority has obtained Environmental Clearance from MoEF&CC Government of India as per the EIA Notification dated 14.9.2006 (as amended on 1.12.2009), and required to go through Environmental Public Hearing process. The Project Proponent has submitted the Terms of Reference (TOR) issued by MoEF&CC, Government of India, New Delhi, Vide No.F.No 10-15/2018-IA.III dtd:14.06.2018 and also considering the requests of the project authority vide their letter NC NHAI/11016/ MOEF&F/Phase-VII/2015/PIU-BNG(EXP)/791 dtd: 20.12.2018 the Environmental Public Hearing is being conducted by the Board.

The details of the project are as follows:

1. Name of the Company & Address: DGM (T) & Project Director PIU-Bangalore Expressway National Highways Authority of India (Ministry of Road Transport & Highways) # 718, 11th Cross, 20th Main, Padmanabha Nagar, Bengaluru-560070.

2. Proposed location of the project: Proposed Phase-I of 8 Lane Bangalore Chennai Expressway which starts from east of Bangalore at Km 301.200 of NH-4 for proposed (0.00 Km to 11.682 Km) and ends at near N.G.Hulkur Village, Bangarpet taluk, (11.628 to 71.00) in Kolar District for proposed 71.00Km. The total length of the proposed Bangalore Chennai Expressway in Phase-I is 73.050 Km.

3. Details of activity: Proposed Phase-I of 8 Lane Bangalore Chennai Expressway which starts from east of Bangalore at Km 301.200 of NH-4 for proposed (0.00 Km to 11.682 Km) and ends at near N.G.Hulkur Village, Bangarpet taluk, (11.628 to 71.00) in Kolar District for proposed 71.00Km. The total length of the proposed Bangalore Chennai Expressway in Phase-I is 73.050Km.

4. Date, time and venue of Public Hearing: 28.02.2019 at 11.00 AM at Syed Palace Auditorium, National Highway, Dongu Palya, Near MVJ College, Bangalore Rural(Dist.), Hosakote-562114.

5. Places of availability of project documents as per EIA Notification, which is kept open to public are: (a) Office of the Deputy Commissioner, Bangalore Rural District. (b) Chief Executive Officer, Zilla Panchayat, Bangalore Rural District. (c) District Industries Centre, Bangalore Rural District. (d) City Municipal Council, Bangalore Rural District. (e) Town Municipal Council Office, Hosakote Office of the Regional Officer, Karnataka State Pollution Control Board Hosakote 'Nisarga Bhavan', Ground Floor, Thimmaiah Road 7th 'D' Cross, Shivanagar, Opp. Peshpanjali Theatre, Bengaluru – 560 010. (f) Ministry of Environment, Forest & Climate Change, South Zone Office, E-3/240, Kendriya Sadan, 4th Floor, E&F Wings, 17th Main Road, 2nd Block, Koramangala, Bengaluru – 560 034. (g) HELP DESK, Karnataka State Pollution Control Board, Ground Floor, No.49, Parisara Bhavan, Church Street, Bangalore – 560 001.

NOTE: Suggestions, views, comments and objections of interested bonafide residents, environmental groups and others located at project site and likely to be affected by the proposed project are invited within 30 days from the date of publication of this Notification. They can also make oral/written/E-Mail suggestions to the Karnataka State Pollution Control Board/Chairman, Environmental Public Hearing Committee (Deputy Commissioner, Bangalore Rural District). Interested public can participate in the Public Hearing at the above place. For details please visit our Website: http://kspcb.gov.in.

Sd/-
Member Secretary

"AVOID USE OF PLASTICS - BE 'ECO' FRIENDLY"

...them on the keyboard.

Public Hearing Questions in Bangalore Rural District

	
RO, PCB introducing Project Proponent and Administrative People	Participant asking Questions
	
Participant asking Questions	Close interaction between Chair of PH and Participants

ANNEXURES 7.4

ಫ್ಯಾಕ್ಸ್ / Fax : 080-25586321
ಈಮೇಲ್ / E-mail : ho@kspcb.gov.in
ವೆಬ್‌ಸೈಟ್ / Website : http://kspcb.gov.in

☎ 25581383, 25580112
25586151, 25586270
25586142, 25586520

ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಮಂಡಳಿ
Karnataka State Pollution Control Board

"ಪರಿಸರ ಭವನ", 1 ರಿಂದ 5ನೇ ಮಹಡಿಗಳು, ನಂ.49, ಚರ್ಚ್‌ಸ್ಟ್ರೀಟ್, ಬೆಂಗಳೂರು - 560 001, ಕರ್ನಾಟಕ, ಭಾರತ

"Parisara Bhavana", 1st to 5th Floor, # 49, Church Street, Bengaluru - 560 001, Karnataka, INDIA

NO.PCB/CNP-19/GEN/18/ 12371 Date: 23 MAY 2019

To

The Director
Ministry of Environment, Forests & Climate Change,
Government of India
Paryavaran Bhawan, CGO Complex
Lodhi Road,
New Delhi - 110 003.

Sir

Sub: Environmental Public Hearing in respect of M/s. National Highway Authority of India (Ministry of Road Transport and Highway) has proposed Phase-I of 6 Lane Bangalore Chennai Expressway which starts from east of Bangalore at KM 301.200 of NH-4 for proposed (0.00 km to 11.682 Km) and ends at near N.G. Hulkur Village, Bangarpet Taluk for proposed (11.628 to 71.00) in Kolar District for proposed 71.00 Km. The total length of the proposed Bangalore Chennai Expressway in Phase-I is 73.050 km – reg.

Ref: 1 TOR letter F No 10-15/2018-IA II dated 14.05.2018 dated 14.05.2018.
2 Project authorities letter dated 20.12.2018.
3. Public Hearing held on 07.03.2019
4 Letter from Regional Officer, KSPCB, Kolar, enclosing the proceedings of environmental public hearing, vide No. 72 dated 27.04.2019.

With reference to the TOR letter cited under reference (1) and as per the request of M/s. National Highway Authority of India (NHAI) vide reference (2), KSPCB has conducted public consultation/public hearing on 07.03.2019 in respect of the Kolar District as per the procedure mentioned in E.A. Notification, 2006 (as amended to date)

The proceedings of Environmental Public Hearing in English and Kannada, list of Participants and other documents along with CD of video recording are enclosed for further needful in the matter

Yours faithfully

Sd/-

MEMBER SECRETARY.

Encl: 1. EPH Proceedings with enclosures.
2. CD.

COPY TO:

1 The Deputy Commissioner, Kolar District, Kolar, for information
2 DGM (T) & Project Director, PIU – Bangalore Expressway, National Highway Authority of India, (Ministry of Road Transport & Highways), # 716, 11th Cross 20th Main, Padmanabha Nagar, Bengaluru – 560 070 for information
3 The Regional Officer, KSPCB, Kolar, for information

MEMBER SECRETARY.

PROCEEDINGS OF THE ENVIRONMENTAL PUBLIC HEARING HELD ON 07.03.2019 AT SVR KALYANA MANTAPA, NO. 22/1, KGF ROAD, NEAR KSRTC BUS STAND, BANGARPET-563114, KOLAR DISTRICT FOR THE PROPOSED PROJECT PHASE -1 OF 8-LANE BENGALURU CHENNAI EXPRESSWAY FROM GANGAPURA VILLAGE, MALUR TALUK TO N.G.HULKUR VILLAGE, BANGARPET TALUK (11.628 TO 71.00) KOLAR DISTRICT IN THE STATE OF KARNATAKA BY NATIONAL HIGHWAYS AUTHORITY OF INDIA (MINISTRY OF ROAD TRANSPORT AND HIGHWAYS).

1.	**Venue of Public Hearing**	:	**SVR KALYANA MANTAPA, NO.22/1, KGF ROAD, NEAR KSRTC BUS STAND, BANGARPET-563114, KOLAR DISTRICT.**
2.	**Officers Present**	:	**Annexure – 1**
3.	**Representatives of the Project**	:	**Annexure – 2**
4.	**Name of the Public Participants**	:	**Annexure – 3**

PREAMBLE:

M/s. NATIONAL HIGHWAYS AUTHORITY OF INDIA (Ministry of Road Transport & Highways) has proposed phase-I of 8 lane Bengaluru Chennai Expressway phase -1 of 8-lane Bengaluru Chennai expressway from Gangapura Village, Malur Taluk to N.G.Hulkur Village, Bangarpet Taluk (11.628 to 71.00) Kolar District. The total length of the proposed Bengaluru Chennai Expressway in Phase-1 is 73.050 km in the state of Karnataka. The length of the proposed National Highway is 61.368 km (59.318 km + spur is 2.050km) in Kolar District. As per the notification of the Ministry of Environment & Forest, GOI, SO No.1533, dtd: 14.09.2006, National Highway Authority of India has obtained Terms of Reference for the preparation of Environmental Impact Assessment to obtain Environmental Clearance for the proposed Expressway project from the Ministry of Environment & Forest, GOI, New Delhi, as per the EIA Notification dtd: 14.09.2006 (as amended) on 01.12.2009 and also it is mandatory to conduct Environmental Public Hearing (District wise). Accordingly the Public hearing was conducted at Kolar District.

Ministry of Environment & Forest has issued the Terms of Reference (TOR) for this project to conduct Environmental Impact Assessment (EIA) studies. Accordingly the Project proponent has prepared draft EIA (Environmental Impact Assessment) report and Executive Summary of the said Project in Kannada and English. In accordance with EIA notification, 2006 the said reports were submitted to the Member Secretary, Karnataka State Pollution Control Board, Bangalore. As per MoEF & CC, GOI terms of reference letter No. F. No. 10-15/2018-IA.III dated 14.05.2018 and request of the project proponent vide their letter No. NHAI/11016/MOEF & F (Phase-1)/1/2018/PIU-BNG (EXP)/791, Dated: 20.12.2018, Environmental Public Hearing notifications were published in leading newspapers of Karnataka State in Kannada & English viz., "Udayavaani" (Kannada) on 07.02.2019 and "Deccan Herald" (English) on 07.02.2019 respectively. The notifications were published by inviting suggestions, views, comments and objections of interested bonafide residents, environmental groups and others located in and around the proposed project site/express way and likely to be affected by the proposed project within 30 days from the date of publication of the Notification. Also, the draft Environmental Impact Assessment (EIA) report and executive summaries in Kannada and English were kept in the following designated places.

1. Office of the Deputy Commissioner, Kolar District, Kolar.
2. Chief Executive Officer, Zilla Panchayat, Kolar District, Kolar.
3. District Industries Centre, Kolar District,
4. City Municipal Council, Kolar District
5. Town Municipal Council Office, Bangarpet
6. Regional Office, Karnataka State Pollution Control Board, Parisara Bhavan, Plot No.14B, KIADB Industrial Area, Tamaka, Kolar 563101.
7. Ministry of Environment & Forest & Climate Change, South Zone Office, E-3/240, Kendriya Sadan, 4th Floor, E & F Wings, 17th Main Road, 2nd Block, Koramangala, Bangalore-560 034.
8. Helpdesk, KSPCB, Ground Floor, No.49, Parisara Bhavan, Church Street, Bangalore – 560001. Bangalore for Public reference.

The Environmental Public Hearing was organized on 07.03.2019 at **SVR KALYANA MANTAPA, NO.22/1, KGF ROAD, NEAR KSRTC BUS STAND, BANGARPET-563114, KOLAR DISTRICT.** Sri. C.R.Manjunath, Environmental Officer, Regional Office-Kolar, Karnataka State Pollution Control Board, extended a warm welcome to Sri. J. Manjunath, IAS, Deputy Commissioner, Kolar District, Kolar, Shri M. Lakshman, Senior Environmental Officer, KSPCB, Zonal Office-Bangalore East, Bangalore, Shri T. Parvateesam, Project Director, NHAI, Bangalore, Smt. G R Harishilpa, Special Land Acquisition Officer, Bengaluru Chennai Expressway, all the public, all the officials of different departments, elected representatives and & the press including media people. Sri. C.R.Manjunath, Environmental Officer, has briefed about the need for Environmental clearance from the Ministry of Environment, Forest and Climate Change, Government of India and conducting Environmental Public hearing as per EIA Notification. Publicity was given in the daily leading newspapers 30 days in advance and sought for the objections. Also informed that, executive summary both in Kannada and English including draft EIA reports were kept in designated locations.

Further, requested Sri. J. Manjunath, IAS, Deputy Commissioner of Kolar to Chair the Public Hearing meeting and in the meantime requested the Public to interact and discuss about the project and also to give suggestions and any queries either in writing or orally, which will be recorded and video graphed. The consultant of the project was requested to give a brief presentation about the proposed project. A Brief power point presentation was made in Kannada by the project consultant. The Deputy Commissioner of Kolar informed the audience, who were present to clarify any doubts or to submit any suggestions/objections either in writing or orally and same will be included/recorded in the proceedings.

The following are the queries / suggestions given by the public / participants / press members.

Sri. M.S. Anand, Ex Zilla Panchyat Member, Hosur Village, Bangarpet Taluk, Kolar District.

During the construction of road work using heavy vehicles, lot of dust and noise nuisance is going to be created and agricultural fields situated on either sides of the road are going to be affected to the maximum extent due to the dust generated during the usage of heavy vehicles.

Since these type of projects will run for minimum of 2-3 years, the extent of pollution will be unbearable. Further, he wanted to know about any sort of compensation being paid for the said problem and questioned about the precautionary measures taken for mitigating sound and dust pollution being caused during the construction phase of the road works.

The Environmental Consultant informed that, sound barriers and continuous water sprinkling arrangements will be provided near the construction works. Meantime he requested the project proponent to make provisions for underpass roads so as to have an access to the agricultural fields.

The project proponent informed that minimum underpass roads will be provided accordingly as per the design at an interval of 300 mtrs whenever we come across with the Villages.

Later, he expressed that,

- Since there is an existing National Highway at a distance of about 20 Km, is it viable to have another highway road and also he wanted to know about the feasibility study reports. He also suggested the chair person and the project proponent that, meetings / interactions would have been held with the land losers / farmers to have any sort of suggestions before taking up these type of projects.
- Requested the Chair person to take a fair decision about the compensation to be paid to the land losers and mentioned that, there is a disparity with respect to the compensation being paid to the land losers of Hoskote Taluk and Bangarpet Taluk. He emphasized the chair person to extend the provisions of providing or extending the compensation to the land losers as adopted in the industrial policy land acquisition procedures.
- Expressed his opinion that, while acquiring the land of the farmers, project proponent must explore the best possibilities of acquiring the whole land instead of dividing the land in to bits and pieces.

Sri. Ramegowda, District President, Raita Sangha, Kurugal Village, Bangarpet Taluk, Kolar District.

Highlighted about the disparity of rates pertinent to Malur, Hoskote and Bangarpet for the lands being paid to the land losers and requested the chair person and the project proponent to grant more compensation if land to be acquired is of fertile in nature.

On behalf of all the farmers who were present in the meeting that, he requested the project proponent to provide good number of underpass roads and service roads and meantime he has suggested to grant Gomala land (Government Land) to the land losers. He did not raise any issue pertaining to Environment.

Sri. Babu, Ithandahalli Village, Bangarpet Taluk, Kolar District.

He also expressed about the disparity with respect to the compensation being paid to the land losers and only Rs. 28.5/- per Sq. Mtr, which is very minimal is going to be paid to our land of 17 Acres of extent belonging to 10 Brothers and even no nearby gomala land is available to obtain land under the provisions of the Acts. In addition to that, about 100 Acres of land on either sides of the mad is being acquired for the development of townships. He mentioned that, these grievances were brought to the kind notice of the Chair person through Memorandums and meantime requested to do the favor in this regard.

Meantime, Sri Babu pointed out specifically about the disparity of compensation for the land being paid in Hoskote and Bangarpet Taluks and in this regard, the Chair person has briefed that, the guidance value for the lands at different places will be fixed by the Government based on the certain criteria's such as business and affairs of that particular location / area. He did not raise any issue pertaining to Environment.

Sri. Srinivasagowda, Ex-Gram Panchyat Chairman, S. Madhamangala Village, Bangarpet Taluk, Kolar District.

During the acquisition process, on certain occasions, along with the land, dwelling houses will also be acquired partially. Under these circumstances project proponent is extending compensation only to the particular affected / acquired portion which will be a huge loss to the house owners and also it is impossible to lead life in that house, since it is prone to be affected due to sound and noise pollution. Considering all these situations, requested the project proponent to grant compensation by considering the dwelling house as a whole instead as a part. Meantime he also expressed / suggested the project proponent to provide service roads on either side of the highway including underpass and also requested the project proponent to ensure the nature of the agricultural land / fields before disbursing the compensation to the land losers. He did not raise any issue pertaining to Environment.

Sri. Muniyappa, Margal Village, Bangarpet Taluk, Kolar District.

He expressed his views to the chair person that, meetings / interaction sessions with the villagers / land losers / public would have been conducted to discuss about the pros and cons of the proposed project or before taking up the project. Also felt that, what the farmers can do with the compensation after losing the agricultural lands which is nothing but routine bread and butter. He also extended heartfelt thanks to the chair person for his concern towards the farmers and meantime requested the chair person to amicably settle the compensation to the land losers. He did not raise any issue pertaining to Environment.

The gathering informed that, they do not have any environmental issues due to proposed Chennai Bengaluru Expressway and support the proposed Chennai Bengaluru Expressway.

The Chair person requested the audience to submit their representations pertinent to environmental issues and impact being caused due to the proposed project and request can be made to the SLO Office pertinent to land acquisition issues.

The Deputy Commissioner of Kolar directed the project proponent to take mandatory clearances. Informed the audience that, Suggestions, Objections and Support extended by you all will be made into an abstract and will be sent to the Karnataka State Pollution Control Board, intern, same will be forwarded to the Ministry of Environment, Forest and Climate Change, Government of India, for issuing the Environmental Clearance for the project. Lastly, the Deputy Commissioner of Kolar has thanked all the audience and informed them to meet at any point of time for needful.

DEPUTY COMMISSIONER
&
CHAIRMAN OF THE PUBLIC HEARING COMMITTEE,
KOLAR DISTRICT, KOLAR.

"ಪರಿಷತ್ತಿನ ಪ್ರಾಮಾಣಿಕ ಸೇವೆ" ದಿನಾಂಕ: 7/03/2019

ಇಷ್ಟಕ್ಕೆ ಕಾರ್ಯಕ್ರಮವು ಕೊನ್ನಿದ್ದು ಪ್ರಾಕೃತಿಕ ಸಮತೋಲನ ಪ್ರಾಮಾಣಿಕ ಪ್ರಾಮಾಣಿಕ ಸೇವೆ ಸಿದ್ಧವಿದೆ & ಪ್ರಾಮಾಣಿಕ ಸೇವೆ - ಪ್ರಾಮಾಣಿಕ ಎಕ್ಸ್‌ಪ್ರೆಸ್‌ಪ್ರೆಸ್ ಸೇವೆ ಸಂತೆಯ ರಸ್ತೆಯಲ್ಲಿ

ಸ್ಟೇಟ್ ಬಸ್ ಸ್ಟಾಪ್ ಪ್ರಾಮಾಣಿಕ ಪ್ರಾಮಾಣಿಕ, ಪ್ರಾಮಾಣಿಕ ಸೇವೆ ಸಿದ್ಧ

ಕ್ರಮ ಸಂಖ್ಯೆ	ಹೆಸರು ಮತ್ತು ಪ್ರಾಮಾಣಿಕ ಪ್ರಾಮಾಣಿಕ ಪ್ರಾಮಾಣಿಕ	ದೂರವಾಣಿ ಸಂಖ್ಯೆ	ಸಹಿ
1)	ಕೆ.ಎಸ್.ಆರ್.ಟಿ.ಸಿ ಚಾಲಕರು	9482639847	
2)	ಸಂತೆಯ ಪ್ರಾಮಾಣಿಕ	9480[illegible]379	
3)	ಪ್ರಾಮಾಣಿಕ ಪ್ರಾಮಾಣಿಕ		
4)	ALLABAKASH KARABALA	9972266777	
5)	B.P ಪ್ರಾಮಾಣಿಕ ಪ್ರಾಮಾಣಿಕ	9538219710	B.P ಪ್ರಾಮಾಣಿಕ
6)	ಕೆ.ಆರ್.ಟಿ.ಸಿ ಪ್ರಾಮಾಣಿಕ	9663622472	ಕೆ.ಆರ್.ಟಿ.ಸಿ
7)	M.S. ANAND A. SIMON	9448044289 8971954723	
8)	[illegible]	9731004485	
9)	[illegible]	9535139463	
10)	[illegible]	7676674740	
11)	[illegible]	9960449066	

ಸಂಖ್ಯೆ	ಹೆಸರು ಮತ್ತು ವಿಳಾಸ	ದೂರವಾಣಿ ಸಂಖ್ಯೆ	ಸಹಿ
12)	ಚಿಂತಪಲ್ಲಿ ಗ್ರಾಮಪಂಚಾಯ್ತಿ	—	
13)	Ravindra S V Sulikunte	9741093470	
14)	S.N. gonda Sulikunte	9964239202	gonda
15)	H N ವೆಂಕಟೇಶಪ್ಪ ಕಾಮಸಮುದ್ರ ವಿಜಯಪುರ	9686941244	HNವೆಂಕಟೇಶಪ್ಪ
16)	ಮಾಲತಿ . ಎ ಶಿಕ್ಷಕಿಯರು	8747953553	Malathi M
17)	S. G. VENKATESH. Siddarahalli	9632025768	
18)	D. M. Ratnappa ಸಿಂಪಿಕಾಪುಕಾಂಪೌಂಡ್ ಅಧಿಕಾರಿ	—	D.M Ratnappa
19)	ಚಿಂತಪಲ್ಲಿ ಪಂಚಾಯ್ತಿ ಸದಸ್ಯರು	8971022302	ಅಧಿಕಾರಿ ಬಳಿಯಿದೆ.
20)	ಮಾಲತಿ ಎಂ ಕೆ ಎಂ	7760799133	ಕಿರಿಯಾಪುಟ್ಟ.
21)	ಎಂ.ಪಿ. ಎಸ್. ಪಿಂಚಣಿದಾರರು	8151871908	LHT
22)	ಸರಸಮ್ಮ		
23)	Manjula.	7022095172	

24)		9880353537	
25)		9441467636	Mourthi SK
26)	K.	9632513184	
27)		9741671667	
28)	Rajam	9772849477	
29)		8861254452	
30)		9449564921	
31)		9591233744	
32			
33)		7676336010	
34)		8771480910	S.V.K.
35)		7448219952	
36)		9085166982	
37)		9164425273	
38)			
39)		9885050824	
40)	Venkatesh	9885737324	Venkatesh
41)		933[illegible]79827	

42	K. [illegible]	91[illegible]97[illegible]	
43	V. [illegible]	91[illegible]	V. [illegible]
44	M. [illegible]	9480436071	[illegible]
	KK [illegible]	9164574253	
45	[illegible]	—	LHT
46	M. [illegible]	9731931669	M. [illegible]
47	[illegible]	9535316736	[illegible]
48	[illegible]	9980282034	[illegible]
49	SG [illegible]	9535319834	S.G. [illegible]
50	[illegible]	9845593704	[illegible]
51	[illegible]	8722428985	[illegible]
52	[illegible]	[illegible]	[illegible]
53	L. [illegible]	7090275394	L [illegible]
54	[illegible]	7829548584	[illegible]
55	[illegible]	—	LHT
56	[illegible]	—	LHT
57	SG [illegible]	9141325540	S.G [illegible]

58)		—	
59)	S.T.		S.T.
60)	S. MUNISWAMY	9960421131	Muniswamy
(61)		9900436391	
62)	K. Muralidhara	9449610943	K. Muralidhara
		9448664043	Murthy
63)		9453945112	
64)		8971493058 2	
65)	Byramma Siddhraty	9164688228	RMC
66)	Gabel. P	9964497478	Gabel. P
67)	K. Venkataramy	9901196751	K. Venkat
68)	N. Anjelappa	9986 7269	Anjelappa
69)	Ramachandappa	9845579376	
70)			

ಕ್ರಮ ಸಂಖ್ಯೆ	ಸಹಿಯಲ್ಲಿ ಬರೆಯಲ್ಪಟ್ಟ ಹೆಸರು ಮತ್ತು ವಿಳಾಸ	ಟೆಲಿಫೋನ್ ನಂಬರ್ (ಮೊಬೈಲ್ ಇದ್ದಲ್ಲಿ)	ಸಹಿ
1)	KUMAR H,	9900640247-	
2)	Siddappa	8715?Hg6576	
3)	S. Gopal. RT	9880 [illegible]	
4)	HN ನಾಗಭೂಷಣ	9980261448	HN-Nagabhushana
5)	Sri Rama.	9141437679	Sri Rama. C
6)	m.d. [illegible]	9441643543	[illegible]
7)	Amarshin. P	9845 8663762	[illegible]
8)	Chowgagowda. V.	7022157181	[illegible]
9)	ಮಂಜುನಾಥ ಗೌಡ	9731317126	[illegible]
10)	ಸೌಭಾಗ್ಯಮ್ಮ ಕಂಪಾಪುರಹಳ್ಳಿ.	9535869444	A.N. Reddy
11)	Manjunatha police ಇಲಾಖೆ ಬಂಗಾರಪೇಟೆ.	9108549706	[illegible]
12)	N. Manjunatha Mandya	8971679879	[illegible]
13)	T.V. Prakash ಇವರು ಕೈಬರಹಗಾರರು ಅಲ್ಲವೆಂದು ತಿಳಿಸಿದ್ದಾರೆ.	9448204878	[illegible]
14)	Ravindra [illegible]	812.388 4591	G.R. Ravindra

86		—		
87		9731629199		
		9900761225		
88	M.S. వెంకట	9611957884	M.S. వెంకట	
	Ramanagarkanahall.			
89	Sandeep R N	9880 48 9997		
	Ramanagarkanahall.			
90		916 8 83782 99		
91		9740508860		
92		9448350399		
93		7411876184 9		
94		9591601384		
95		9HH8713931		
96		8183901203		
		~~9740715047~~		
		9900397817		
97		8088680686		

క్రమ సంఖ్య	పేరు, హోదా & చిరునామా	టెలిఫోన్ నంబర్ (మొబైల్ నంబర్)	సంతకం
98)	[illegible]	MR RAGHU 9036666372	[illegible]
99)	[illegible]	—	LHT
100)	[illegible]	9886326905	[illegible]
101)	[illegible]	9036578682	
102)	[illegible]	—	LHT
103)	Mahmad Rafiquddin S. Manager - Comm. Egis India Consulting Engg pvt ltd.	9177390560	
104)	Sajal Bhowmick Sr. Manager, Environment Egis India Consulting Engineering Pvt Ltd Gurgaon	[illegible]	
105)	MAHENDRA KASIRI BE-DCS/ATL EGIS - PRAMAC	9845339632	
106)	SULTAN KUMAR KP Sr. Manager Bengalore	9880256565	
107)			

ಕ್ರಮ ಸಂಖ್ಯೆ	ಸಿಬ್ಬಂದಿಯ ಹೆಸರು ಹುದ್ದೆ ಮತ್ತು ಕಛೇರಿ	ದೂರವಾಣಿ (ಮೊಬೈಲ್ ಸಂಖ್ಯೆ)	ಸಹಿ	ಕೈ ಸಂಖ್ಯೆ
	B K ಶಿವಪ್ರಸಾದ್	9902388500	B K S	
	ಸಿಂಧೂ .ಬಿ.ಆರ್.	9845608607	Sindhu	
	T PARVATEESAM	8762722834	T Parvateesam	
	M. Lakshman SEO - Bangalore RRC.	9845182704		
	C. R. Manjunath EO, RO, Kolar	9845267378		
	Mrityunjay B. Deenappa AEO, RO, Kolar	9980340099		
	R. Meghana Executive Secretary Eco Eco Pvt Ltd, Bangalore	9900054793		
	J. Manjunath Deputy Commissioner Kolar District Kolar			

ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಮಂಡಳಿ
ನಂ.49, "ಪರಿಸರ ಭವನ", 1 ರಿಂದ 5ನೇ ಅಡ್ಡರಸ್ತೆ ಚರ್ಚ್ ಸ್ಟ್ರೀಟ್,
ಬೆಂಗಳೂರು-560 001. ಕರ್ನಾಟಕ, ಭಾರತ
ದೂರವಾಣಿ: 25581701, 25581702, 25586524, ಫ್ಯಾಕ್ಸ್: 080-25586311
ಈ-ಮೇಲ್: hoo[at]kspcb.gov.in ವೆಬ್‌ಸೈಟ್ : http://kspcb.gov.in

No.PCB/CNP-HO/EIA/2019/488 ದಿನಾಂಕ : 04-02-2019

ಜನರ ಸಾರ್ವಜನಿಕ ಸಭೆಗಾಗಿ ಸೂಚನೆ

ಮೆ. ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಪ್ರಾಧಿಕಾರ, ಭಾರತ ಸರ್ಕಾರ, ಇವರು ಕರ್ನಾಟಕ, ಆಂಧ್ರಪ್ರದೇಶ ಮತ್ತು ತಮಿಳುನಾಡು ರಾಜ್ಯಗಳಲ್ಲಿ ಎಂಟು ಪಥಗಳ ಬೆಂಗಳೂರು ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ನಿರ್ಮಾಣ ಮಾಡಲು ಉದ್ದೇಶಿಸಿರುತ್ತಾರೆ. ಇದರ ಭಾಗವಾಗಿ ಒಂದೇ ಹಂತದ ಯೋಜನೆಯ ಒಂದು ಭಾಗವು ಹೊರ ವರ್ತುಲ ರಸ್ತೆಯ ಅಂತರಾಜ್ಯ ಹೆದ್ದಾರಿ-44ರಲ್ಲಿ 6.ಮಿ 301.200 (ಪ್ರಾರಂಭ 6.ಮಿ.0.000 ನಿಂದ 11.682 ಕಿ.ಮೀ.) ಬೆಂಗಳೂರು ಗ್ರಾಮಾಂತರ ಜಿಲ್ಲೆಯ ಹುದಗುಧಾಣಗೆರೆ ಮತ್ತು ಪ್ರಾರಂಭ 6.ಮೀ 71.000 ಕರ್ನಾಟಕ ರಾಜ್ಯದ ಬಂಗಾರಪೇಟೆ ತಾಲ್ಲೂಕು ಕೋಲಾರ ಜಿಲ್ಲೆಯ ಎಸ್.ಪಿ.ಹುಲ್ಲೂರ ಗ್ರಾಮದವರೆಗೆ ಮುಗಿಯುತ್ತದೆ. ಕೋಲಾರ ಜಿಲ್ಲೆಯಲ್ಲಿ (ಪ್ರಾರಂಭ 11.682 ಕಿ.ಮೀ.ಗಳಿಂದ 71.000 ವರೆಗೆ) ವಿಸ್ತರಣೆಯಾಗಿದೆ. ಹಾಗೂ ಒಟ್ಟಾರೆ ಈ ಮಾರ್ಗವು 71 ಕಿ.ಮೀಗಳನ್ನು ಕ್ರಮಿಸುತ್ತದೆ. ಕೇಂದ್ರ ಅರಣ್ಯ ಮತ್ತು ಪರಿಸರ ಮಂತ್ರಾಲಯ, ಭಾರತ ಸರ್ಕಾರ, ಇದರ Terms of Reference (TOR) (TOR) F.No.10-15/2018-IA.III dtd.14.05.2018 ರಂತೆ ಮತ್ತು ಉದ್ದೇಶಿತರದ ಸಂಖ್ಯೆ NO.NHAI/ 11016/MOEF&F (Phase-I)/2018/PIU-BNG(EXP)/791 dtd: 20.12.2018 ರಡಿಯಲ್ಲಿ ಪ್ರಸ್ತಾವಿತ ಪರಿಸರ ಸಾರ್ವಜನಿಕ ಅಭಿಪ್ರಾಯವನ್ನು ಪಡೆಯಲಾಗುತ್ತಿದೆ. ಯೋಜನೆಯ ವಿವರಗಳು ಕೆಳಕಂಡಂತಿವೆ

1. ಪ್ರಸ್ತಾವಿತ ಹೆಸರು ಮತ್ತು ವಿಳಾಸ : ರಸ್ತೆಯ (ಟಿ) ಮತ್ತು ಯೋಜನಾ ನಿರ್ದೇಶಕರು, ಕ.ಮ.ಯ.ಪ-ಬೆಂಗಳೂರು (ಎಕ್ಸ್‌ಪ್ರೆ ವೇ), ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಪ್ರಾಧಿಕಾರ, (ಸ್ಥಾಪನೆಗಾಗಿ ಮತ್ತು ಹೆದ್ದಾರಿ ಸಚಿವಾಲಯ)
2. ಉದ್ದೇಶಿತ ಯೋಜನೆಯ ಸ್ಥಳ : ಕರ್ನಾಟಕ, ಆಂಧ್ರಪ್ರದೇಶ ಮತ್ತು ತಮಿಳುನಾಡು ರಾಜ್ಯಗಳಲ್ಲಿ ಎಂಟು ಪಥಗಳ ಬೆಂಗಳೂರು ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ನಿರ್ಮಾಣ ಮಾಡಲು ಉದ್ದೇಶಿಸಿರುತ್ತಾರೆ. ಇದರ ಭಾಗವಾಗಿ ಒಂದೇ ಹಂತದ ಯೋಜನೆಯ ಒಂದು ಭಾಗವು ಹೊರ ವರ್ತುಲ ರಸ್ತೆಯ ಅಂತರಾಜ್ಯ ಹೆದ್ದಾರಿ-44ರಲ್ಲಿ 6.ಮಿ 301.200 (ಪ್ರಾರಂಭ 6.ಮಿ.0.000 ನಿಂದ 11.682 ಕಿ.ಮೀ.) ಬೆಂಗಳೂರು ಗ್ರಾಮಾಂತರ ಜಿಲ್ಲೆಯ ಹುದಗುಧಾಣಗೆರೆ ಗ್ರಾಮದಿಂದ ಪ್ರಾರಂಭವಾಗುತ್ತದೆ ಮತ್ತು ಪ್ರಾರಂಭ 6.ಮೀ 71.000 ಕರ್ನಾಟಕ ರಾಜ್ಯದ ಬಂಗಾರಪೇಟೆ ತಾಲ್ಲೂಕು ಕೋಲಾರ ಜಿಲ್ಲೆಯ ಎಸ್.ಪಿ.ಹುಲ್ಲೂರ ಗ್ರಾಮದವರೆಗೆ ಮುಗಿಯುತ್ತದೆ. ಕೋಲಾರ ಜಿಲ್ಲೆಯಲ್ಲಿ (ಪ್ರಾರಂಭ 11.682 ಕಿ.ಮೀ.ಗಳಿಂದ 71.000 ವರೆಗೆ) ವಿಸ್ತರಣೆಯಾಗಿದೆ. ಹಾಗೂ ಒಟ್ಟಾರೆ ಈ ಮಾರ್ಗವು 71 ಕಿ.ಮೀಗಳನ್ನು ಕ್ರಮಿಸುತ್ತದೆ.
3. ಯೋಜನೆಯ ಅಂದಾಜುವೆಚ್ಚ : ಕರ್ನಾಟಕ, ಆಂಧ್ರಪ್ರದೇಶ ಮತ್ತು ತಮಿಳುನಾಡು ರಾಜ್ಯಗಳಲ್ಲಿ ಎಂಟು ಪಥಗಳ ಬೆಂಗಳೂರು ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ನಿರ್ಮಾಣ ಮಾಡಲು ಉದ್ದೇಶಿಸಿರುತ್ತಾರೆ. ಇದರ ಭಾಗವಾಗಿ ಒಂದೇ ಹಂತದ ಯೋಜನೆಯ ಒಂದು ಭಾಗವು ಹೊರ ವರ್ತುಲ ರಸ್ತೆಯ ಅಂತರಾಜ್ಯ ಹೆದ್ದಾರಿ-44ರಲ್ಲಿ 6.ಮಿ 301.200 (ಪ್ರಾರಂಭ 6.ಮಿ.0.000 ನಿಂದ 11.682 ಕಿ.ಮೀ.) ಬೆಂಗಳೂರು ಗ್ರಾಮಾಂತರ ಜಿಲ್ಲೆಯ ಹುದಗುಧಾಣಗೆರೆ ಗ್ರಾಮದಿಂದ ಪ್ರಾರಂಭವಾಗುತ್ತದೆ ಮತ್ತು ಪ್ರಾರಂಭ 6.ಮೀ 71.000 ಕರ್ನಾಟಕ ರಾಜ್ಯದ ಬಂಗಾರಪೇಟೆ ತಾಲ್ಲೂಕು ಕೋಲಾರ ಜಿಲ್ಲೆಯ ಎಸ್.ಪಿ.ಹುಲ್ಲೂರ ಗ್ರಾಮದವರೆಗೆ ಮುಗಿಯುತ್ತದೆ. ಕೋಲಾರ ಜಿಲ್ಲೆಯಲ್ಲಿ (ಪ್ರಾರಂಭ 11.682 ಕಿ.ಮೀ.ಗಳಿಂದ 71.000 ವರೆಗೆ) ವಿಸ್ತರಣೆಯಾಗಿದೆ. ಹಾಗೂ ಒಟ್ಟಾರೆ ಈ ಮಾರ್ಗವು 71 ಕಿ.ಮೀಗಳನ್ನು ಕ್ರಮಿಸುತ್ತದೆ.
4. ಜನರ ಸಾರ್ವಜನಿಕ ಸಭೆಯ ಸ್ಥಳ, ದಿನಾಂಕ ಮತ್ತು ಸಮಯ - **ದಿನಾಂಕ : 07.03.2019, ಬೆಳಗ್ಗೆ 11.00 ಘಂಟೆಗೆ, ಎಸ್.ಪಿ.ಜಿ. ಲೇಔಟ್‌ನಲ್ಲಿರುವ ಜಕ್ಕೂರ, ಸಂ.22/1, ಕೆಪಿಟಿಸಿಎಲ್ ರಸ್ತೆ ಸೊಣ್ಣೇಗೌಡ ಬಿಲ್ಡಿಂಗ್‌ನ ಹಿಂಭಾಗ, ಬಂಗಾರಪೇಟೆ, ಕೋಲಾರ ಜಿಲ್ಲೆ.**
5. ಯೋಜನೆಯ ಕಾರ್ಯಾಗಾರ ಸಾರ್ವಜನಿಕ ವಿಚಾರಣೆಗೆ ಇರುವ ಸ್ಥಳ : (ಅ) ಜಿಲ್ಲಾಧಿಕಾರಿಗಳ ಕಛೇರಿ, ಕೋಲಾರ ಜಿಲ್ಲೆ (ಆ) ಮುಖ್ಯ ಕಾರ್ಯನಿರ್ವಾಹಕ ಅಧಿಕಾರಿ, ಜಿಲ್ಲಾ ಪಂಚಾಯತ್, ಬೆಂಗಳೂರು ಕೋಲಾರ ಜಿಲ್ಲೆ (ಇ) ಜಿಲ್ಲಾ ಕೈಗಾರಿಕಾ ಕೇಂದ್ರ ಬೆಂಗಳೂರು ಕೋಲಾರ ಜಿಲ್ಲೆ. (ಈ) ನಗರಸಭೆ, ಕೋಲಾರ ಜಿಲ್ಲೆ. (ಉ) ಗ್ರಾಮ ಪಂಚಾಯಿತಿ ಕಾರ್ಯಾಲಯ, ಬಂಗಾರಪೇಟೆ (ಊ) ಪ್ರಾದೇಶಿಕ ಅಧಿಕಾರಿ-ಕೋಲಾರ ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಮಂಡಳಿ, ಪ್ಲಾಟ್ ಸಂಖ್ಯೆ-14, ಕೆ.ಐ.ಎ.ಡಿ.ಬಿ. ಕೈಗಾರಿಕಾ ಪ್ರದೇಶ, ಬೇತಮಂಗಲ ರಸ್ತೆ, ಬಡಾಕ, ಕೋಲಾರ ರಸ್ತೆ (ಋ) ಕೇಂದ್ರ ಅರಣ್ಯ ಮತ್ತು ಪರಿಸರ ಮಂತ್ರಾಲಯ, ಪಶ್ಚಿಮ ಮಂಡಲ ಕಛೇರಿ, ಸಂಗ್ರಹಣಾ-1/240, ಕೇಂದ್ರೀಯ ಸದನ, 4ನೇ ಮಹಡಿ, ಇ ಮತ್ತು ಎಫ್ ವಿಂಗ್ಸ್, 17ನೇ ಮುಖ್ಯ ರಸ್ತೆ, 2ನೇ ಫೇಸ್, ಕೋರಮಂಗಲ, ಬೆಂಗಳೂರು-560 034. (ಋೂ) ಸಹಾಯಕ ಕೇಂದ್ರ, ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಮಂಡಳಿ, ಕೆ.ಸಿ ಆಂಜನಪ್ಪ ಸಂ.49, ಪರಿಸರ ಭವನ, ಚರ್ಚ್ ಸ್ಟ್ರೀಟ್, ಬೆಂಗಳೂರು-560 001.
ಸೂಚನೆ: ಯೋಜನಾ ಸ್ಥಳದಲ್ಲಿ ವಾಸಿಸುತ್ತಿರುವ ಜನತೆ ನಿವಾಸಿಗಳು, ಪರಿಸರಾಸಕ್ತ ಗುಂಪುಗಳು ಮತ್ತು ಈ ಯೋಜನೆಯಿಂದ ತೊಂದರೆಗೊಳಗಾಗಬಹುದಾದ ಸಾರ್ವಜನಿಕರು ತಮ್ಮ ಸಲಹೆಗಳು, ಆಕ್ಷೇಪಣೆಗಳು, ಪ್ರತಿಕ್ರಿಯೆಗಳು ಹಾಗೂ ಅಭಿಪ್ರಾಯಗಳನ್ನು ಪಿ.ಸಿ.ಬಿ.ಸಿ.ಎನ್.ಒ-ಹೆಚ್.ಓ ಮೂಲಕ ಕರ್ನಾಟಕ ರಾಜ್ಯ ಮಾಲಿನ್ಯ ನಿಯಂತ್ರಣ ಮಂಡಳಿಯವರಿಗೆ, ಜನರ ಸಾರ್ವಜನಿಕ ಸಭೆ (ಜನಾಭಿಪ್ರಾಯ), ಕೋಲಾರ ಜಿಲ್ಲೆ ಇವರಿಗೆ ಈ ಅಧಿಸೂಚನೆ ಪ್ರಕಟವಾದ 30 ದಿನಗಳ ಒಳಗೆ ಸಲ್ಲಿಸತಕ್ಕದ್ದು. ಇತ್ಯರ್ಥವಾಗಿ ಸಾರ್ವಜನಿಕರು ಮೇಲೆ ತಿಳಿಸಿರುವ ದಿನಾಂಕದ ಜನರ ಸಾರ್ವಜನಿಕ ಸಭೆಯಲ್ಲಿ ಪಾಲ್ಗೊಳ್ಳಬಹುದಾಗಿದೆ. ಹೆಚ್ಚಿನ ವಿವರಗಳನ್ನು ಮಂಡಳಿಯ ವೆಬ್‌ಸೈಟ್ : http://kspcb.gov.in ನಲ್ಲಿ ಪಡೆಯಬಹುದು.	ಸಹಿ/- ಸದಸ್ಯ ಕಾರ್ಯದರ್ಶಿ

KARNATAKA STATE POLLUTION CONTROL BOARD
No.49 "Parisara Bhavana", 1st to 5th Floor, Church Street,
Bengaluru - 560 001. Karnataka, INDIA.
Ph: 25591180, 25591112, 25586525 Fax: 080 25585321
E-mail: hoj@kspcb.gov.in Website : http://kspcb.gov.in

No.PCB/ENP/33GEN/2018/6846 DATE : 04-02-2019

ENVIRONMENTAL PUBLIC HEARING NOTIFICATION

National Highways Authority of India (Ministry of Road Transport and Highways) has proposed Phase-I of 8 Lane Bangalore Chennai Expressway which starts from east of Bangalore at km 301.200 of NH-4 for proposed (0.00 Km to 11.682 Km) and ends at near N.G.Hukur Village, Bangarpet Tq.A. (11.628 to 71.00) in Kolar District for proposed 71.00Km. The total length of the proposed Bangalore Chennai Expressway in Phase-I is 73.050 Km. The said project authority has obtained Environmental Clearance from MoEF&CC, Government of India, as per the EIA Notification dated 14.9.2006 (as amended on 1.12.2009), and required to go through Environmental Public Hearing process. The Project Proponent has submitted the Terms of Reference (TOR) issued by MoEF&CC, Government of India, New Delhi, Vide No.F.No.10-75/2015-IA.III dtd:14.09.2018 and also considering the requests of the project authority vide their letter NO.NHAI/11015/MOEF&F/Phase-I/W/2015/PIU-BNG/EXP/791 dtd: 20.12.2018 the Environmental Public Hearing is being conducted by the Board.

The details of the project are as follows.

1. Name of the Company & Address : DGM (TR) Project Director, PIU-Bangalore Expressway National Highways Authority of India (Ministry of Road Transport & Highways) # 218, 11th Cross, 20th Main, Parmanandha Nagar, Bengaluru-560070.

2. Proposed location of the project : Proposed Phase-I of 8 Lane Bangalore Chennai Expressway which starts from east of Bangalore at Km 301.200 of NH-4 for proposed (0.00 Km to 11.682 Km) and ends at near N.G.Hukur Village, Bangarpet taluk, (11.628 to 71.00) in Kolar District for proposed 71.00Km. The total length of the proposed Bangalore Chennai Expressway in Phase-I is 73.050 Km.

3. Details of activity : Proposed Phased of 8 Lane Bangalore Chennai Expressway which starts from east of Bangalore at Km 301.200 of NH-4 for proposed (0.00 Km to 11.682 Km) and ends at near N.G.Hukur Village, Bangarpet taluk, (11.628 to 71.00) in Kolar District for proposed 71.00Km. The total length of the proposed Bangalore Chennai Expressway in Phase-I is 73.050 Km.

4. Date, time and venue of Public Hearing : 07.03.2019 at 11.00 Am. at SVR Kalyana Mantapa, No.22/1, KGF Road, Near KSRTC Bus Stand, Bangarpet-563114, Kolar District.

5. Places of availability of project documents as per EIA Notification, which is kept open to public are is; Office of the Deputy Commissioner, Kolar District (b) Chief Executive Officer, Zilla Panchayat, Kolar District (c) District Industries Centre, Kolar District (d) City Municipal Council, Kolar District (e) Village Panchayat Office, Bangarpet (f) Office of the Regional Office, Kolar - Karnataka State Pollution Control Board, Khan Plot No. 14, KIADB, Industrial Area, Bethamangala Road, Tamaka Kolar-563101 (g) Ministry of Environment, Forest & Climate Change, South Zone Office, E-3/240, Kendriya Sadan, 4th Floor, E&F Wings, 17th Main Road 2nd Block, Koramangala, Bengaluru-560 034 (h) HELP DESK Karnataka State Pollution Control Board, Ground Floor, No.49, Parisara Bhavan, Church Street, Bengaluru - 560001

NOTE: Suggestions, views, comments and objections of interested bonafide residents environmental groups and others located in project site and likely to be affected by the proposed project are invited within 30 days from the date of publication of this Notification. They can also make statement/E-Mail suggestions to the Karnataka State Pollution Control Board/Chairman, Environmental Public Hearing Committee (Deputy Commissioner, Kolar District). Interested public can participate in the Public Hearing at the above place. For details please visit our Website http://kspcb.gov.in.

Sd/-
Member Secretary

"AVOID USE OF PLASTICS - BE 'ECO' FRIENDLY"

Bengaluru

Public Hearing Photographs for Kolar District

	
RO, PCB introducing PD and Administrative Peoples	Interested General Public
	
Participants asking questions	Participants asking questions

ANNEXURE 7.5

PROJECT NAME: Construction of 8 Lane Bangalore Chennai Expressway Phase-I from Bangalore at Km 0.000 and ends at Km 71.000 Near N.G. Hulkur Village including Spur Alignment of 2.05 Km in the State of Karnataka

FILE NO: 10-15/2018-IA.III PROPOSAL NO.: IA/KA/MIS/73474/2018 AGENDA ITEM NO.: 3.7 of 246 EAC Meeting

Response to the issues / concerns raised by Public during Public Hearing

Bangalore Rural:

S. No	Issue	Reply
1.	Sri. Harish, Kolathur Village, Hoskote Taluk, Bengaluru Rural District, requested to create job opportunities to residents of Kolathur Village as maximum land losers are from the said village. He also requested for hospital facility to the Kolathur Village from the project proponent.	The Chairman of Public Hearing Committee informed that, job opportunities will be created during formation of Road and the local people will be given preference for jobs during road formation. The Project Director, PIU, NHAI, Bengaluru, also informed that, road is being proposed as a part of Chennai. Bengaluru industrial corridor which will help industrial development in the area through which job opportunities will be created to local people.
2.	Sri. Krishnamurthy, Kolathur Village, Hoskote Taluk, Bengaluru Rural District, informed that he has developed a residential layout adjacent to proposed expressway. He informed that, few full sites and part of few sites were acquired for road purpose because of which he could not sell the remaining portion of partially acquired sites. He requested for to suitable compensation for such sites. He also requested for road connectivity to his layout.	The chairman informed that, such issues may occur during acquisition process and informed him to submit a representation to SLAO office. However, as there is no specific provision under NH Act for acquiring such piece of land Chairman also informed that, road connectivity will be provided to layout through existing roads. Accordingly, VUPs, LVUPs etc., have been provided for Continuation of existing roads across express highway.
3.	Sri. Anjenappa, Kolathuru Village, Hoskote Taluk, Bengaluru Rural District, demanded for higher compensation for the land acquired in Kolathur village limits as present value is 8 -10 Crores per acre.	The Compensation fixed as per NH Act 1956 and Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act 2013 Guidelines by CALA. An amount of INR 26.97 Cr was awarded for said survey no. and amount was also received by the respective person. The documents regarding the same are enclosed as **Appendix I.**
4.	Sri Hnumanthagowda Kolathuru Village, Hoskote Taluk, Bengaluru Rural District, requested for fixation of compensation based on the guidance value and also not to delay dispersal of compensation.	Chairman informed that, the compensation will be fixed based on the present guidance value and also informed that, action will be taken for speedy dispersal of compensation to land losers. An amount of INR 9.9 Cr was awarded as Compensation to land looser and amount was also received by the respective person. The documents regarding the same are enclosed as **Appendix II**
5.	Sri. Shekar Kolathur Village, Hoskote Taluk, Bengaluru Rural District, informed that Government is forced to give interest for compensation value for the delayed period which is loss of Government revenue and requested for timely dispersal of compensation amount.	Chairman informed that 12% interest will be paid from the date of Publication of 3(A) notification as per RFCTLARR 2013. Amount disbursed to the concerned and obtained possession of land.

S.P. Somashekar
General Manager (Tech) Project Director
National Highways Authority of India
P.I.U. Bangalore

Kolar:

S. No	Issue	Reply
1.	Sri. M.S. Anand, Ex Zilla Panchyat Member, Hosur Village, Bangarpet Taluk, Kolar District. During the construction of road work using heavy vehicles, lot of dust and noise nuisance is going to be created and agricultural fields situated on either sides of the road are going to be affected to the maximum extent due to the dust generated during the usage of heavy vehicles. Since these types of projects will run for minimum of 2-3 years, the extent of pollution will be unbearable. Further, he wanted to know about any sort of compensation being paid for the said problem and questioned about the precautionary measures taken for mitigating sound and dust pollution being caused during the construction phase of the road works. Meantime he requested the project proponent to make provisions for underpass roads so as to have an access to the agricultural fields.	NHAI informed that continuous water sprinkling arrangements will be ensured at construction works as well as loading and unloading area of Camp site. All noise generating equipment will be installed sufficiently away from settlement area and will be operated with controlled devices. Green belt provided along the road will act as a vegetative noise barrier. In addition to that, Noise barriers have been proposed at 21 nos. of villages along the settlement falling within 500 m from the alignment covering a total length of 7270 m. The list of the area along with the location is enclosed as **Appendix III**. A separate budgetary provision of INR 10.90 crores has been made for the provision of Noise barrier. In order to reduce the dust at construction sites. • The Concessionaire will take every precaution to control dust nuisance at all the construction zones and allied sites where works are under progress. • Every equipment and machinery will be fitted with dust suppression devices such as water sprinklers, dust bags, cyclone etc. as appropriate. • The Concessionaire will provide necessary certificates to confirm that all crushers used in construction conform to relevant dust emission control legislation. • At all the construction zones and unpaved lead roads, earthen temporary diversions and plant premises periodical water sprinkling will be carried out to suppress dust. • Transportation of loose earth, sand, and fly ash will be done in covered vehicles. • All equipments and machineries will be maintained properly. • Periodical monitoring of fine Particulate Matters (PM_{10} and $PM_{2.5}$) will be carried out as per Environmental Monitoring Plan. • Workers at mixing sites will wear masks

S.P. Somashekar
General Manager (Tech) Project Director
National Highways Authority of India
P.I.U. Bangalore

S. No	Issue	Reply
		to reduce the chances of exposure to fugitive dusts PD, NHAI informed that adequate number of underpasses and culverts will be provided at regular interval for ensuring movement of light vehicles / pedestrian / cattle movement from one side to another side of the Expressway..
1.1	Since there is an existing National Highway at a distance of about 20 Km, is it viable to have another highway road and also he wanted to know about the feasibility study reports. He also suggested the chair person and the project proponent that, meetings / interactions would have been held with the land losers / farmers to have any sort of suggestions before taking up these types of projects.	Feasibility Report is available with Office of the Project Director, National Highways Authority of India (NHAI). This is also submitted with MoEFCC during submission proposed ToR. Copy of Feasibility Report is enclosed as **Appendix IV.** There is a provision under NH Act for submission of objection within 21 days after 3(A) notifications. Further, there is a provision for arbitration even after disbursement. In addition, in between any affected person may also submit written grievance regarding compensation of land and structure as well as valuation with CALA. The date of hearing and notifications for land acquisition are published in the local newspaper intimating the public about the intension for acquisition under Section 3(A) of National Highway Act, 1956 notification inviting objection from the person losing the land. In this project also the 3(A) Notification was published in English News Paper Times of India, Bengaluru on 27 May vide Notification No.-LAQ/BC/EXPWAY/CR/10/2015-16 dt. 23 May, 2015. The same notification was sent to all the concern offices in local language. The copy of Newspaper cutting and circulation in local language are enclosed as **Appendix V.**
1.2	Requested the Chairperson to take a fair decision about the compensation to be paid to the land losers and mentioned that, there is a disparity with respect to the compensation being paid to the land losers of Hoskote Taluk and Bangarpet Taluk. He emphasized the chair person to extend the provisions of providing or extending the compensation to the land losers as adopted in the industrial policy land acquisition procedures.	The value for compensation against land acquisition is determined by SLAO depending upon the specific criteria as per the NH Act 1956 and RFCTLARR Act 2013.
1.3	Expressed his opinion that, while acquiring the land of the farmers, project proponent must explore the best possibilities of acquiring the whole land instead of dividing the land in to bits and pieces.	The project alignment is not passing through Hosur Village and no land is affected from this village. The name of Shri M. S. Anand is not within the affected person list.

S.P. Somashekar
General Manager (Tech) Project Director
National Highways Authority of India
P.I.U. Bangalore

S. No	Issue	Reply
		Design of Expressway is not possible to acquire 100 % land of the affected person due to maintaining the road geometry as per IRC and MoRTH guidelines. However, this type of stray issue is likely to be compensated during evaluation of compensation if same is raised with CALA before disbursement. In addition, such kind of issues are further settled as per NH Act 1956 and Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act 2013 by CALA.
2	Sri. Ramellowda. District President. Raita Sanlha. Kurugal Villlge. Bangarpet Taluk, Kolar District. Highlighted about the disparity of rates pertinent to Malur, Hoskote and Bangarpet for the lands being paid to the land losers and requested the chair person and the project proponent to grant more compensation if land to be acquired is of fertile in nature. On behalf of all the farmers who were present in the meeting that, he requested the project proponent to provide good number of underpass and service roads and meantime he has suggested to grant Gomala land (Government Land) to the land losers. He did not raise any issue pertaining to Environment.	The value for compensation against land acquisition is determined by SLAO depending upon the specific criteria as per the NH Act 1956 and RFCTLARR Act 2013. A total of 16 nos. of Light Vehicular Underpasses, 25 nos. Vehicular underpass and 4 nos. Vehicular Overpasses have provided in design in the project stretch of Kolar district for facilitating pedestrian/ cattle movement / vehicular movement across the Expressway. In addition, 96 nos. of box culverts have also been provided in this stretch which will also facilitate movement of pedestrian/cattle /smaller vehicle during dry period. Around Kurulu Village 2 underpasses have been provided at project cjhainages 64+472 and 65+533 to provide connectivity to the Village Roads. The list of underpasses is provided in **Appendix VI**
3.	Sri. Babu, Ithandahalli Village, Bangarpet Taluk, Kolar District - He also expressed about the disparity with respect to the compensation being paid to the land losers and only Rs. 28.5/- per Sq. Mtr, which is very minimal is going to be paid to our land of 17 Acres of extent belonging to 10 Brothers and even no nearby gomala land is available to obtain land under the provisions of the Acts. In addition to that, about 100 Acres of land on either sides of the road is being acquired for the development of townships. He mentioned that, these grievances were brought to the kind notice of the Chair	The Compensation fixed as per NH Act 1956 and RFCTLARR 2013 Guidelines by CALA and an amount of INR 9.5 Lakh was awarded for said survey no. and amount was also received by the respective person. The documents regarding the same are enclosed as **Appendix VII.**

S.P. Somasheka
General Manager (Tech) Project Director
National Highways Authority of India
P.I.U. Bangalore

S. No	Issue	Reply
	person through Memorandums and meantime requested to do the favor in this Regard.	
3.1.	Meantime, Sri Babu pointed out specifically about the disparity of compensation for the land being paid in Hoskote and Bangarpet Taluks and in this regard, the Chair person has briefed that, the guidance value for the lands at different places will be fixed by the Government based on the certain criteria's such as business and affairs of that particular location / area. He did not raise any issue pertaining to Environment.	The Compensation fixed as per NH Act 1956 and Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act 2013 Guidelines by CALA
4.	Sri. Srinivasagowda, Ex-Gram Panchyat Chairman, S. Madamangala Village, Bangarpet Taluk, Kolar District. During the acquisition process, on certain occasions, along with the land, dwelling houses will also be acquired partially. Under these circumstances project proponent is extending compensation only to the particular affected / acquired portion which will be a huge loss to the house owners and also it is impossible to lead life in that house, since it is prone to be affected due to sound and noise pollution. Considering all these situations, requested the project proponent to grant compensation by considering the dwelling house as a whole instead as a part. Meantime he also expressed/ suggested the project proponent to provide service roads on either side of the highway including underpass and also requested the project proponent to ensure the nature of the agricultural land / fields before disbursing the compensation to the land losers. He did not raise any issue pertaining to Environment.	NHAI submitted compensation with CALA for disbursement as per evaluation of land and any property as per NH Act 1956 and Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act 2013. Public Works Department (PWD) evaluate value of the affected structures. However, any structure is partially affected – whether it will be compensated for the whole or partial shall be recommended by PWD based on the stability of the structure after acquisition of required part. The final evaluation is determined by SLAO (CALA). The Compensation fixed as per NH Act 1956 and Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act 2013 Guidelines by CALA. In Madamangala Village 1 no. of Vehicular Underpass including access has been incorporated in the project. A total of 16 nos. of Light Vehicular Underpasses, 25 nos. Vehicular underpass and 4 nos. Vehicular Overpasses have provided in design in the project stretch of Kolar district for facilitating pedestrian/ cattle movement / vehicular movement across the Expressway. In addition, 96 nos. of box culverts have also been provided in this stretch which will also facilitate movement of pedestrian/cattle /smaller vehicle during dry period. **(Appendix VI)**

S.P. Somashekar
General Manager (Tech) Project Director
National Highways Authority of India
P.I.U. Bangalore

S. No	Issue	Reply
5.	Sri. Muniyappa, Margal Village, Bangarpet Taluk, Kolar District. He expressed his views to the chair person that, meetings / interaction sessions with the villagers / land losers / public would have been conducted to discuss about the pros and cons of the proposed project or before taking up the project. Also felt that, what the farmers can do with the compensation after losing the agricultural lands which is nothing but routine bread and butter. He also extended heartfelt thanks to the chair person for his concern towards the farmers and meantime requested the chair person to amicably settle the compensation to the land losers. He did not raise any issue pertaining to Environment. The gathering informed that, they do not have any environmental issues due to proposed Chennai Bengaluru Expressway and support the proposed Chennai Bengaluru Expressway.	The Compensation fixed as per NH Act 1956 and Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (RFCTLARR) Act 2013 Guidelines by CALA.
6.	The Chairperson requested the audience to submit their representations pertinent to environmental issues and impact being caused due to the proposed project and request can be made to the SLA Office pertinent to land acquisition issues.	No written representation received

S.P. Somashekar
General Manager (Tech) Project Director
National Highways Authority of India
P.I.U. Bangalore

ಬೆಂಗಳೂರು–ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನುಗಳ ಹಸ್ತಾಂತರಿಸಿದ ಬಗ್ಗೆ ದೃಢೀಕರಣ ಪತ್ರ.
(ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 ರ ಕಲಂ 3–ಎಫ್ ನಂತೆ)

ಈ ಕೆಳಗೆ ಸಹಿ ಮಾಡಿರುವ ನಾನು / ನಾವುಗಳು ಈ ದಿನ ದಿನಾಂಕ: 8-4-19 201__ರಂದು ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನು ಮತ್ತು ಅದರಲ್ಲಿರುವ ಕಟ್ಟಡ, ಕೊಳವೆ ಬಾವಿ / ತೆರದ ಬಾವಿ, ಮರ ಗಿಡ ಪಗೈರೆಗಳ ಸಮೇತ (ಕಿ.ಮೀ. 0/000 ರಿಂದ ಕಿ.ಮೀ. 74/870 ಮತ್ತು ಕಿ.ಮೀ. 82/150 ರಿಂದ ಕಿ.ಮೀ. 83/350 ರವರೆಗೆ) ನಿರ್ಮಾಣ, ನಿರ್ವಹಣೆ, ಸಂರಕ್ಷಣೆ ಮತ್ತು ಕಾರ್ಯನಿರ್ವಹಣೆಗಾಗಿ ಈ ಕೆಳಗಿನಂತೆ ಹಸ್ತಾಂತರಿಸಿದೆ.

ಜಿಲ್ಲೆ	ತಾಲ್ಲೂಕು	ಹೋಬಳಿ	ಗ್ರಾಮ	ಸ.ನಂ.	ವಿಸ್ತೀರ್ಣ	ತರಹ	ಷರಾ
ಬೆಂಗಳೂರು ಗ್ರಾಮಾಂತರ	ಹೊಸಕೋಟೆ	ಕಸಬಾ	ಕೊಳತೂರು	146/1	1846 + 101 "ಬಿ" ಖರಾಬ್	ಖುಷ್ಕಿ	

ಕಟ್ಟಡ ಮತ್ತು ಮಾಲ್ಕಿ ವಗೈರೆ ವಿವರ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಕಟ್ಟಡ / ಮಾಲ್ಕಿ	ಸಂಖ್ಯೆ	ಷರಾ
1	ಕಟ್ಟಡ, ಕೊಳವೆ ಬಾವಿ, ಶೆಲ್ಟರ್, ಪಂಪ್ ಮನೆ ಮತ್ತು ತೆರಡ ಬಾವಿ	1, 4, 2, 2 ಮತ್ತು 1	
2	ಹಲಸು ಮತ್ತು ಸೀತಾಪಲ	1 ಮತ್ತು 1	
3	ನೀಲಗಿರಿ ತೋಪು		
4			

ಅಧಿಕಾರ:–ಕೇಂದ್ರ ಸರ್ಕಾರದ ಭೂ ಸಾರಿಗೆ ಮತ್ತು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಪ್ರಾಧಿಕಾರ ನವದೆಹಲಿ, ಇವರು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 (1956 ರ 48) ರ ಕಲಂ 3–ಡಿ ಯಂತೆ ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಹೊರಡಿಸಿರುವ ಅಧಿಸೂಚನೆ ಸಂಖ್ಯೆ ಎಸ್.ಓ. 670(ಇ) ದಿನಾಂಕ: 04–03–2016 ಅಸಾದಾರಣ ರಾಜ್ಯ ಪತ್ರದ ಭಾಗ II ಕಲಂ 3 ಉಪಕಲಂ (ii) ಹಿಂದಿ ಪುಟ ಸಂಖ್ಯೆ: 1 ರಿಂದ 164 ಮತ್ತು ಆಂಗ್ಲ ಬಾಷೆ 164 ರಿಂದ 306 ರಲ್ಲಿ ಪ್ರಕಟಿಸಿರುತ್ತದೆ.

ಹಸ್ತಾಂತರಿಸಿದೆ

ಸ್ವಾಧೀನಪಡೆದುಕೊಂಡಿದೆ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಆಸಕ್ತಿಯುಳ್ಳ / ಹಕ್ಕುದಾರನ ಹೆಸರು ಮತ್ತು ಸಹಿ	ಭೂಸ್ವಾಧೀನಾಧಿಕಾರಿಗಳ ಸಹಿ
1	ನಿಂಬೆಗಲ್ಲ	Special Land Acquisition Officer and Competent Authority, NHAI, Bangalore-Chennai Expressway Hebbal, Bangalore - 560 024.
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ಸ್ವಾಧೀನಪಡಿಸಿಕೊಂಡಿದೆ (ಎನ್.ಹೆಚ್.ಎ.ಐ)

ಬೆಂಗಳೂರು–ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನುಗಳ ಹಸ್ತಾಂತರಿಸಿದ ಬಗ್ಗೆ ದೃಢೀಕರಣ ಪತ್ರ. (ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 ರ ಕಲಂ 3–ಎಫ್ ನಂತೆ)

ಈ ಕೆಳಗೆ ಸಹಿ ಮಾಡಿರುವ ನಾನು / ನಾವುಗಳು ಈ ದಿನ ದಿನಾಂಕ: 8-4-19 201__ರಂದು ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇ ಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನು ಮತ್ತು ಅದರಲ್ಲಿರುವ ಕಟ್ಟಡ, ಕೊಳವೆ ಬಾವಿ / ತೆರದ ಬಾವಿ, ಮರ ಗಿಡ ಬಗೈರೆಗಳ ಸಮೀತ (ಕಿ.ಮೀ. 0/000 ರಿಂದ ಕಿ.ಮೀ. 74/870 ಮತ್ತು ಕಿ.ಮೀ. 82/150 ರಿಂದ ಕಿ.ಮೀ. 83/350 ರವರೆಗೆ) ನಿರ್ಮಾಣ, ನಿರ್ವಹಣೆ, ಸಂರಕ್ಷಣೆ ಮತ್ತು ಕಾರ್ಯನಿರ್ವಹಣೆಗಾಗಿ ಈ ಕೆಳಗಿನಂತೆ ಹಸ್ತಾಂತರಿಸಿದೆ.

ಜಿಲ್ಲೆ	ತಾಲ್ಲೂಕು	ಹೋಬಳಿ	ಗ್ರಾಮ	ಸ.ನಂ.	ವಿಸ್ತೀರ್ಣ	ತರಹೆ	ಷರಾ
ಬೆಂಗಳೂರು ಗ್ರಾಮಾಂತರ	ಹೊಸಕೋಟೆ	ಕಸಬಾ	ಕೊಳತೂರು	146/1	1871 + 101 "ಬಿ" ಖರಾಬ್	ಖುಷ್ಕಿ	

ಕಟ್ಟಡ ಮತ್ತು ಮಾಲ್ಕಿ ವಗೈರೆ ವಿವರ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಕಟ್ಟಡ / ಮಾಲ್ಕಿ	ಸಂಖ್ಯೆ	ಷರಾ
1	ಕಟ್ಟಡ, ಕೊಳವೆ ಬಾವಿ, ಶೇಲ್ಟರ್, ಪಂಪ್ ಮನೆ ಮತ್ತು ತೆರಡ ಬಾವಿ	1, 4, 2, 2 ಮತ್ತು 1	
2	ಹಲಸು ಮತ್ತು ಸೀತಾಪಲ	1 ಮತ್ತು 1	
3	ನೀಲಗಿರಿ ತೋಪು		
4			

ಅಧಿಕಾರ:–ಕೇಂದ್ರ ಸರ್ಕಾರದ ಭೂ ಸಾರಿಗೆ ಮತ್ತು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಪ್ರಾಧಿಕಾರ ನವದೆಹಲಿ, ಇವರು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 (1956 ರ 48) ರ ಕಲಂ 3–ಡಿ ಯಂತೆ ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಹೊರಡಿಸಿರುವ ಅಧಿಸೂಚನೆ ಸಂಖ್ಯೆ ಎಸ್.ಓ. 670(ಇ) ದಿನಾಂಕ: 04–03–2016 ಅಸಾದಾರಣ ರಾಜ್ಯ ಪತ್ರದ ಭಾಗ II ಕಲಂ 3 ಉಪಕಲಂ (ii) ಹಿಂದಿ ಪುಟ ಸಂಖ್ಯೆ: 1 ರಿಂದ 164 ಮತ್ತು ಆಂಗ್ಲ ಬಾಷೆ 164 ರಿಂದ 306 ರಲ್ಲಿ ಪ್ರಕಟಿಸಿರುತ್ತದೆ.

ಹಸ್ತಾಂತರಿಸಿದೆ

ಸ್ವಾಧೀನಪಡೆದುಕೊಂಡಿದೆ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಆಸಕ್ತಿಯುಳ್ಳ / ಹಕ್ಕುದಾರನ ಹೆಸರು ಮತ್ತು ಸಹಿ	ಭೂಸ್ವಾಧೀನಾಧಿಕಾರಿಗಳ ಸಹಿ
1	ಒಕ್ಕಲರ ಪಟ್ಟೆ	Special Land Acquisition Officer and Competent Authority, NHAI Bangalore-Chennai Expressway Hebbal, Bangalore - 560 024
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ಸ್ವಾಧೀನಪಡಿಸಿಕೊಂಡಿದೆ (ಎನ್.ಹೆಚ್.ಎ.ಐ)

ಬೆಂಗಳೂರು–ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನುಗಳ ಹಸ್ತಾಂತರಿಸಿದ ಬಗ್ಗೆ ದೃಢೀಕರಣ ಪತ್ರ.
(ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 ರ ಕಲಂ 3–ಎಫ್ ನಂತೆ)

ಈ ಕೆಳಗೆ ಸಹಿ ಮಾಡಿರುವ ನಾನು / ನಾವುಗಳು ಈ ದಿನ ದಿನಾಂಕ: 8/4/2021 ರಂದು ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನು ಮತ್ತು ಅದರಲ್ಲಿರುವ ಕಟ್ಟಡ, ಕೊಳವೆ ಬಾವಿ / ತೆರದ ಬಾವಿ, ಮರ ಗಿಡ ವಗೈರೆಗಳ ಸಮೀತ (ಕಿ.ಮೀ. 0/000 ರಿಂದ ಕಿ.ಮೀ. 74/870 ಮತ್ತು ಕಿ.ಮೀ. 82/150 ರಿಂದ ಕಿ.ಮೀ. 83/350 ರವರೆಗೆ) ನಿರ್ಮಾಣ, ನಿರ್ವಹಣೆ, ಸಂರಕ್ಷಣೆ ಮತ್ತು ಕಾರ್ಯನಿರ್ವಹಣೆಗಾಗಿ ಈ ಕೆಳಗಿನಂತೆ ಹಸ್ತಾಂತರಿಸಿದೆ.

ಜಿಲ್ಲೆ	ತಾಲ್ಲೂಕು	ಹೋಬಳಿ	ಗ್ರಾಮ	ಸ.ನಂ.	ವಿಸ್ತೀರ್ಣ	ತರಹೆ	ಪರಾ
ಬೆಂಗಳೂರು ಗ್ರಾಮಾಂತರ	ಹೊಸಕೋಟೆ	ಕಸಬಾ	ಕೊಳತೂರು	146/1	2074 + 101 "ಬಿ" ಖರಾಬ್	ಖುಷ್ಕಿ	

ಕಟ್ಟಡ ಮತ್ತು ಮಾಲ್ಕಿ ವಗೈರೆ ವಿವರ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಕಟ್ಟಡ / ಮಾಲ್ಕಿ	ಸಂಖ್ಯೆ	ಪರಾ
1	ಕಟ್ಟಡ, ಕೊಳವೆ ಬಾವಿ, ಶೇಲ್ಟರ್, ಪಂಪ್ ಮನೆ ಮತ್ತು ತೆರಡ ಬಾವಿ	1, 4, 2, 2 ಮತ್ತು 1	
2	ಹಲಸು ಮತ್ತು ಸೀತಾಪಲ	1 ಮತ್ತು 1	
3	ನೀಲಗಿರಿ ತೋಪು		
4			

ಅಧಿಕಾರ:–ಕೇಂದ್ರ ಸರ್ಕಾರದ ಭೂ ಸಾರಿಗೆ ಮತ್ತು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಪ್ರಾಧಿಕಾರ ನವದೆಹಲಿ, ಇವರು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 (1956 ರ 48) ರ ಕಲಂ 3–ಡಿ ಯಂತೆ ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಹೊರಡಿಸಿರುವ ಅಧಿಸೂಚನೆ ಸಂಖ್ಯೆ ಎಸ್.ಓ. 670(ಇ) ದಿನಾಂಕ: 04–03–2016 ಅಸಾದಾರಣ ರಾಜ್ಯ ಪತ್ರದ ಭಾಗ II ಕಲಂ 3 ಉಪಕಲಂ (ii) ಹಿಂದಿ ಪುಟ ಸಂಖ್ಯೆ: 1 ರಿಂದ 164 ಮತ್ತು ಆಂಗ್ಲ ಬಾಷೆ 164 ರಿಂದ 306 ರಲ್ಲಿ ಪ್ರಕಟಿಸಿರುತ್ತದೆ.

ಹಸ್ತಾಂತರಿಸಿದೆ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಆಸಕ್ತಿಯುಳ್ಳ / ಹಕ್ಕುದಾರನ ಹೆಸರು ಮತ್ತು ಸಹಿ	ಭೂಸ್ವಾಧೀನಾಧಿಕಾರಿಗಳ ಸಹಿ
1	K. Muniyappa	Land Acquisition Officer Authority, NHAI Bengaluru-Chennai Expressway Kolar - 560 024.
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ಸ್ವಾಧೀನಪಡಿಸಿಕೊಂಡಿದೆ (ಎನ್.ಹೆಚ್.ಎ.ಐ)

ಸ್ವಾಧೀನಪಡೆದುಕೊಂಡಿದೆ

ಬೆಂಗಳೂರು–ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನುಗಳ ಹಸ್ತಾಂತರಿಸಿದ ಬಗ್ಗೆ ದೃಢೀಕರಣ ಪತ್ರ.
(ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 ರ ಕಲಂ 3–ಎಫ್ ನಂತೆ)

15-4-2019

ಈ ಕೆಳಗೆ ಸಹಿ ಮಾಡಿರುವ ನಾನು / ನಾವುಗಳು ಈ ದಿನ ದಿನಾಂಕ: ——— ರಂದು ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇ ಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನು ಮತ್ತು ಅದರಲ್ಲಿರುವ ಕಟ್ಟಡ, ಕೊಳವೆ ಬಾವಿ / ತೆರದ ಬಾವಿ, ಮರ ಗಿಡ ಪಗೈರೆಗಳ ಸಮೀತ (ಕಿ.ಮೀ. 0/000 ರಿಂದ ಕಿ.ಮೀ. 74/870 ಮತ್ತು ಕಿ.ಮೀ. 82/150 ರಿಂದ ಕಿ.ಮೀ. 83/350 ರವರೆಗೆ) ನಿರ್ಮಾಣ, ನಿರ್ವಹಣೆ, ಸಂರಕ್ಷಣೆ ಮತ್ತು ಕಾರ್ಯನಿರ್ವಹಣೆಗಾಗಿ ಈ ಕೆಳಗಿನಂತೆ ಹಸ್ತಾಂತರಿಸಿದೆ.

ಜಿಲ್ಲೆ	ತಾಲ್ಲೂಕು	ಹೋಬಳಿ	ಗ್ರಾಮ	ಸ.ನಂ.	ವಿಸ್ತೀರ್ಣ	ತರಹೆ	ಷರಾ
ಬೆಂಗಳೂರು ಗ್ರಾಮಾಂತರ	ಹೊಸಕೋಟೆ	ಕಸಬಾ	ಕೊಳತೂರು	146/3	3ಕ-0ಗು-303 "ಬಿ" (3845)	ಖುಷ್ಕಿ	

ಕಟ್ಟಡ ಮತ್ತು ಮಾಲ್ಕಿ ವಗೈರೆ ವಿವರ

3845

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಕಟ್ಟಡ / ಮಾಲ್ಕಿ	ಸಂಖ್ಯೆ	ಷರಾ
1	–ಇಲ್ಲ–		
2			
3			
4			

ಅಧಿಕಾರ:–ಕೇಂದ್ರ ಸರ್ಕಾರದ ಭೂ ಸಾರಿಗೆ ಮತ್ತು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಪ್ರಾಧಿಕಾರ ನವದೆಹಲಿ, ಇವರು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 (1956 ರ 48) ರ ಕಲಂ 3–ಡಿ ಯಂತೆ ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಹೊರಡಿಸಿರುವ ಅಧಿಸೂಚನೆ ಸಂಖ್ಯೆ ಎಸ್.ಓ. 670(ಇ) ದಿನಾಂಕ: 04–03–2016 ಅಸಾದಾರಣ ರಾಜ್ಯ ಪತ್ರದ ಭಾಗ II ಕಲಂ 3 ಉಪಕಲಂ (ii) ಹಿಂದಿ ಪುಟ ಸಂಖ್ಯೆ: 1 ರಿಂದ 164 ಮತ್ತು ಆಂಗ್ಲ ಬಾಷೆ 164 ರಿಂದ 306 ರಲ್ಲಿ ಪ್ರಕಟಿಸಿರುತ್ತದೆ.

ಹಸ್ತಾಂತರಿಸಿದೆ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಆಸಕ್ತಿಯುಳ್ಳ / ಹಕ್ಕುದಾರನ ಹೆಸರು ಮತ್ತು ಸಹಿ	ಭೂಸ್ವಾಧೀನಾಧಿಕಾರಿಗಳ ಸಹಿ
1	K.V. Murali	Special Land Acquisition Officer and Competent Authority, NHAI Bangalore-Chennai Expressway Hebbal, Bangalore - 560 024.
2		
3		
4		
5		

ಸ್ವಾಧೀನಪಡೆದುಕೊಂಡಿದೆ

ಸ್ವಾಧೀನಪಡಿಸಿಕೊಂಡಿದೆ (ಎನ್.ಹೆಚ್.ಎ.ಐ)

Appendix III

List of Proposed Noise Barriers

S. No.	Name of the Settlement	Chainage (Km)	Distance from ROW Edge (m)	Side	Length (m)
1	Kolathur	1+000	107	L.H.S	350
2	Karibeerana hosahalli	8+700	173	R.H.S	350
3	Thaggali hosahalli	10+900	206	L.H.S	450
4	Bellavi	14+800	87	R.H.S	200
5	Abbenahalli	17+700	167	L.H.S	300
6	Kanivana halli	19+800	197	R.H.S	350
7	Vardenahalli	21+100	25	R.H.S	200
8	Dodda Shivara	22+200	136	R.H.S	300
9	Nambigana halli	25+100	95	L.H.S	350
10	Hijuvanahalli	27+700	126	L.H.S	160
11	Anepura	28+400	86	L.H.S	290
12	Mugalabele	36+800	90	L.H.S	450
		37+200	333	L.H.S	
13	Siddanahalli	39+800	194	L.H.S	350
14	Karabele	43+700	103	L.H.S.	360
15	Doddurkarpanhalli	50+200	43	R.H.S	350
16	Ghattakamadenahalli	55+300	308	R.H.S	350
17	Bethamangala	60+500	206	L.H.S	800
18	Doddakari	62+000	35	L.H.S	200
19	Koolur	65+500	40	R.H.S	150
20	Gopenahalli	69+500	120	R.H.S	250
21	N.G Hulkur	71+000	150-380	R.H.S & L.H.S	360 L.H.S 350 R.H.S.
	Total length of Proposed Noise Barrier				**7270**

APPENDIX-V

TIMES OF INDIA, BENGALURU
WEDNESDAY, MAY 27, 2015

GOVERNMENT OF INDIA
MINISTRY OF ROAD TRANSPORT AND HIGHWAYS
NEW DELHI
NOTIFICATION

No. LAQ/BC/EXPWAY/CR/10/2015-16 Date: 23rd May 2015

Gazette of India, Extraordinary No. 564, dated: 13th March 2015 in part II Section 3, Subsection(ii) at page Nos 1 to 71 **S.O.752(E):-** In exercise of the powers conferred by sub-section (1) of section 3A of the National Highways Act, 1956 (48 of 1956) (hereinafter referred to as the said Act), the Central Government, after being satisfied that for the public purpose, the land, the brief description of which is given in the Schedule below, is required for building (four laning etc.), maintenance, management and operation of proposed Bangalore - Chennai Expressway, in the stretch of land Design Chainage Km. 0/000 to Design Chainage Km 74/870 and Design Chainage Km 82/150 to Design Chainage Km. 83/350 in the districts of Bangalore Rural & Kolar in the State of Karnataka, hereby declares its intention to acquire such land;

Any person interested in the said land may, within twenty-one days from the date of publication of this notification in this Newspaper object to the use of such land for the aforesaid purpose under sub-section(1) of section 3C of the said Act.

Every such objection shall be made to the competent authority, namely, The **Special Land Acquisition Officer and Competent Authority, National Highway Authority of India, Bangalore-Chennai Expressway Project, No. 678/3, Neerubhavi Kempanna Layout, Hebbal, Bangalore, Karnataka,** in writing and shall set out the grounds thereof and the competent authority shall give the objector an opportunity of being heard, either in person or by a legal practitioner, and may, after hearing all such objections and after making such further enquiry, if any, as the competent authority thinks necessary, by order, either allow or disallow the objections.

Any order made by the competent authority under sub-section (2) of section 3C of the said Act shall be final.

The land plans and other details of the land covered under this notification are available and can be inspected by the interested person at the aforesaid office of the competent authority.

SCHEDULE

Brief description of the land to be acquired, with or without structure, falling within the stretch of lands from Design Chainage Km 0/000 to Design Chainage Km 74/870 & Design Chainage Km 82/150 to Design Chainage Km 83/350 of building (four laning etc), maintenance, management and operation of proposed Bangalore - Chennai Expressway, in Districts of Bangalore Rural and Kolar, in the State of Karnataka.

District : Bangalore Rural Taluk : Hosakote

Sl. No.	Survey No.	Type of Land	Nature of Land	Area in sq.mts.
1	2	3	4	5
Village (1) Dandupalya				
1	168	Private	NAK	5931
2	169	Private	Dry	3274
			TOTAL	9205
Village (2) Kolathur				

1	2	3	4	5
26	BetweenSy.No. 9/1, 7/2 & 5/2	Govt.	Nala	3146
			Total	128084
Village: (4) Karibeerana hosahalli				
1	2	Private	Dry	15971
2	3	Private	Dry	11896
3	17	Private	Dry	181
4	18	Private	Dry	1839

1	2
2	12
3	37
4	188
5	189
6	190
7	191
8	192
9	193
10	194
11	195
12	197
13	199
14	207
15	Between Sy... 11,12 & SH...
Village: (10) Cl...	
1	19
2	21
3	22
Village(11) Chi...	
1	24
2	25
3	26
4	27
5	28
6	29
Village(12) Jir...	
1	25
2	26
3	143
Village (13) Va...	
1	107
2	151
3	167
4	168
5	169
6	170
7	171
8	174
9	177
10	178
11	180
12	188
13	191
14	193
15	205
Dist: (2) Kola...	
Village (1) Ga...	
1	5/1
2	5/2
3	6
4	62

Appendix VI

List of Structures provided in Kolar District

A. Details of Light Vehicular Underpasses (LVUP):

S. No.	Chainage(km)	Type of crossing	Name of Village	Span Arrangement (no. x m)	Type of Structure	Minimum Vertical Clearance required (m)	Total width of structure*
Package 1 – Main Expressway							
1	19+510	VR	Maliyappanahalli	1 x 12	RCC Box	4.0	2 X 13.75
2	25+160	VR	Nambiganahalli	1 x 12	RCC Box	4.0	2 X 13.75
3	25+786	VR	Nambiganahalli	1 x 12	RCC Box	4.0	2 X 13.75
Package 2 – Main Expressway							
4	29+490	VR	Karamgutte	1 x 12	RCC Box	4.0	2 X 13.75
5	34+120	VR	Vadagere	1 x 12	RCC Box	4.0	2 X 13.75
6	36+768	VR	Sulikunte	1 x 12	RCC Box	4.0	2 X 13.75
7	38+543	VR	Madigarahalli	1 x 12	RCC Box	4.0	2 X 13.75
8	40+595	VR	Kuppanahalli	1 x 12	RCC Box	4.0	2 X 13.75
9	48+488	VR	Doddurukarapanahalli	1 x 12	RCC Box	4.0	28.75 + 21.25
Package 3 – Main Expressway							
10	57+110	VR	Nagasettihalli	1 x 12	RCC Box	4.0	2 X 13.75
11	58+900	VR	Parisepalli	1 x 12	RCC Box	4.0	2 X 13.75
12	59+455	VR	Bethamangala	1 x 12	RCC Box	4.0	2 X 13.75
13	61+831	VR	Bethamangala	1 x 12	RCC Box	4.0	2 X 13.75
14	62+150	VR	Doddakari	1 x 12	RCC Box	4.0	2 X 13.75
15	62+500	VR	Bethamangala	1 x 12	RCC Box	4.0	2 X 13.75
16	66+411	VR	Pillagundlahalli	1 x 12	RCC Box	4.0	2 X 13.75

B. Details of Vehicular Overpasses

S. No.	Chainage	Type of crossing	Names of Connecting Villages	Name of Village	Span Arrangement	Type of Structure	Minimum Vertical Clearance required	Total width of structure
Package 1 – Main Expressway								

S. No.	Chainage	Type of crossing	Names of Connecting Villages	Name of Village	Span Arrangement	Type of Structure	Minimum Vertical Clearance required	Total width of structure
1	15+573	VR	Hedaginabele - Bellavi	Bellavi	2 x 40	PSC Box Girder	5+5	1 x 12.0
Package 2 – Main Expressway								
2	31+310	VR	Parswaganahalli - Nakkanahalli	Kuntanahalli	2 x 40	PSC Box Girder	5+5	1 x 12.0
3	33+562	VR	Swamigalagollahalli - Vadagere	Karadugurki	2 x 40	PSC Box Girder	5+5	1 x 12.0
4	45+033	VR	Karabele - Maragal	Maragal	2 x 40	PSC Box Girder	5+5	1 x 12.0

C. Details of Vehicular Underpasses along Main Alignment:

S. No.	Chainage	Type of crossing	Name of Connecting Villages	Name of Village	Span Arrangement	Type of Structure	Minimum Vertical Clearance required	Total width of structure *
Package 1 – Main Expressway								
1	13+335	VR	Yelachammanahalli - Hedaginabele	Hedaginabele	1 x 12	RCC Box	5+5	2 X 13.75
2	17+720	VR	M. Sonnahalli - Abbe halli	Abbenahalli	1 x 20	PSC I Girder	5+5	2 X 13.75
3	19+857	VR	Ramenahalli - Kanivanahalli	Maliyappanahalli	1 x 12	RCC Box	5+5	2 X 13.75
4	21+960	MDR	Thornahalli - Doddashivara	Doddashivara	1 x 30	PSC I Girder	5+5	2 X 13.75
5	22+400	MDR	Hungenhalli - Doddashivara	Varadenahalli	1 x 30	PSC I Girder	5+5	2 X 13.75
6	23+750	VR	Hungenhalli - Doddasabbenahalli	Chikkasabbenahalli	1 x 12	RCC Box	5+5	2 X 13.75 + 2 x 12.5
Package 2 – Main Expressway								
7	28+126	VR	Anepura - Nidaramangala	Anepura	1 x 12	RCC Box	5+5	2 X 13.75
8	28+680	VR	Karamgutte - Annepura	Anepura	1 x 12	RCC Box	5+5	2 X 13.75
9	32+327	SH 99	Parswaganahalli - Karadagurki	Swamigalagollahalli	1 x 30	PSC I Girder	5+5	2 X 13.75
10	37+235	VR	Mugalabele - Madamangala	Madamangala	1 x12	RCC Box	5+5	2 X 13.75
11	39+610	VR	Madigarahalli - Siddanahalli	Siddanahalli	1 x12	RCC Box	5+5	2 X 13.75
12	43+687	VR	Karabele - Birandahalli	Maragal	1 x 12	RCC Box	5+5	2 X 21.25
13	47+245	VR	Ithandahalli - Nernahalli	Ithandahalli	1 x 12	RCC Box	5+5	13.75 + 21.25
14	49+220	VR	Kavaranahalli - Doddarahalli	Doddurukarapanahalli	1 x12	RCC Box	5+5	2 x 13.75
Package 3 – Main Expressway								
15	55+250	VR	Reddyhalli - Krishnarajapura	Pedampalli	1 x 30	PSC I Girder	5+5	2 x 13.75
16	56+200	VR	Pedampalli - Kammasandra	Thammenahalli	1 x 12	RCC Box	5+5	2 x 13.75
17	57+824	VR	Thammenahalli - Ramapura	Hosa(kotta)palya	1 x 12	RCC Box	5+5	2 x 13.75

S. No.	Chainage	Type of crossing	Name of Connecting Villages	Name of Village	Span Arrangement	Type of Structure	Minimum Vertical Clearance required	Total width of structure *
18	58+435	SH 95	Nagasettihalli - Kothapalya	Hosa(kotta)palya	1 x 30	PSC I Girder	5+5	2 x 13.75
19	60+560	VR	Bethamangala - Madivala	Bethamangala	1 x 30	PSC I Girder	5+5	2 x 13.75
20	63+310	VR	Doddakari(m)kambampalli - Deverahalli	Doddakari(m) kambampalli	1 x 12	RCC Box	5+5	2 x 13.75
21	64+472	VR	Doddakari(m)kambampalli - Kuluru	Kuluru	1 x 30	PSC I Girder	5+5	2 x 13.75
22	65+533	VR	Nernahalli - Kuluru	Vadrahalli	1 x 12	RCC Box	5+5	2 x 13.75
23	66+922	VR	Vadrahalli - Ramasagara	Rayasandra	1 x 12	RCC Box	5+5	2 x 13.75
24	67+673	VR	Pillagundlahallii - Sarvareddihalli	Rayasandra	1 x 30	PSC I Girder	5+5	2 x 13.75
25	69+485	VR	Rayasandra - Gopenahalli	Vengasandra	1 x 30	PSC I Girder	5+5	2 x 13.75

D. Details of Proposed Culverts along Main Alignment

S. No	Chainage	Span Arrangement	Type of Water Body	Name of Village	Type of structure	Formation width of structure
	Package 1 Main Expressway					
1	12+028	1 x 2.0 x 2.5	-	Gangapura	RCC Box	As per TCS
2	12+250	1 x 2.0 x 2.5	Stream/Nallah	Gangapura	RCC Box	As per TCS
3	12+530	1 x 2.0 x 2.5	Stream/Nallah	Gangapura	RCC Box	As per TCS
4	14+610	1 x 2.0 x 2.5	Stream/Nallah	Hedaginabele	RCC Box	As per TCS
5	14+706	2 x 3.0 x 3.0	Stream/Nallah	Hedaginabele	RCC Box	As per TCS
6	14+750	1 x 2.0 x 2.5	-	Hedaginabele	RCC Box	As per TCS
7	14+850	1 x 2.0 x 2.5	-	Hedaginabele	RCC Box	As per TCS
8	14+950	1 x 2.0 x 2.5	-	Hedaginabele	RCC Box	As per TCS
9	18+689	1 x 3.5 x 3.0	Stream/Nallah	Abbenahalli	RCC Box	As per TCS
10	18+790	1 x 5.0 x 3.0	-	Maliyappanahalli	RCC Box	As per TCS
11	18+920	1 x 3.5 x 3.0	-	Maliyappanahalli	RCC Box	As per TCS
12	19+128	2 x 2.5 x 2.5	-	Maliyappanahalli	RCC Box	As per TCS
13	21+294	2 x 2.5 x 2.5	Stream/Nallah	Obalapura	RCC Box	As per TCS
14	21+507	1 x 2.0 x 2.5	Stream/Nallah	Obalapura	RCC Box	As per TCS
15	22+430	1 x 2.0 x 2.5	-	Varadenahalli	RCC Box	As per TCS
16	22+890	1 x 2.0 x 2.5	Stream/Nallah	Varadenahalli	RCC Box	As per TCS
17	23+120	1 x 2.0 x 2.5	-	Varadenahalli	RCC Box	As per TCS

S. No	Chainage	Span Arrangement	Type of Water Body	Name of Village	Type of structure	Formation width of structure
18	24+500	1 x 2.0 x 2.5	-	Doddasabbenahalli	RCC Box	As per TCS
19	25+090	1 x 2.0 x 2.5	-	Nambiganahalli	RCC Box	As per TCS
20	25+861	1 x 2.0 x 2.5	-	Nambiganahalli	RCC Box	As per TCS
21	26+218	2 x 3.0 x 3.0	-	Nambiganahalli	RCC Box	As per TCS
	Package 2 Main Expressway					
22	26+860	1 x 2.0 x 2.5	-	Hijuvanahalli	RCC Box	As per TCS
23	27+529	1 x 2.0 x 2.5	Stream/Nallah	Hijuvanahalli	RCC Box	As per TCS
24	27+764	2 X 2.0 X 2.5	-	Hijuvanahalli	RCC Box	As per TCS
25	27+966	1 x 2.0 x 2.5	Stream/Nallah	Hijuvanahalli	RCC Box	As per TCS
26	28+113	2 X 2.5 X 3.0	Stream/Nallah	Anepura	RCC Box	As per TCS
27	28+333	3 x 2.0 x 2.5	Stream/Nallah	Anepura	RCC Box	As per TCS
28	29+640	1 x 2.0 x 2.5	-	Karamgutte	RCC Box	As per TCS
29	30+500	1 x 2.0 x 2.5	-	Kuntanahalli	RCC Box	As per TCS
30	31+735	1 x 2.0 x 2.5	-	Karadugurki	RCC Box	As per TCS
31	32+166	1 x 2.0 x 2.5	-	Karadugurki	RCC Box	As per TCS
32	33+000	1 x 2.0 x 2.5	-	Swamigalagollahalli	RCC Box	As per TCS
33	34+160	1 x 2.0 x 2.5	-	Vadagere	RCC Box	As per TCS
34	34+205	1 x 2.0 x 2.5	-	Vadagere	RCC Box	As per TCS
35	34+315	1 x 2.0 x 2.5	-	Vadagere	RCC Box	As per TCS
36	34+540	1 x 3.0 x 3.0	-	Sulikunte	RCC Box	As per TCS
37	35+800	1 x 2.0 x 2.5	Stream/Nallah	Naganathapura	RCC Box	As per TCS
38	37+110	1 x 2.0 x 2.5	-	Mugalabele	RCC Box	As per TCS
39	38+920	1 x 2.0 x 2.5	-	Madigarahalli	RCC Box	As per TCS
40	39+780	1 x 2.0 x 2.5	-	Siddanahalli	RCC Box	As per TCS
41	40+380	1 x 2.0 x 2.5	Stream/Nallah	Kuppanahalli	RCC Box	As per TCS
42	41+665	1 x 2.0 x 2.5	-	Kuppanahalli	RCC Box	As per TCS
43	42+475	1 x 2.0 x 2.5	-	Birandahalli	RCC Box	As per TCS
44	42+938	1 x 6.0 x 3.0	Stream/Nallah	Birandahalli	RCC Box	As per TCS
45	43+395	2 x 3.0 x 3.0	Stream/Nallah	Karabele	RCC Box	As per TCS
46	43+603	1 x 3.0 x 3.0	Stream/Nallah	Maragal	RCC Box	As per TCS
47	44+865	2 x 3.0 x 3.0	-	Maragal	RCC Box	As per TCS
48	45+698	2 X 3.0 X 3.0	Stream/Nallah	Ithandahalli	RCC Box	As per TCS

S. No	Chainage	Span Arrangement	Type of Water Body	Name of Village	Type of structure	Formation width of structure
49	46+275	1 x 2.0 x 2.5	-	Ithandahalli	RCC Box	As per TCS
50	46+900	1 x 2.0 x 2.5	-	Ithandahalli	RCC Box	As per TCS
51	48+450	1 x 2.0 x 2.5	-	Doddurukarapanahalli	RCC Box	As per TCS
52	48+720	1 x 2.0 x 2.5	-	Doddurukarapanahalli	RCC Box	As per TCS
53	49+455	1 x 2.0 x 2.5	-	Doddurukarapanahalli	RCC Box	As per TCS
54	52+960	2 x 3.0 x 3.0	Stream/Nallah	Gattakamadenahalli	RCC Box	As per TCS
	Package 3 Main Expressway					
55	53+640	1 x 3.0 x 2.5	-	Reddyhalli	RCC Box	As per TCS
56	54+525	1 x 3.0 x 2.0	Stream/Nallah	Reddyhalli	RCC Box	As per TCS
57	54+769	1 x 3.0 x 2.5	Stream/Nallah	Reddyhalli	RCC Box	As per TCS
58	55+050	1 x 2.0 x 2.5	Stream/Nallah	Reddyhalli	RCC Box	As per TCS
59	55+927	2 x 2.5 x 2.5	Stream/Nallah	Pedampalli	RCC Box	As per TCS
60	56+100	2 x 3.0 x 2.5	-	Thammenahalli	RCC Box	As per TCS
61	56+863	2 x 2.5 x 2.5	Stream/Nallah	Thammenahalli	RCC Box	As per TCS
62	58+540	2 x 3.0 x 3.0	-	Hosa(kotta)palya	RCC Box	As per TCS
63	59+435	2 x 3.0 x 2.5	Stream/Nallah	Bethamangala	RCC Box	As per TCS
64	59+537	1 x 2.0 x 2.5	Stream/Nallah	Bethamangala	RCC Box	As per TCS
65	59+995	1 x 2.0 x 2.5	Stream/Nallah	Bethamangala	RCC Box	As per TCS
66	60+100	1 x 2.0 x 2.5	Stream/Nallah	Bethamangala	RCC Box	As per TCS
67	61+340	1 x 2.0 x 2.5	Stream/Nallah	Doddakari	RCC Box	As per TCS
68	61+940	1 x 3.5 x 3.0	Stream/Nallah	Doddakari	RCC Box	As per TCS
69	62+077	1 x 2.0 x 2.5	Stream/Nallah	Doddakari	RCC Box	As per TCS
70	62+965	1 x 3.5 x 3.0	Stream/Nallah	Bethamangala	RCC Box	As per TCS
71	63+207	1 x 2.0 x 2.5	-	Doddakari(m)kambampalli	RCC Box	As per TCS
72	63+904	1 x 2.0 x 2.5	Stream/Nallah	Kuluru	RCC Box	As per TCS
73	64+960	2 x 2.0 x 2.5	Stream/Nallah	Vadrahalli	RCC Box	As per TCS
74	65+783	1 x 3.0 x 3.0	Stream/Nallah	Vadrahalli	RCC Box	As per TCS
75	66+115	2 x 2.5 x 2.5	Stream/Nallah	Pillagundlahalli	RCC Box	As per TCS
76	67+210	2 x 2.5 x 2.5	-	Rayasandra	RCC Box	As per TCS
77	67+920	1 x 6.0 x 3.0	Stream/Nallah	Rayasandra	RCC Box	As per TCS
78	68+000	1 x 6.0 x 3.0	Stream/Nallah	Vengasandra	RCC Box	As per TCS
79	68+152	2 x 3.0 x 2.0	-	Vengasandra	RCC Box	As per TCS

S. No	Chainage	Span Arrangement	Type of Water Body	Name of Village	Type of structure	Formation width of structure
80	68+490	1 x 2.0 x 2.5	-	Vengasandra	RCC Box	As per TCS
81	68+565	2 x 3.0 x 2.5	-	Vengasandra	RCC Box	As per TCS
82	68+647	1 x 2.0 x 2.5	-	Vengasandra	RCC Box	As per TCS
83	68+858	1 x 3.5 x 3.0	Stream/Nallah	Vengasandra	RCC Box	As per TCS
84	70+580	1 x 3.0 x 3.0	-	Vengasandra	RCC Box	As per TCS
85	70+840	1 x 2.0 x 2.5	-	N.G.Hulkur	RCC Box	As per TCS

E. Details of Proposed Culverts along Interchanges

Sl. No.	Interchange (on BCE in km)	Type	Location		Size
			Ramp/loop	Chainage (km)	No. x Width (m) x Height (m)
1	24.138	RCC Box	Ramp 1	0.200	1 x 2 x 2.5
	Package 2 IC				
2	52.085	RCC Box	Connecting road	1.323	1 x 3.0 x 3.0
	Package 3 IC				
3	68.620	RCC Box	Ramp 3	0.210	1 x 2 x 2.5
		RCC Box	Ramp 3	0.300	2 x 3 x 2.5
		RCC Box	Loop 2	0.180	2 x 3 x 2.5
		RCC Box	Loop 2	0.105	2 x 3 x 2.5
		RCC Box	Loop 1	0.260	2 x 3 x 2.5
		RCC Box	Loop 1	0.095	2 x 3 x 2.5
		RCC Box	Ramp 1	0.175	2 x 3 x 2.5
		RCC Box	Ramp 2	0.130	1 x 2 x 2.5
		RCC Box	Connecting road	0.460	1 x 2 x 2.5

ಬೆಂಗಳೂರು–ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನುಗಳ ಹಸ್ತಾಂತರಿಸಿದ ಬಗ್ಗೆ ದೃಢೀಕರಣ ಪತ್ರ
(ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 ರ ಕಲಂ 3–ಎಫ್ ನಂತೆ)

ಈ ಕೆಳಗೆ ಸಹಿ ಮಾಡಿರುವ ನಾನು / ನಾವುಗಳು ಈ ದಿನ ದಿನಾಂಕ: 21/7/ 2018 ರಂದು ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇ ಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನು ಮತ್ತು ಅದರಲ್ಲಿರುವ ಕಟ್ಟಡ, ಕೊಳವೆ ಬಾವಿ / ತೆರದ ಬಾವಿ, ಮರ ಗಿಡ ವಗೈರೆಗಳ ಸಮೀತ (ಕಿ.ಮೀ. 0/000 ರಿಂದ ಕಿ.ಮೀ. 74/870 ಮತ್ತು ಕಿ.ಮೀ. 82/150 ರಿಂದ ಕಿ.ಮೀ. 83/350 ರವರೆಗೆ) ನಿರ್ಮಾಣ, ನಿರ್ವಹಣೆ, ಸಂರಕ್ಷಣೆ ಮತ್ತು ಕಾರ್ಯನಿರ್ವಹಣೆಗಾಗಿ ಈ ಕೆಳಗಿನಂತೆ ಹಸ್ತಾಂತರಿಸಿದೆ.

ಜಿಲ್ಲೆ	ತಾಲ್ಲೂಕು	ಹೋಬಳಿ	ಗ್ರಾಮ	ಸ.ನಂ.	ವಿಸ್ತೀರ್ಣ	ತರಹೆ	ಷರಾ
ಕೋಲಾರ	ಬಂಗಾರಪೇಟೆ	ಕಸಬಾ	ಐತಂಡಹಳ್ಳಿ	54/9	506	ಖುಷ್ಕಿ	

ಕಟ್ಟಡ ಮತ್ತು ಮಾಲ್ಕಿ ವಗೈರೆ ವಿವರ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಕಟ್ಟಡ / ಮಾಲ್ಕಿ	ಸಂಖ್ಯೆ	ಷರಾ
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ಅಧಿಕಾರ:–ಕೇಂದ್ರ ಸರ್ಕಾರದ ಭೂ ಸಾರಿಗೆ ಮತ್ತು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಪ್ರಾಧಿಕಾರ ನವದೆಹಲಿ, ಇವರು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 (1956 ರ 48) ರ ಕಲಂ 3–ಡಿ ಯಂತೆ ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಹೊರಡಿಸಿರುವ ಅಧಿಸೂಚನೆ ಸಂಖ್ಯೆ ಎಸ್.ಓ. 670(ಇ) ದಿನಾಂಕ: 04–03–2016 ಅಸಾದಾರಣ ರಾಜ್ಯ ಪತ್ರದ ಭಾಗ II ಕಲಂ 3 ಉಪಕಲಂ (ii) ಹಿಂದಿ ಪುಟ ಸಂಖ್ಯೆ: 1 ರಿಂದ 164 ಮತ್ತು ಆಂಗ್ಲ ಬಾಷೆ 164 ರಿಂದ 306 ರಲ್ಲಿ ಪ್ರಕಟಿಸಿರುತ್ತದೆ.

ಹಸ್ತಾಂತರಿಸಿದೆ

ಸ್ವಾಧೀನಪಡೆದುಕೊಂಡಿದೆ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಆಸಕ್ತಿಯುಳ್ಳ / ಹಕ್ಕುದಾರನ ಹೆಸರು ಮತ್ತು ಸಹಿ	ಭೂಸ್ವಾಧೀನಾಧಿಕಾರಿಗಳ ಸಹಿ
1	(BABU. M)	Special Land Acquisition Officer and Competent Authority, NHAI Bangalore Chennai Expressway Hebbal, Bangalore - 560 024
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ಸ್ವಾಧೀನಪಡಿಸಿಕೊಂಡಿದೆ (ಎನ್.ಹೆಚ್.ಎ.ಐ)

ಬೆಂಗಳೂರು–ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನುಗಳ ಹಸ್ತಾಂತರಿಸಿದ ಬಗ್ಗೆ ದೃಢೀಕರಣ ಪತ್ರ. (ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 ರ ಕಲಂ 3–ಎಫ್ ನಂತೆ)

ಈ ಕೆಳಗೆ ಸಹಿ ಮಾಡಿರುವ ನಾನು / ನಾವುಗಳು ಈ ದಿನ ದಿನಾಂಕ: 2/7/ 2018 ರಂದು ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನು ಮತ್ತು ಅದರಲ್ಲಿರುವ ಕಟ್ಟಡ, ಕೊಳವೆ ಬಾವಿ / ತೆರದ ಬಾವಿ, ಮರ ಗಿಡ ವಗೈರೆಗಳ ಸಮೀತ (ಕಿ.ಮೀ. 0/000 ರಿಂದ ಕಿ.ಮೀ. 74/870 ಮತ್ತು ಕಿ.ಮೀ. 82/150 ರಿಂದ ಕಿ.ಮೀ. 83/350 ರವರೆಗೆ) ನಿರ್ಮಾಣ, ನಿರ್ವಹಣೆ, ಸಂರಕ್ಷಣೆ ಮತ್ತು ಕಾರ್ಯನಿರ್ವಹಣೆಗಾಗಿ ಈ ಕೆಳಗಿನಂತೆ ಹಸ್ತಾಂತರಿಸಿದೆ.

ಜಿಲ್ಲೆ	ತಾಲ್ಲೂಕು	ಹೋಬಳಿ	ಗ್ರಾಮ	ಸ.ನಂ.	ವಿಸ್ತೀರ್ಣ	ತರಹ	ಷರಾ
ಕೋಲಾರ	ಬಂಗಾರಪೇಟೆ	ಕಸಬಾ	ಐತಂಡಹಳ್ಳಿ	54/10	766	ಖುಷ್ಕಿ	

ಕಟ್ಟಡ ಮತ್ತು ಮಾಲ್ಕಿ ವಗೈರೆ ವಿವರ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಕಟ್ಟಡ / ಮಾಲ್ಕಿ	ಸಂಖ್ಯೆ	ಷರಾ
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ಅಧಿಕಾರ:–ಕೇಂದ್ರ ಸರ್ಕಾರದ ಭೂ ಸಾರಿಗೆ ಮತ್ತು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಪ್ರಾಧಿಕಾರ ನವದೆಹಲಿ, ಇವರು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 (1956 ರ 48) ರ ಕಲಂ 3–ಡಿ ಯಂತೆ ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಹೊರಡಿಸಿರುವ ಅಧಿಸೂಚನೆ ಸಂಖ್ಯೆ ಎಸ್.ಓ. 670(ಇ) ದಿನಾಂಕ: 04–03–2016 ಅಸಾದಾರಣ ರಾಜ್ಯ ಪತ್ರದ ಭಾಗ II ಕಲಂ 3 ಉಪಕಲಂ (ii) ಹಿಂದಿ ಪುಟ ಸಂಖ್ಯೆ: 1 ರಿಂದ 164 ಮತ್ತು ಆಂಗ್ಲ ಬಾಷೆ 164 ರಿಂದ 306 ರಲ್ಲಿ ಪ್ರಕಟಿಸಿರುತ್ತದೆ.

ಹಸ್ತಾಂತರಿಸಿದೆ

ಸ್ವಾಧೀನಪಡೆದುಕೊಂಡಿದೆ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಆಸಕ್ತಿಯುಳ್ಳ / ಹಕ್ಕುದಾರನ ಹೆಸರು ಮತ್ತು ಸಹಿ	ಭೂಸ್ವಾಧೀನಾಧಿಕಾರಿಗಳ ಸಹಿ
1	(BABU. M)	Special Land Acquisition Officer and Competent Authority, NHAI, Bangalore Chennai Expressway Hebbal, Bangalore - 560 024.
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ಸ್ವಾಧೀನಪಡಿಸಿಕೊಂಡಿದೆ (ಎನ್.ಹೆಚ್.ಎ.ಐ)

-ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನುಗಳ ಹಸ್ತಾಂತರಿಸಿದ ಬಗ್ಗೆ ದೃಢೀಕರಣ ಪತ್ರ. (ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 ರ ಕಲಂ 3–ಎಫ್ ನಂತೆ)

ಈ ಕೆಳಗೆ ಸಹಿ ಮಾಡಿರುವ ನಾನು / ನಾವುಗಳು ಈ ದಿನ ದಿನಾಂಕ: 2/7/ 2018ರಂದು ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇ ಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನು ಮತ್ತು ಅದರಲ್ಲಿರುವ ಕಟ್ಟಡ, ಕೊಳವೆ ಬಾವಿ / ತೆರದ ಬಾವಿ, ಮರ ಗಿಡ ವಗೈರೆಗಳ ಸಮೀತ (ಕಿ.ಮೀ. 0/000 ರಿಂದ ಕಿ.ಮೀ. 74/870 ಮತ್ತು ಕಿ.ಮೀ. 82/150 ರಿಂದ ಕಿ.ಮೀ. 83/350 ರವರೆಗೆ) ನಿರ್ಮಾಣ, ನಿರ್ವಹಣೆ, ಸಂರಕ್ಷಣೆ ಮತ್ತು ಕಾರ್ಯನಿರ್ವಹಣೆಗಾಗಿ ಈ ಕೆಳಗಿನಂತೆ ಹಸ್ತಾಂತರಿಸಿದೆ.

ಜಿಲ್ಲೆ	ತಾಲ್ಲೂಕು	ಹೋಬಳಿ	ಗ್ರಾಮ	ಸ.ನಂ.	ವಿಸ್ತೀರ್ಣ	ತರಹೆ	ಷರಾ
ಕೋಲಾರ	ಬಂಗಾರಪೇಟೆ	ಕಸಬಾ	ಐತಂಡಹಳ್ಳಿ	54/11	347	ತರಿ	

ಕಟ್ಟಡ ಮತ್ತು ಮಾಲ್ಕಿ ವಗೈರೆ ವಿವರ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಕಟ್ಟಡ / ಮಾಲ್ಕಿ	ಸಂಖ್ಯೆ	ಷರಾ
1	Delhi 404 Sqw Nobe		
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ಅಧಿಕಾರ:–ಕೇಂದ್ರ ಸರ್ಕಾರದ ಭೂ ಸಾರಿಗೆ ಮತ್ತು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಪ್ರಾಧಿಕಾರ ನವದೆಹಲಿ, ಇವರು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 (1956 ರ 48) ರ ಕಲಂ 3–ಡಿ ಯಂತೆ ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಹೊರಡಿಸಿರುವ ಅಧಿಸೂಚನೆ ಸಂಖ್ಯೆ ಎಸ್.ಓ. 670(ಇ) ದಿನಾಂಕ: 04–03–2016 ಅಸಾದಾರಣ ರಾಜ್ಯ ಪತ್ರದ ಭಾಗ II ಕಲಂ 3 ಉಪಕಲಂ (ii) ಹಿಂದಿ ಪುಟ ಸಂಖ್ಯೆ: 1 ರಿಂದ 164 ಮತ್ತು ಆಂಗ್ಲ ಬಾಷೆ 164 ರಿಂದ 306 ರಲ್ಲಿ ಪ್ರಕಟಿಸಿರುತ್ತದೆ.

ಹಸ್ತಾಂತರಿಸಿದೆ

ಸ್ವಾಧೀನಪಡೆದುಕೊಂಡಿದೆ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಆಸಕ್ತಿಯುಳ್ಳ / ಹಕ್ಕುದಾರನ ಹೆಸರು ಮತ್ತು ಸಹಿ	ಭೂಸ್ವಾಧೀನಾಧಿಕಾರಿಗಳ ಸಹಿ
1	 of Narayanamma	
2		Special Land Acquisition Officer and Competent Authority, NHAI, Bangalore Chennai Expressway Hebbal, Bangalore - 560 024.
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ಸ್ವಾಧೀನಪಡಿಸಿಕೊಂಡಿದೆ (ಎನ್.ಹೆಚ್.ಎ.ಐ)

ಬೆಂಗಳೂರು–ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನುಗಳ ಹಸ್ತಾಂತರಿಸಿದ ಬಗ್ಗೆ ದೃಢೀಕರಣ ಪತ್ರ
(ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 ರ ಕಲಂ 3–ಎಫ್ ನಂತೆ)

ಈ ಕೆಳಗೆ ಸಹಿ ಮಾಡಿರುವ ನಾನು / ನಾವುಗಳು ಈ ದಿನ ದಿನಾಂಕ: 21/7/ 2018 ರಂದು ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇ ಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನು ಮತ್ತು ಅದರಲ್ಲಿರುವ ಕಟ್ಟಡ, ಕೊಳವೆ ಬಾವಿ / ತೆರದ ಬಾವಿ, ಮರ ಗಿಡ ವಗೈರೆಗಳ ಸಮೀತ (ಕಿ.ಮೀ. 0/000 ರಿಂದ ಕಿ.ಮೀ. 74/870 ಮತ್ತು ಕಿ.ಮೀ. 82/150 ರಿಂದ ಕಿ.ಮೀ. 83/350 ರವರೆಗೆ) ನಿರ್ಮಾಣ, ನಿರ್ವಹಣೆ, ಸಂರಕ್ಷಣೆ ಮತ್ತು ಕಾರ್ಯನಿರ್ವಹಣೆಗಾಗಿ ಈ ಕೆಳಗಿನಂತೆ ಹಸ್ತಾಂತರಿಸಿದೆ.

ಜಿಲ್ಲೆ	ತಾಲ್ಲೂಕು	ಹೋಬಳಿ	ಗ್ರಾಮ	ಸ.ನಂ.	ವಿಸ್ತೀರ್ಣ	ತರಹ	ಪರಾ
ಕೋಲಾರ	ಬಂಗಾರಪೇಟೆ	ಕಸಬಾ	ಐತಂಡಹಳ್ಳಿ	54/12	101	ತರಿ	

ಕಟ್ಟಡ ಮತ್ತು ಮಾಲ್ಕಿ ವಗೈರೆ ವಿವರ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಕಟ್ಟಡ / ಮಾಲ್ಕಿ	ಸಂಖ್ಯೆ	ಪರಾ
1	ಸಿಮೆಂಟ್ ಶೀಟು	1011+1011 Sqr Mtrs	
2	ಶೌಚಾಲಯ	1	
3	ತೆಂಗಿನ	1	
4			
5			

ಅಧಿಕಾರ:– ಕೇಂದ್ರ ಸರ್ಕಾರದ ಭೂ ಸಾರಿಗೆ ಮತ್ತು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಪ್ರಾಧಿಕಾರ ನವದೆಹಲಿ, ಇವರು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 (1956 ರ 48) ರ ಕಲಂ 3–ಡಿ ಯಂತೆ ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಹೊರಡಿಸಿರುವ ಅಧಿಸೂಚನೆ ಸಂಖ್ಯೆ ಎಸ್.ಓ. 670(ಇ) ದಿನಾಂಕ: 04–03–2016 ಅಸಾದಾರಣ ರಾಜ್ಯ ಪತ್ರದ ಭಾಗ II ಕಲಂ 3 ಉಪಕಲಂ (ii) ಹಿಂದಿ ಪುಟ ಸಂಖ್ಯೆ: 1 ರಿಂದ 164 ಮತ್ತು ಆಂಗ್ಲ ಬಾಷೆ 164 ರಿಂದ 306 ರಲ್ಲಿ ಪ್ರಕಟಿಸಿರುತ್ತದೆ.

ಹಸ್ತಾಂತರಿಸಿದೆ

ಸ್ವಾಧೀನಪಡೆದುಕೊಂಡಿದೆ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಆಸಕ್ತಿಯುಳ್ಳ / ಹಕ್ಕುದಾರನ ಹೆಸರು ಮತ್ತು ಸಹಿ	ಭೂಸ್ವಾಧೀನಾಧಿಕಾರಿಗಳ ಸಹಿ
1	(BABU. M)	Special Land Acquisition Officer and Competent Authority, NHAI, Bangalore Chennai Expressway Hebbal, Bangalore - 560 024
2		
3		
4		
5		

ಸ್ವಾಧೀನಪಡಿಸಿಕೊಂಡಿದೆ (ಎನ್.ಹೆಚ್.ಎ.ಐ)

ಬೆಂಗಳೂರು–ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನುಗಳ ಹಸ್ತಾಂತರಿಸಿದ ಬಗ್ಗೆ ದೃಢೀಕರಣ ಪತ್ರ.
(ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 ರ ಕಲಂ 3–ಎಫ್ ನಂತೆ)

ಈ ಕೆಳಗೆ ಸಹಿ ಮಾಡಿರುವ ನಾನು / ನಾವುಗಳು ಈ ದಿನ ದಿನಾಂಕ: 4/6/ 2018ರಂದು ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇ ಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನು ಮತ್ತು ಅದರಲ್ಲಿರುವ ಕಟ್ಟಡ, ಕೊಳವೆ ಬಾವಿ / ತೆರದ ಬಾವಿ, ಮರ ಗಿಡ ವಗೈರೆಗಳ ಸಮೀತ (ಕಿ.ಮೀ. 0/000 ರಿಂದ ಕಿ.ಮೀ. 74/870 ಮತ್ತು ಕಿ.ಮೀ. 82/150 ರಿಂದ ಕಿ.ಮೀ. 83/350 ರವರೆಗೆ) ನಿರ್ಮಾಣ, ನಿರ್ವಹಣೆ, ಸಂರಕ್ಷಣೆ ಮತ್ತು ಕಾರ್ಯನಿರ್ವಹಣೆಗಾಗಿ ಈ ಕೆಳಗಿನಂತೆ ಹಸ್ತಾಂತರಿಸಿದೆ.

ಜಿಲ್ಲೆ	ತಾಲ್ಲೂಕು	ಹೋಬಳಿ	ಗ್ರಾಮ .	ಸ.ನಂ.	ವಿಸ್ತೀರ್ಣ	ತರಹೆ	ಪರಾ
ಕೋಲಾರ	ಬಂಗಾರಪೇಟೆ	ಕಸಬಾ	ಪತಂಡಹಳ್ಳಿ	54/13	404	ತರಿ	

ಕಟ್ಟಡ ಮತ್ತು ಮಾಲ್ಕಿ ವಗೈರೆ ವಿವರ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಕಟ್ಟಡ / ಮಾಲ್ಕಿ	ಸಂಖ್ಯೆ	ಪರಾ
1	ಕೊಳವೆ ಬಾವಿ 404 Sq/Mtrs		
2			
3			
4			
5			

ಅಧಿಕಾರ:–ಕೇಂದ್ರ ಸರ್ಕಾರದ ಭೂ ಸಾರಿಗೆ ಮತ್ತು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಪ್ರಾಧಿಕಾರ ನವದೆಹಲಿ, ಇವರು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 (1956 ರ 48) ರ ಕಲಂ 3–ಡಿ ಯಂತೆ ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಹೊರಡಿಸಿರುವ ಅಧಿಸೂಚನೆ ಸಂಖ್ಯೆ ಎಸ್.ಓ. 670(ಇ) ದಿನಾಂಕ: 04–03–2016 ಅಸಾದಾರಣ ರಾಜ್ಯ ಪತ್ರದ ಭಾಗ II ಕಲಂ 3 ಉಪಕಲಂ (ii) ಹಿಂದಿ ಪುಟ ಸಂಖ್ಯೆ: 1 ರಿಂದ 164 ಮತ್ತು ಆಂಗ್ಲ ಬಾಷೆ 164 ರಿಂದ 306 ರಲ್ಲಿ ಪ್ರಕಟಿಸಿರುತ್ತದೆ.

ಹಸ್ತಾಂತರಿಸಿದೆ

ಸ್ವಾಧೀನಪಡೆದುಕೊಂಡಿದೆ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಆಸಕ್ತಿಯುಳ್ಳ / ಹಕ್ಕುದಾರನ ಹೆಸರು ಮತ್ತು ಸಹಿ	ಭೂಸ್ವಾಧೀನಾಧಿಕಾರಿಗಳ ಸಹಿ
1	ಮುರಿಕಿ ಮಲ್ಲಿಕ (Markandappa)	Special Land Acquisition Officer and Competent Authority, NHAI, Bangalore Chennai Expressway Hebbal, Bangalore - 560 024
2		
3		
4		
5		

ಸ್ವಾಧೀನಪಡಿಸಿಕೊಂಡಿದೆ (ಎನ್.ಹೆಚ್.ಎ.ಐ)

ಬೆಂಗಳೂರು–ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನುಗಳ ಹಸ್ತಾಂತರಿಸಿದ ಬಗ್ಗೆ ದೃಢೀಕರಣ ಪತ್ರ.
(ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 ರ ಕಲಂ 3–ಎಫ್ ನಂತೆ)

ಈ ಕೆಳಗೆ ಸಹಿ ಮಾಡಿರುವ ನಾನು / ನಾವುಗಳು ಈ ದಿನ ದಿನಾಂಕ: 2/7/ 2019ರಂದು ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇ ಗೆ ಭೂಸ್ವಾಧೀನವಾಗಿರುವ ಜಮೀನು ಮತ್ತು ಅದರಲ್ಲಿರುವ ಕಟ್ಟಡ, ಕೊಳವೆ ಬಾವಿ / ತೆರದ ಬಾವಿ, ಮರ ಗಿಡ ವಗೈರೆಗಳ ಸಮೀತ (ಕಿ.ಮೀ. 0/000 ರಿಂದ ಕಿ.ಮೀ. 74/870 ಮತ್ತು ಕಿ.ಮೀ. 82/150 ರಿಂದ ಕಿ.ಮೀ. 83/350 ರವರೆಗೆ) ನಿರ್ಮಾಣ, ನಿರ್ವಹಣೆ, ಸಂರಕ್ಷಣೆ ಮತ್ತು ಕಾರ್ಯನಿರ್ವಹಣೆಗಾಗಿ ಈ ಕೆಳಗಿನಂತೆ ಹಸ್ತಾಂತರಿಸಿದೆ.

ಜಿಲ್ಲೆ	ತಾಲ್ಲೂಕು	ಹೋಬಳಿ	ಗ್ರಾಮ	ಸ.ನಂ.	ವಿಸ್ತೀರ್ಣ	ತರಹೆ	ಷರಾ
ಕೋಲಾರ	ಬಂಗಾರಪೇಟೆ	ಕಸಬಾ	ಐತಂಡಹಳ್ಳಿ	54/14	404	ತರಿ	

ಕಟ್ಟಡ ಮತ್ತು ಮಾಲ್ಕಿ ವಗೈರೆ ವಿವರ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಕಟ್ಟಡ / ಮಾಲ್ಕಿ	ಸಂಖ್ಯೆ	ಷರಾ
1	Land Only Sq/mts		
2			
3			
4			
5			

ಅಧಿಕಾರ:–ಕೇಂದ್ರ ಸರ್ಕಾರದ ಭೂ ಸಾರಿಗೆ ಮತ್ತು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಪ್ರಾಧಿಕಾರ ನವದೆಹಲಿ, ಇವರು ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ಕಾಯ್ದೆ 1956 (1956 ರ 48) ರ ಕಲಂ 3–ಡಿ ಯಂತೆ ಬೆಂಗಳೂರು – ಚೆನ್ನೈ ಎಕ್ಸ್‌ಪ್ರೆಸ್ ವೇಗೆ ಹೊರಡಿಸಿರುವ ಅಧಿಸೂಚನೆ ಸಂಖ್ಯೆ ಎಸ್.ಓ. 670(ಇ) ದಿನಾಂಕ: 04–03–2016 ಅಸಾದಾರಣ ರಾಜ್ಯ ಪತ್ರದ ಭಾಗ II ಕಲಂ 3 ಉಪಕಲಂ (ii) ಹಿಂದಿ ಪುಟ ಸಂಖ್ಯೆ: 1 ರಿಂದ 164 ಮತ್ತು ಆಂಗ್ಲ ಭಾಷೆ 164 ರಿಂದ 306 ರಲ್ಲಿ ಪ್ರಕಟಿಸಿರುತ್ತದೆ.

ಹಸ್ತಾಂತರಿಸಿದೆ

ಸ್ವಾಧೀನಪಡೆದುಕೊಂಡಿದೆ

ಕ್ರಮ. ಸಂಖ್ಯೆ	ಆಸಕ್ತಿಯುಳ್ಳ / ಹಕ್ಕುದಾರನ ಹೆಸರು ಮತ್ತು ಸಹಿ	ಭೂಸ್ವಾಧೀನಾಧಿಕಾರಿಗಳ ಸಹಿ
1	(BABU.M)	
2		Special Land Acquisition Officer and Competent Authority, NHAI, Bangalore Chennai Expressway Hebbal, Bangalore - 560 024.
3		
4		
5		

ಸ್ವಾಧೀನಪಡಿಸಿಕೊಂಡಿದೆ (ಎನ್.ಹೆಚ್.ಎ.ಐ)

ANNEXURE-9.1

TREE PLANTATION STRATEGY

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

Aim and Objective of Tree Plantation: -

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

Tree Plantation Strategy

Plantation is one of the most important constituents of soft landscaping. Trees, shrubs and climbers have been used to enhance the soft natural ambience against harsh elements in most of the enhancement schemes. The planting species are decided based on the physical growth characteristics of trees, like form and shape, foliage pattern, growth rate, branching pattern, soil characteristics etc. While selecting the species of trees for landscaping a great care should be taken to choose the species, which already exist on the project corridor. The tree plantation will be carried out in accordance with the IRC: SP: 21:2009 guidelines and specifications.

Plantation Pattern

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

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

6. The last row to be planted with tall shade bearing trees for better road safety and for enhancing aesthetics.

Tree Plantation along the Highway Section

1st Row

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

Table A-4.1: Species recommended for 1st row plantation

S.No	Botanical Name	Local Name
1	*Cassia fistula*	Amaltas
2	*Terminalia arjuna*	Arjun
3	*Delonix regia*	Gulmohar
4	*Bauhinia sps*	Kachnar
5	*Cassia nodusa*	Cassia

2nd Row

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

Table A4.2: Species recommended for subsequent row plantation

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

Subsequent Rows

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

Table A4.3: Species recommended for Subsequent rows

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

Shrub plantation for Median

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

Table A4.4: Species recommended for Median

S.No	Botanical Name	Local Name
1	Thaventia nerifolia	Kaner
2	Bouganvillea sps.	Bouganvillea
3	Ipomia	

Plantation along the Embankments

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

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

1. Ornamental plants except last row

- Distance from embankment : 1.0m away from the toe of the embankment
- Spacing between plant to plant : 3m
- Spacing between rows : 3m
- Size of the pits : 60x60x60 cms
- For alkaline soils : By auger
- Water logged areas : mounds with height varying depending on the water level
- Species recommended : Listed in **Table A4.1** and **Table A4.2.**
- No of plants per Km : 333
- Height of plant : 1.5 to 2m

2. Shaded plants (Last row)

- Distance from the preceding row : 3.0m
- Spacing between plant to plant : 12m
- Size of the pits
- Normal size : 60x60x60 cms
- For alkaline soils : By auger
- Water logged areas : mounds
- Species recommended : Listed in **Table A4.3**
- No of plants per Km : 84
- Height of plant : more than 2m

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

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

2. Shrubs (For Median/ Embankment)

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

- Size of the pits for planting shrubs : 45x45x45 cms
- Species recommended : Listed in **Table A4.4**
- No of plants per Km : 666 (For two rows in the median)
- Use of compost and manure : 1/3 of volume of pit mixed with soil and refilled

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

Plantation at Road Junctions/ Intersection and Traffic Islands

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

Plantation at the Sensitive noise receptors

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

Tree Plantation Strategy for BCE-Phase-I

A total of 20,748 number of trees are likely to be felled. As per direction of NGT, 10 trees will be planted for every tree which gets cut. So a total number of 207480 trees are to be planted. The actual number of trees to be planted within the available right of way of Bangalore-Chennai Expressway Phase-I is 49423. The balance number of trees will be planted in the degraded forest areas as per the instructions from the forest department. The Chainage wise and row wise number of trees to be planted within the available right of way in BCE Phase-I is given in Table 10.1A,10.1B,10.1C,10.1D.

Table 10.1A: The Chainage and Row Wise Number of Trees to be Planted within RoW of BCE Phase-I for Type-1 Cross Section

CHAINAGE		LENGTH	TYPE	LHS	LHS	LHS	RHS	RHS	RHS	TOTAL
START	END			Ist Row	II Nd Row	IIIrd Row	Ist Row	II Nd Row	IIIrd Row	
1+530	1+694	164	TYPE-1	55	27	14	55	27	14	191
1+706	1+840	134	TYPE-1	45	22	11	45	22	11	156
1+880	2+100	220	TYPE-1	73	37	18	73	37	18	257
2+600	3+000	400	TYPE-1	133	67	33	133	67	33	467
3+200	4+125	925	TYPE-1	308	154	77	308	154	77	1079
4+455	4+500	45	TYPE-1	15	8	4	15	8	4	53
5+400	5+500	100	TYPE-1	33	17	8	33	17	8	117
6+160	6+202	42	TYPE-1	14	7	4	14	7	4	49
6+218	6+613	395	TYPE-1	132	66	33	132	66	33	461
7+039	7+235	196	TYPE-1	65	33	16	65	33	16	229
7+505	8+314	809	TYPE-1	270	135	67	270	135	67	944
8+326	8+739	413	TYPE-1	138	69	34	138	69	34	482

CHAINAGE		LENGTH	TYPE	LHS	LHS	LHS	RHS	RHS	RHS	TOTAL
START	END			Ist Row	II Nd Row	IIIrd Row	Ist Row	II Nd Row	IIIrd Row	
8+751	9+162	411	TYPE-1	137	69	34	137	69	34	480
10+775	10+939	164	TYPE-1	55	27	14	55	27	14	191
10+951	10+971	20	TYPE-1	7	3	2	7	3	2	23
10+981	11+337	356	TYPE-1	119	59	30	119	59	30	415
11+372	11+644	273	TYPE-1	91	46	23	91	46	23	319
11+656	11+833	176	TYPE-1	59	29	15	59	29	15	205
12+350	13+160	81	TYPE-1	27	14	7	27	14	7	95
13+700	14+100	400	TYPE-1	133	67	33	133	67	33	467
16+870	17+040	170	TYPE-1	57	28	14	57	28	14	198
17+650	17+710	60	TYPE-1	20	10	5	20	10	5	70
17+730	18+000	270	TYPE-1	90	45	23	90	45	23	315
18+600	19+120	520	TYPE-1	173	87	43	173	87	43	607
19+260	19+504	244	TYPE-1	81	41	20	81	41	20	285
19+516	19+851	335	TYPE-1	112	56	28	112	56	28	391
19+863	20+119	256	TYPE-1	85	43	21	85	43	21	299
20+133	20+445	312	TYPE-1	104	52	26	104	52	26	364
20+455	20+980	525	TYPE-1	175	88	44	175	88	44	613
22+000	22+385	385	TYPE-1	128	64	32	128	64	32	449
22+800	23+315	515	TYPE-1	172	86	43	172	86	43	601
23+345	23+55	205	TYPE-1	68	34	17	68	34	17	239
24+152	24+200	490	TYPE-1	163	82	41	163	82	41	572
24+63	25+154	524	TYPE-1	175	87	44	175	87	44	611
25+166	25+750	584	TYPE-1	195	97	49	195	97	49	681
25+950	26+400	450	TYPE-1	150	75	38	150	75	38	525
26+400	27+000	600	TYPE-1	200	100	50	200	100	50	700
27+010	27+224	214	TYPE-1	71	36	18	71	36	18	250
27+254	28+050	796	TYPE-1	265	133	66	265	133	66	929
29+650	29+840	190	TYPE-1	63	32	16	63	32	16	222
30+300	30+615	315	TYPE-1	105	53	26	105	53	26	368
30+795	30+970	175	TYPE-1	58	29	15	58	29	15	204

CHAINAGE		LENGTH	TYPE	LHS	LHS	LHS	RHS	RHS	RHS	TOTAL
START	END			Ist Row	II Nd Row	IIIrd Row	Ist Row	II Nd Row	IIIrd Row	
31+500	31+900	400	TYPE-1	133	67	33	133	67	33	467
32+350	33+100	750	TYPE-1	250	125	63	250	125	63	875
34+000	34+114	114	TYPE-1	38	19	10	38	19	10	133
34+126	34+650	524	TYPE-1	175	87	44	175	87	44	611
34+950	35+031	81	TYPE-1	27	14	7	27	14	7	95
35+039	35+216	177	TYPE-1	59	30	15	59	30	15	207
35+238	35+453	215	TYPE-1	72	36	18	72	36	18	251
35+900	36+202	302	TYPE-1	101	50	25	101	50	25	352
36+216	36+446	231	TYPE-1	77	39	19	77	39	19	270
36+458	36+762	304	TYPE-1	101	51	25	101	51	25	355
36+774	37+100	326	TYPE-1	109	54	27	109	54	27	380
37+350	37+450	100	TYPE-1	33	17	8	33	17	8	117
37+600	37+775	175	TYPE-1	58	29	15	58	29	15	204
37+785	38+275	490	TYPE-1	163	82	41	163	82	41	572
38+390	38+537	147	TYPE-1	49	25	12	49	25	12	172
38+549	38+900	351	TYPE-1	117	59	29	117	59	29	410
39+700	40+589	889	TYPE-1	296	148	74	296	148	74	1037
40+601	40+835	234	TYPE-1	78	39	20	78	39	20	273
40+925	40+945	20	TYPE-1	7	3	2	7	3	2	23
40+955	40+980	25	TYPE-1	8	4	2	8	4	2	29
43+651	43+681	30	TYPE-1	10	5	3	10	5	3	35
43+693	44+250	557	TYPE-1	186	93	46	186	93	46	650
44+350	44+613	263	TYPE-1	88	44	22	88	44	22	307
45+593	45+870	277	TYPE-1	92	46	23	92	46	23	323
46+035	46+350	315	TYPE-1	105	53	26	105	53	26	368
46+550	46+678	128	TYPE-1	43	21	11	43	21	11	149
46+698	46+900	202	TYPE-1	67	34	17	67	34	17	236
47+675	48+050	375	TYPE-1	125	63	31	125	63	31	438
48+371	48+482	111	TYPE-1	37	19	9	37	19	9	130
48+494	48+918	423	TYPE-1	141	71	35	141	71	35	494

CHAINAGE		LENGTH	TYPE	LHS	LHS	LHS	RHS	RHS	RHS	TOTAL
START	END			Ist Row	II Nd Row	IIIrd Row	Ist Row	II Nd Row	IIIrd Row	
48+935	49+214	279	TYPE-1	93	47	23	93	47	23	326
50+500	50+682	182	TYPE-1	61	30	15	61	30	15	212
50+957	51+100	143	TYPE-1	48	24	12	48	24	12	167
51+300	51+422	122	TYPE-1	41	20	10	41	20	10	142
52+038	52+068	30	TYPE-1	10	5	3	10	5	3	35
52+103	52+25	148	TYPE-1	49	25	12	49	25	12	173
52+500	52+656	156	TYPE-1	52	26	13	52	26	13	182
52+674	53+000	326	TYPE-1	109	54	27	109	54	27	380
53+043	53+05	70	TYPE-1	23	12	6	23	12	6	82
53+050	53+109	59	TYPE-1	20	10	5	20	10	5	69
53+137	53+181	44	TYPE-1	15	7	4	15	7	4	51
53+209	53+284	75	TYPE-1	25	13	6	25	13	6	88
53+500	55+000	1500	TYPE-1	500	250	125	500	250	125	1750
55+275	55+742	467	TYPE-1	156	78	39	156	78	39	545
56+206	56+725	519	TYPE-1	173	87	43	173	87	43	606
57+000	57+104	104	TYPE-1	35	17	9	35	17	9	121
57+116	57+266	15	TYPE-1	5	3	1	5	3	1	18
57+676	57+818	142	TYPE-1	47	24	12	47	24	12	166
58+073	58+25	177	TYPE-1	59	30	15	59	30	15	207
58+544	58+894	350	TYPE-1	117	58	29	117	58	29	408
58+906	59+109	203	TYPE-1	68	34	17	68	34	17	237
59+778	60+52	742	TYPE-1	247	124	62	247	124	62	866
60+520	60+545	25	TYPE-1	8	4	2	8	4	2	29
60+575	61+036	461	TYPE-1	154	77	38	154	77	38	538
61+100	61+712	612	TYPE-1	204	102	51	204	102	51	714
62+700	63+000	300	TYPE-1	100	50	25	100	50	25	350
63+670	63+750	80	TYPE-1	27	13	7	27	13	7	93
64+718	64+850	132	TYPE-1	44	22	11	44	22	11	154
65+700	66+405	705	TYPE-1	235	118	59	235	118	59	823
66+417	66+650	233	TYPE-1	78	39	19	78	39	19	272

CHAINAGE		LENGTH	TYPE	LHS	LHS	LHS	RHS	RHS	RHS	TOTAL
START	END			Ist Row	II Nd Row	IIIrd Row	Ist Row	II Nd Row	IIIrd Row	
68+016	68+607	591	TYPE-1	197	99	49	197	99	49	690
68+634	69+156	522	TYPE-1	174	87	44	174	87	44	609
69+220	69+400	180	TYPE-1	60	30	15	60	30	15	210
70+100	70+230	130	TYPE-1	43	22	11	43	22	11	152
70+881	71+000	119	TYPE-1	40	20	10	40	20	10	139
									TOTAL	**37728**

Table 10.1B: The Chainage and Row Wise Number of Trees to be Planted within RoW of BCE Phase-I for Type-2 Cross Section

CHAINAGE		LENGTH	TYPE	LHS	LHS	LHS	RHS	RHS	RHS	TOTAL
START	END			Ist Row	II Nd Row	IIIrd Row	Ist Row	II Nd Row	IIIrd Row	
0+530	1+024	494	Type-2	165	82	41	165	82	41	576
1+037	1+530	494	Type-2	165	82	41	165	82	41	576
4+500	4+725	225	Type-2	75	38	19	75	38	19	263
9+162	10+114	952	Type-2	317	159	79	317	159	79	1111
10+146	10+775	629	Type-2	210	105	52	210	105	52	734
15+100	15+500	400	Type-2	133	67	33	133	67	33	467
15+500	15+567	66	Type-2	22	11	6	22	11	6	77
15+580	16+870	1291	Type-2	430	215	108	430	215	108	1506
18+000	18+600	600	Type-2	200	100	50	200	100	50	700
29+840	30+300	460	Type-2	153	77	38	153	77	38	537
30+970	31+304	334	Type-2	111	56	28	111	56	28	390
31+317	31+500	183	Type-2	61	31	15	61	31	15	214
33+100	33+556	455	Type-2	152	76	38	152	76	38	531
33+569	34+000	431	Type-2	144	72	36	144	72	36	503
34+650	34+950	300	Type-2	100	50	25	100	50	25	350
44+717	45+027	310	Type-2	103	52	26	103	52	26	362
45+040	45+593	554	Type-2	185	92	46	185	92	46	646
48+250	48+371	121	Type-2	40	20	10	40	20	10	141
50+721	50+845	124	Type-2	41	21	10	41	21	10	145

CHAINAGE		LENGTH	TYPE	LHS	LHS	LHS	RHS	RHS	RHS	TOTAL
START	END			Ist Row	II Nd Row	IIIrd Row	Ist Row	II Nd Row	IIIrd Row	
51+422	51+758	336	Type-2	112	56	28	112	56	28	392
53+324	53+459	135	Type-2	45	23	11	45	23	11	158
									TOTAL	10376

Table 10.1C: The Chainage and Row Wise Number of Trees to be Planted within RoW of BCE Phase-I for Type-3 Cross Section

CHAINAGE		LENGTH	TYPE	LHS	LHS	LHS	RHS	RHS	RHS	TOTAL
START	END			Ist Row	II Nd Row	IIIrd Row	Ist Row	II Nd Row	IIIrd Row	
38+275	38+390	115	Type-3	38	19	10	38	19	10	134
50+845	50+957	112	Type-3	37	19	9	37	19	9	131
53+284	53+324	40	Type-3	13	7	3	13	7	3	47
53+459	53+500	41	Type-3	14	7	3	14	7	3	48
									TOTAL	359

Table 10.1D: The Chainage and Row Wise Number of Trees to be Planted within RoW of BCE Phase-I for Type-4 Cross Section

CHAINAGE		LENGTH	TYPE	LHS	LHS	LHS	RHS	RHS	RHS	TOTAL
START	END			Ist Row	II Nd Row	IIIrd Row	Ist Row	II Nd Row	IIIrd Row	
3+000	3+200	200	Type-4	67	33	17	67	33	17	233
44+613	44+717	104	Type-4	35	17	9	35	17	9	121
48+050	48+250	200	Type-4	67	33	17	67	33	17	233
50+682	50+721	39	Type-4	13	7	3	13	7	3	46
51+758	52+038	280	Type-4	93	47	23	93	47	23	327
									TOTAL	960

Financial Outlay for Compensatory Plantation:

Following table presents the tentative cost of tree plantation time schedule (5 years of maintenance)

S. No	Description of Works for Tree Plantations	Per Tree Cost (In INR)
Total Expenditure in Ist Year		
1.	Site Clearance	19.60
2.	Pit Digging	14.15
3.	Manure or Vermicomposting	6.77
4.	Transportation of Fertile Soil	4.13
5.	Neem Cake	2.71
6.	Thimet, Foret or Chloropyrlfos	1.02
7.	Cost of Plant	24.37
8.	Soil Mixing, Pit filling, planting, irrigation, gap filling and fertilizer	10.00
9.	Bamboo Tree Guard	184.00
10.	Plant Protection Chemicals	6.77
11.	DAP as top dressing	2.03
12.	Complete supervision (irrigation, weeding, hoeing, chemical spraying)	125.57
13.	Irrigation facility	10.83
Total Expenditure in 2nd Year		
A	20% Filling gap	6.77
B	Expenditure on Fertilizer and plant protection	10.00
C	Irrigation facility	1.69
D	Complete supervision (irrigation, weeding, hoeing, chemical spraying)	125.57
Total Expenditure in 3rd Year		
A	10% gap filling	3.38
B	Expenditure on Fertilizer and plant protection	20.00
C	Irrigation facility	2.50
24.	Complete supervision (irrigation, weeding, hoeing, chemical spraying)	125.57
Total Expenditure in 4th Year		
A	Expenditure on Fertilizer	10.00
B	Complete supervision (irrigation, weeding, hoeing, chemical spraying)	125.57
Total Expenditure in 5th Year		
A	Expenditure on Fertilizer and plant protection	10.00
B	Complete supervision (irrigation, weeding, hoeing, chemical spraying)	125.57
	Total	978.55
	Contingency	48.93
	Grand Total	1027.47
	Cost of Plantation of Per Tree including 5 year maintainance	**1027.00**

Total No. of trees to be planted = 207480
Cost of per tree plantation with 5 year maintenance = 1027
Total cost of Compensatory Plantation including 5 year maintenance = 1027 x 207480 = Rs. 213081960/-
Say Rs. 21.31 Crores

ANNEXURE-9.2

PLANT SITE MANAGEMENT

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

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

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

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

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

2. Statutory Requirements:

- Obtaining Consent-for-Establishment (CFE) under Air and Water Acts from the State Pollution Control Board (KSPCB) before start of installation.
- Obtaining Consent-for-Operation (CFO) under Air and Water Acts from the State Pollution Control (KSPCB) before start of commissioning and trial run
- Complying with the terms and conditions laid down in the CFE and CFO, which generally include providing metallic road inside plant campus for movement of vehicles, plantation, periodic (monthly) pollution monitoring i.e. ambient air, noise and stack emission
- The suspended particulate matter contribution value at a distance of 40 m from a controlled isolated as well as from a unit located in a cluster should be less than 600 g/m3 or as shall be prescribed by State Pollution Control Board (KSPCB).
- Obtain certificates from manufacturer for Type Approval and Conformity of Production for Diesel Generator (DG) set/s. For DG sets of capacity up to 1000 KVA, the noise level at 1m from the enclosure surface shall not exceed 75 dB (A).

3. Pollution control measures

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

- Prefer bulk bitumen storage with mechanized handling facilities that storage in drums with manual operation at HMP to prevent / minimize bitumen spillage and thereby contaminating soil and water.
- Impervious platform for storage of bituminous and other liquid hazardous chemical
- Bag house filter / multi-cone cyclone for emission control. For bag house, cartridge filters reported to be more efficient than fabric filters.
- The stone crusher plants should be installed with operational water sprinklers over jaw crusher, conveyor belts and vibratory screens.
- Pollution control measures for Diesel Generator (DG) set i.e. stack height, acoustic enclosure etc.
- Periodical maintenance of all the plant and equipments to keep the plants in order.
- Damaged bag-house and filters should be immediately replaced.
- All the workers shall use all the time helmets, footwear, earplugs, facemasks etc. when the plants are operational.
- No workers should be allowed to work in loose clothes near conveyor belts.
- Proper lighting arrangement shall be made around plant site if the plants are operated during dark hours.
- Provision of first aid kit, fire fighting equipments at the plant site at appropriate location to respond in case of accident.
- Periodical monitoring of air quality and noise levels as per conditions stipulated under the statutory clearance from KSPCB. Whenever the emission exceeds the permissible level the plants should be stopped and necessary repairing works of faults will be done to bring down the emission levels.
- The office complex, residential units shall be constructed on upwind direction from the plant site.

ANNEXURE -9.3

BORROW AREAS MANAGEMENT PLAN

1. INTRODUCTION:

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

2. PROJECT PLANNING AND DESIGN STAGE:

Design measures for reduction in the quantity of the earthwork will have to be undertaken to reduce the quantity of material extracted and consequently decrease the borrow area requirement. The DPR shall contain Guidelines for locating site of borrow areas and borrow material specifications.

3. IDENTIFICATION OF THE BORROW AREAS:

Specific locations of borrow areas will be identified by contractor. The selection and recommendations of borrow areas will be based on environmental as well as civil engineering considerations. Location of source of supply of material for embankment or sub-grade and the procedure for excavation or transport of material shall be in compliance with the environmental requirements of MoEF&CC.

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

Borrow Area Identification:

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

4. PRE-CONSTRUCTION STAGE:

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

Borrowing to be avoided on the following areas:

- Lands close to toe line.
- Irrigated agricultural lands (In case of necessity for borrowing from such lands, the topsoil shall be preserved in stockpiles.);
- Grazing land.
- Lands within 1km of settlements;
- A distance of 1km should be maintained from environmentally sensitive areas such as Reserve Forests, Protected Forests, wetlands.
    - No borrow ares will be opened in Ecosensitive zone of WildlifeSanctuary/ National parks,
- Designated protected areas / forests.
- Unstable side-hills.
- Seepage areas.
- Areas supporting rare plant/ animal species;
- Ensure unsuitable soft rock is not prominent within the proposed depth of excavation which will render rehabilitation difficult.

5. CONSTRUCTION STAGE:

No borrow area shall be operated without Environment Clearance & Environment Clearance condition. In addition, the contractor should adopt precautionary measures to minimize any adverse impacts on the environment. Checklists for monitoring borrow areas operation and management has been prepared (Table 1).

Table 1: Checklist for Monitoring Borrow Area Operation and Management

Attributes	**Requirements**
Access Road	Access road shall be used for hauling only after approval.
Top soil preservation	Top soil, if any, shall be stripped and stored at corners of the area before the start of excavation for material collection; Top soil should be reused / re-laid as per agreed plan; In case of riverside, borrow pit should be located not less than 15m from the toe of the bank, distance depending on the magnitude and duration of flood to be withstood. In no case shall be borrow pit be within 1.5m from the Toe line of the proposed embankment.
Depth of excavation	For agricultural land, the total depth of excavation should be limited to 150cm including top 30 cm for top soil preservation; For river side borrow area, the depth of excavation shall be regulated so that the inner edge of any borrow pit, should not be less than 15m from the

	toe of the bank and bottom of the pit should not cut the imaginary line of 1:4 projected from the edge of the final section of the embankment. To avoid any embankment slippage, the borrow areas will not be dug continuously and the size and shape of borrow pits will be decided by the Engineer in charge.
Damage to surrounding land	Movement of man and machinery should be regulated to avoid damage to surrounding land. To prevent damages to adjacent properties, the Contractor shall ensure that an undisturbed buffer zone exists between the distributed borrow areas and adjacent land. Buffer zone shall be 3 m wide or equal to the depth of excavation whichever is greater.
Drainage control	The Contractor shall maintain erosion and drainage control in the vicinity of all borrow pits and make sure that surface drains do not affect the adjacent land or future reclamation. This needs to be rechecked by the Engineer in charge.
Dust Suppression	Water should be sprayed on kutcha haul road twice a day or as may be required to avoid dust generation during transportation of material; Depending on moisture content, 0.5 to 1.5% water may be added to excavated soil before loading during dry weather to avoid fugitive dust emission.
Covering material for transport material	Material transport shall be provided with tarpaulin cover
Personal Protective Equipment	Workers should be provided with helmet, gumboots and air mask and their use should be strictly enforced.
Redevelopment	The area should be redeveloped within agreed timeframe on completion of material collection as per agreed rehabilitation plan.

6. POST CONSTRUCTION STAGE:

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

7. OPERATION:

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

Precautionary measures as the covering of vehicles will be taken to avoid spillage during transport of borrow materials. To ensure that the spills, which might result from the transport of borrow materials do not impact the settlements, it will be ensured that the excavation and

carrying of earth will be done during day time only. The unpaved surfaces used for the haulage of borrow materials will be maintained properly. A general guideline will be followed in the line of MoEF&CC conditions as follows:

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

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

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

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

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

Borrow pits along Roadside: Borrow pits shall be located 10 m away from the toe of the embankment. Depth of the pit should be such that the bottom of the pit shall not fall within an imaginary line of slope 1 vertical to 4 horizontal projected from the edge of the final section of the bank. Borrow pits should not be dug continuously. Ridges of not less than 8 m width should be left at intervals not exceeding 300m. Small drains should be cut through the ridges to facilitate drainage.

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

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

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

8. BORROW AREA REDEVELOPMENT:

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

9. CHECKLIST FOR INSPECTION OF REHABILITATION AREA

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

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

10. STATUTORY CLEARANCE FOR BORROW AREA:

Regarding the borrow area for ordinary soil, the Contractor has to obtain environmental clearance from State Environmental Impact Assessment Authority (SEIAA) or District Environmental Impact Assessment Authority (DEIAA) of MoEF&CC vide their notification no. S.O. 141(E) dated 15th January 2016. If the area of a borrow area is less than 5 Ha then this will be treated as Category-B-2 Project and will be appraised and approved based of only Form-1. No EIA study will be required for such area. However if the size of the borrow area is more than 5 Ha then it will be categorized as "Category-B1" and therefore will require EIA study, based on which the SEIAA will give clearance for the same.

PROCEDURE FOR ENVIRONMENTAL CLEARANCE FOR MINING OF MINOR MINERALS INCLUDING CLUSTER:

ANNEXURE -9.3

The following policy shall be followed for environmental clearance of mining of minor minerals including cluster situation:-

1. The data provided by the States (Sustainable Sand Mining Guidelines) shows that most of the mining leases for minor minerals are of lease area less than 5 hectare. It is also reported that in hill States getting a stretch in river with area more than 5 hectare is very uncommon. So the size of lease for minor minerals including river sand mining will be determined by the States as per their circumstances.
2. The mining of minor minerals is mostly in clusters. The Environment Impact Assessment or Environment Management Plan is required to be prepared for the entire cluster in order to capture all the possible externalities. These reports shall capture carrying capacity of the cluster, transportation and related issues, replenishment and recharge issues, geo-hydrological study of the cluster area. The Environment Impact Assessment or Environment Management Plan shall be prepared by the State or State nominated Agency or group of project proponents in the Cluster or the project proponent in the cluster.
3. There shall be one public consultation for entire cluster after which the final Environment Impact Assessment or Environment Management Plan report for the cluster shall be prepared.
4. Environmental clearance shall be applied for and issued to the individual project proponent. The individual lease holders in cluster can use the same Environment Impact Assessment or Environment Management Plan for application for environmental clearance. The cluster Environment Impact Assessment or Environment Management Plan shall be updated as per need keeping in view any significant change.
5. The details of cluster Environment Impact Assessment or Environment Management Plan shall be reflected in each environmental clearance in that cluster and DEAC, SEAC, and EAC shall ensure that the mitigative measures emanating from the Environment Impact Assessment or Environment Management Plan study are fully reflected as environmental clearance conditions in the environmental clearance's of individual project proponents in that cluster.
6. A cluster shall be formed when the distance between the peripheries of one lease is less than 500 meters from the periphery of other lease in a homogeneous mineral area.
7. Form 1M, Pre-Feasibility Report and mine plan for Category 'B2' projects for mining of minor minerals shall be prepared by the Registered Qualified Person or Accredited Consultants of Quality Council of India, National Accreditation Board for Education and Training. The Environment Impact Assessment or Environment Management Plan for Category 'A' and Category 'B1' projects shall be prepared by the accredited consultants of Quality Council of India, National Accreditation Board for Education and Training.
8. The SEIAAs shall have supervisory jurisdiction over the DEIAAs and decisions of DEIAA shall be reviewed by the SEIAA without prejudice to any provisions under any existing law.

ANNEXURE -9.3

Schematic Presentation of Requirements on Environmental Clearance of Minor Minerals including cluster situation

Area of Lease (Ha)	Category of Project	Requirement Of EIA / EMP	Requirement Of Public Hearing	Requirement Of EC	Who can prepare EIA/ EMP	Who will apply for EC	Authority to appraise/ grant EC	Authority to monitor EC compliance
EC Proposal of Sand Mining and other Minor Mineral Mining on the basis of individual mine lease								
0– 5 ha	B2	Form –1M, PFR and Approved Mine Plan	No	Yes	Project Proponent	Project Proponent	DEAC/ DEIAA	DEIAA, SEIAA SPCB, CPCB MoEF&CC Agency
> 5 ha and < 25 ha	B2	Form –1M, PFR and Approved Mine Plan	No	Yes	Project Proponent	Project Proponent	SEAC/ SEIAA	Nominated by MoEF&CC
EC Proposal of Sand Mining and other Minor Mineral Mining in cluster situation								
Cluster area of mine leases up to 5 ha	B2	Form –1M, PFR and Approved Mine Plan	No	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	DEAC/ DEIAA	DEIAA, SEIAA SPCB, CPCB MoEF&CC Agency nominated by MoEF&CC
Cluster area of Mine leases > 5 ha and < 25 ha with no Individual lease > 5 ha	B2	Form –1M, PFR and Approved Mine Plan	No	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	DEAC/ DEIAA	
Cluster of mine leases of area ≥ 25 hectares with individual lease size < 50ha	B1	Yes	Yes	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	SEAC/ SEIAA	
Cluster of any size with any of the individual lease ≥ 50ha	A	Yes	Yes	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	EAC/ MoEFCC	

ANNEXURE – 9.4

QUARRY AREA MANAGEMENT PLAN

1. INTRODUCTION:

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

2. PROJECT PLANNING AND DESIGN STAGE:

Design measures for reduction in the quantity of the chips and metals required for concrete works will have to be undertaken to reduce the quantity of material to be quarried and consequently decrease the quarry area requirement. The DPR shall contain Guidelines for locating quarry site and quarry material specifications.

3. IDENTIFICATION OF THE QUARRY SITES:

Specific locations of quarry site will be identified by contractor. The selection and recommendations of quarry site will be based on environmental as well as civil engineering considerations. Location of source of supply of material and transport of material shall be in compliance with the environmental requirements of MoEF&CC.

However, following guidelines should be followed for selection of new quarry.

- Environmental Clearance is required for Quarry Area.
- Only licensed quarry will be used.
- New quarry will be at least 2.0 km away from the settlement, forest and other ecologically sensitive areas
- Minimum 500m away from water bodies.
- The Contractor shall identify alternative quarry sites along the whole corridor based on required quantity and environmental consideration and obtained approval from the Engineer in Charge.

4. PRE-CONSTRUCTION STAGE:

- The Contractor has to obtain Quarry Lease Deed / License from the Department of Mines and Geology and provide copy of the same to the Project Proponent prior to start of the material extraction.
- The Contractor shall estimate water requirement for dust suppression at quarry sites during operation and for water spraying on *kutcha* (non-metal) haul road and ensure availability water by identifying sources and obtaining necessary permission.

- The Contractor shall prepare quarry sites operation and redevelopment plan considering surrounding land uses, local needs and agreement with the landowner.
- Permits for transportation, storage and use of explosive, as will be required, shall be obtained from the Controller of Engineer, controlled blasting e.g. using less charge, restricting depth and diameter or drill holes, cut-off blasting etc., and shall be undertaken.

5. OPERATION STAGE:

No quarry area shall be operated without Environment Clearance.

- Only licensed blaster i.e. short-firer certificate holder will be responsible for quarry Blasting.
- Quarry operation will be undertaken in stages with adequate benching.
- In addition, the contractor should adopt precautionary measures to minimize any adverse impacts on the environment.

Checklists for monitoring quarry site operation and management has been furnished in Table 1.

Table 1: Checklist for Monitoring Quarry Area Operation and Management

Attributes	**Requirements**
Top soil preservation	Top soil, if any, shall be stripped and stored at corners of the area before the start of quarrying for material collection; Top soil should be reused / re-laid as per agreed plan.
Damage to surrounding land	Movement of man and machinery should be regulated to avoid damage to surrounding land. To prevent damages to adjacent properties, the contractor shall ensure that an undisturbed buffer zone exists between the quarry areas and adjacent land.
Dust Suppression	Water should be sprayed on kutcha haul road twice a day or as may be required to avoid dust generation during transportation of material;
Covering material for transport material	Material transport shall be provided with tarpaulin cover
Personal Protective Equipment	Workers should be provided with helmet, gumboots and air mask and their use should be strictly enforced.
Redevelopment	The area should be redeveloped within agreed timeframe on completion of material collection as per agreed rehabilitation plan.

6. REDEVELOPMENT OF QUARRY AREA:

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

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

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

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

7. PROCEDURE FOR ENVIRONMENTAL CLEARANCE OF QUARRY SITES (MINOR MINERAL):

The following policy shall be followed for environmental clearance of mining of minor minerals including cluster situation:-

1. The size of lease for minor minerals including river sand mining will be determined by the States as per their circumstances.
2. The mining of minor minerals is mostly in clusters. The Environment Impact Assessment or Environment Management Plan is required to be prepared for the entire cluster in order to capture all the possible externalities. These reports shall capture carrying capacity of the cluster, transportation and related issues, replenishment and recharge issues, geo-hydrological study of the cluster area. The Environment Impact Assessment or Environment Management Plan shall be prepared by the State or State nominated Agency or group of project proponents in the Cluster or the project proponent in the cluster.
3. There shall be one public consultation for entire cluster after which the final Environment Impact Assessment or Environment Management Plan report for the cluster shall be prepared.
4. Environmental clearance shall be applied for and issued to the individual project proponent. The individual lease holders in cluster can use the same Environment Impact Assessment or Environment Management Plan for application for environmental clearance. The cluster Environment Impact Assessment or Environment Management Plan shall be updated as per need keeping in view any significant change.
5. The details of cluster Environment Impact Assessment or Environment Management Plan shall be reflected in each environmental clearance in that cluster and DEAC, SEAC, and EAC shall ensure that the mitigative measures emanating from the Environment Impact Assessment or Environment Management Plan study are fully reflected as environmental clearance conditions in the environmental clearance's of individual project proponents in that cluster.
6. A cluster shall be formed when the distance between the peripheries of one lease is less than 500 meters from the periphery of other lease in a homogeneous mineral area.
7. Form 1M, Pre-Feasibility Report and mine plan for Category 'B2' projects for mining of minor minerals shall be prepared by the Registered Qualified Person or Accredited Consultants of Quality Council of India, National Accreditation Board for Education and Training. The Environment Impact Assessment or Environment Management Plan for Category 'A' and Category 'B1' projects shall be prepared by the accredited consultants of Quality Council of India, National Accreditation Board for Education and Training.

8. The SEIAAs shall have supervisory jurisdiction over the DEIAAs and decisions of DEIAA shall be reviewed by the SEIAA without prejudice to any provisions under any existing law.

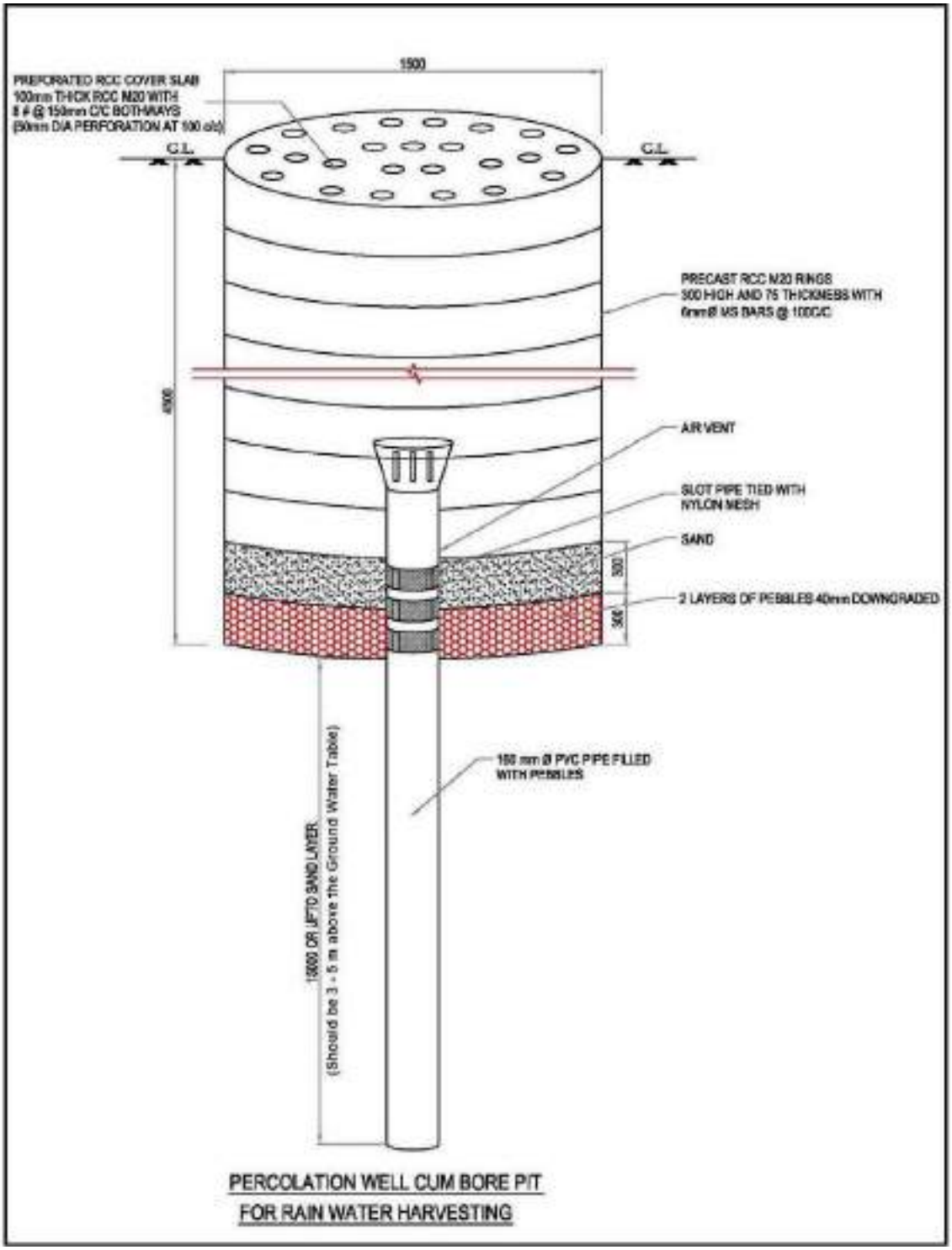
ANNEXURE – 9.4

Schematic Presentation of Requirements on Environmental Clearance of Minor Minerals including cluster situation

Area of Lease (Ha)	Category of Project	Requirement Of EIA / EMP	Requirement Of Public Hearing	Requirement Of EC	Who can prepare EIA/ EMP	Who will apply for EC	Authority to appraise/ grant EC	Authority to monitor EC compliance
EC Proposal of Sand Mining and other Minor Mineral Mining on the basis of individual mine lease								
0– 5ha	B2	Form –1M, PFR and Approved Mine Plan	No	Yes	Project Proponent	Project Proponent	DEAC/ DEIAA	DEIAA SEIAA, SPCB CPCB, MoEF&CC Agency
> 5 ha and < 25 ha	B2	Form –1M, PFR and Approved Mine Plan	No	Yes	Project Proponent	Project Proponent	SEAC/ SEIAA	nominated by MoEF&CC
EC Proposal of Sand Mining and other Minor Mineral Mining in cluster situation								
Cluster area of mine leases up to 5 ha	B2	Form –1M, PFR and Approved Mine Plan	No	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	DEAC/ DEIAA	DEIAA SEIAA SPCB, CPCB MoEF&CC Agency nominated by MoEF&CC
Cluster area of Mine leases > 5 ha and < 25 ha with no individual lease > 5 ha	B2	Form –1M, PFR and Approved Mine Plan	No	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	DEAC/ DEIAA	
Cluster of mine leases of area ≥ 25 hectares with individual lease size < 50ha	B1	Yes	Yes	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	SEAC/ SEIAA	
Cluster of any size with any of the individual lease ≥ 50ha	A	Yes	Yes	Yes	State, State Agency, Group of Project Proponents, Project Proponent	Project Proponent	EAC/ MoEF&CC	

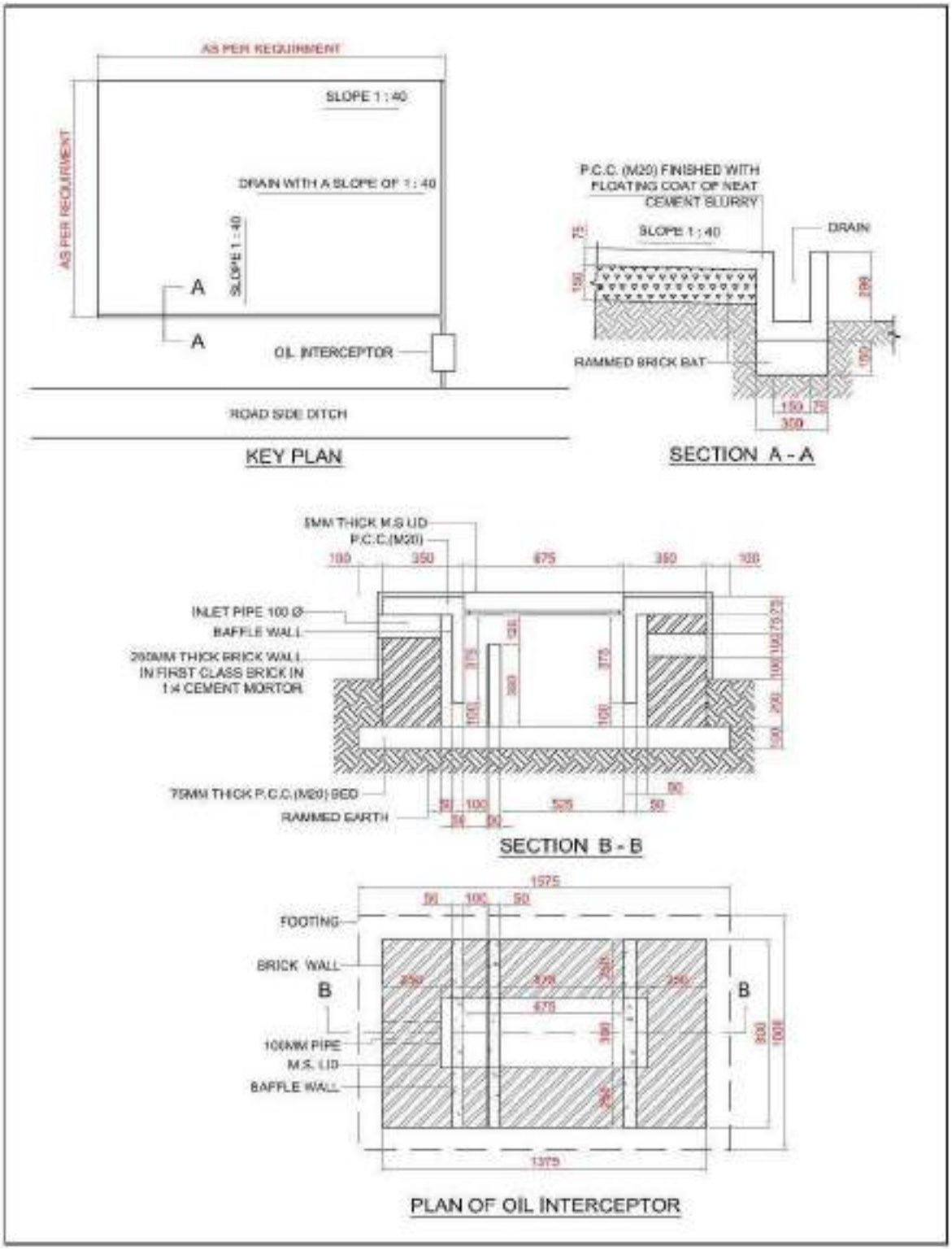
ANNEXURE-9.5

SCHEMATIC PLAN OF RAIN WATER HARVESTING PIT



ANNEXURE-9.6

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



Annexure 9.7

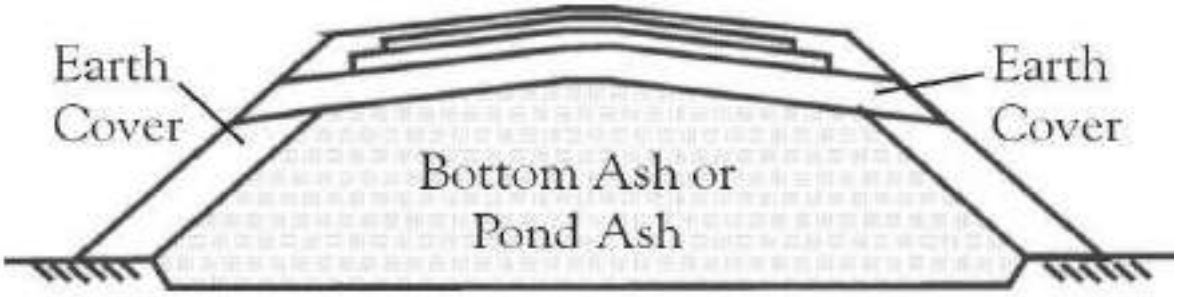
FLY ASH UTILISATION IN ROAD CONSTRUCTION:

According to the Fly as Notification, No. S.O. 763(E), dated 14.09.1999 and its amendment thereafter and as per the latest Notification S.O. 254(E) dated 27th January 2016 issued by the Ministry of Environment and Forests, Government of Inadia, it is mandatory to use fly ash with in a radius of 300 kilometers of Thermal Power Plant.

No agency, person or organization shall, within a radius of 300 kilometres of a thermal power plant undertake construction or approve design for construction of roads or flyover embankments in contravention of the Guidelines/Specifications issued by the India Road Congress (IRC) as contained in IRC specification No. SP: 58 of 2001.The Guidelines for use of Fly Ash in road embankments i.e IRC: SP 58, 2001 shall be followed by the Concessionaire during road construction. The typical cross-section of Fly ash road embankment, flexible pavement using Fly ash and rigid pavement using Fly ash in road construction is given in **Figure 9.1.**

Fly ash properties are somewhat unique as an engineering material. Unlike typical soils used for embankment construction, fly ash has a large uniformity coefficient consisting of clay-sized particles. Engineering properties that will affect fly ash's use in embankments include grain size distribution, compaction characteristics, shear strength, compressibility, permeability, and frost susceptibility. Nearly all fly ash used in embankments are Class F fly ash.

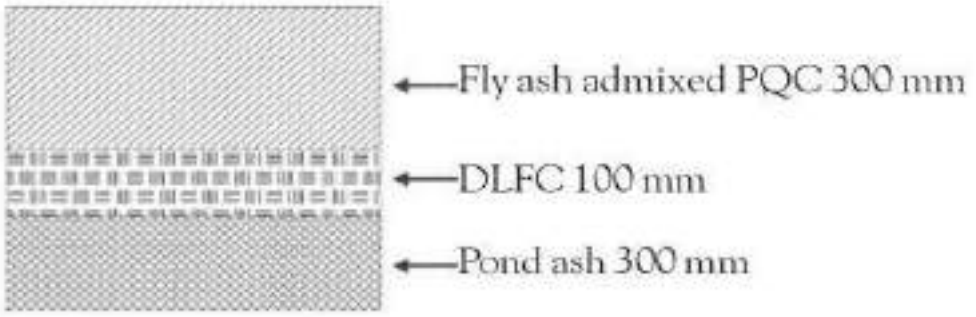
Fly Ash for Road Embankment



Typical Cross Section of Fly Ash Road Embankment



Typical Cross Section of Flexible Pavement - Using Fly Ash



Typical Cross Section of Rigid Pavement - Using Fly Ash

Figure A9.1: Typical Cross section of fly ash utilisation in road construction

Handling and Transportation of Fly ash:

The fly ash handling and transportation of the same shall be done as per section 4.6 of IRC: SP:58-2001. Fly ash being a very fine material gets air borne easily and cause dust nuisance. Dust at a construction site may be a safety hazard. It may also lead to environmental pollution, public resentment and damage to internal combustion engine of the construction equipment besides being a health hazards to workers. To avoid this, fly ash from hoppers or silos must be conditioned with water at power plant to prevent dusting enroute. Fly ash is typically delivered to the site in covered dump truck to minimise loss of moisture and dusting. On the other hand, pond ash generally contains enough moisture to prevent dusting, and may even contain excess moisture to create road spillage during transport. In such cases, periodic inspection and lifting of ash from relatively dry areas of the pond would be needed.

The fly ash may require on site temporary stockpiling if the rate at which the ash is supplied to the project site is more than the contractor's demand for an efficient rate of placement. Such cases should be avoided to the extent possible and in case stockpiling at site is inevitable, adequate precautions should be taken to prevent dusting by spraying water on stockpiles at regular intervals. Otherwise, the surface of fly ash stockpile may be covered with tarpaulins or a thin layer of soil or

other granular material not subject to dusting. Traffic movement may be restricted to those areas which are kept moist to prevent tyres of passing vehicles dispersing ash into the air.

Thermal Power Plants within 300 Km from Project

The list of Thermal Power Plants within 300 km from the proposed project road of Phase-I of BCE Alignment is given in following table;

Sr.No.	Name of Thermal Power Plant	Distance from Phase-I
1	Ennore Thermal Power Station,Chennai	247
2	Vallur Thermal Power Station,Chennai	251
3	North Chennai Thermal Power Station,Chennai	255
4	Simhapuri Thermal Power Station,Nellore	285
5	Meenakshi Thermal Power Station.Nellore	284
6	**Sri Damodaram Sanjeevaiah Thermal Power Station,Nellore**	**304**
7	**Sembcorp Gayatri Power Complex,Nellore**	**305**
8	Rayalaseema Thermal Power Station,Kadapa	264
9	Mettur Thermal Power Station,Salem	204
10	Neyveli Thermal Power Station I, Cuddalore	264
11	Neyveli Thermal Power Station II, Cuddalore	204
12	Neyveli Zero Lignite Power Station, Cuddalore	288
13	IL&FS Thermal Power Station, Cuddalore	294

From the above table it is evident that 11 thermal Power plants are situated within 300 Km radius of the project stretch. The location of these plants is depicted in **Figure 9.2**

The Concessionaire will have to assess the availability of the quantity of fly ash from the thermal power plants located within 300 km radius and depending upon its quality, utilization plan of fly ash in embankment will be submitted by the Concessionaire along with its handling and transportation plan. The design of the embankment using fly ash will be examined and approved by the Engineers on behalf of PUI-NHAI and then the construction of embankment will be commenced.

In case of non availability of Pond Ash from Thermal Power Plant the concessionaire will have to submit a certificate of "Pond ash not available" from the Thermal Power Plant(s) located within 300 kilometers of the site construction.

The cost of transportation of ash for road construction projects or for manufacturing of ash based products or use as soil conditioner in agriculture activity within a radius of 100 km from a Coal/Lignite based Thermal Power Station shall be borne by such Coal/Lignite based Thermal Power Station and the cost of transportation beyond the radius of 100 km and up to 300 km shall be shared equally between the user and the Coal/Lignite based Thermal Power Station.

Figure 9.2: Location of Thermal Power Plants within 300 Km from the Project Road (Phase-I)



ANNEXURE 9.8

TRAFFIC AND ROAD SAFETY PLAN

A. Traffic Safety Plan in Project Design:

Different type of safety provisions have been incorporated in the project. Adequate emphasis has been given in the project

Addressal of Safety in Project Design

The Safety provisions for Road users have been adequately addressed in the project. The detail of safety features included in the project has been presented below:

S. No.	Safety Provisions	Details
1	Pedestrian/ Cattle Under Passes	19 new pedestrian/cattle crossings have been proposed near settlement areas to ensure safe crossings for local people and cattle.
2	Vehicular Underpasses	33 Nos. on Main Alignment and 02 Nos. at Interchange locations underpasses have been provided to ensure smooth and safe flow of vehicles.
3	Vehicular Overpasses	6 new vehicular underpasses have been provided to ensure smooth and safe flow of vehicles.
4	Truck laybyes cum rest area	2 Truck lay-byes cum rest area have been provided
5	Street Lights	Provision of street lighting is for locations at PUP,CUP,VOP,VUP, Interchange, Check Post, Rest Area, Toll Plaza Locations
6	Crash Barriers	W-Beam crash barrier has been proposed throughout the expressway.

Following traffic and Road Safety provisions shall be provided in the project:

(i) Traffic Control Devices/Road Safety Devices/ Roadside Furniture:

Traffic Control Devices/Road Safety Devices/ Roadside Furniture shall comprise of Road Sign, road marking, object markers, hazard markers, studs, delineators, attenuators, safety barriers, pedestrian guardrails, boundary stones, kilometer stones, etc. Guidelines given in IRC: 8, IRC:25, IRC:26, IRC:35, IRC:67, IRC:79, IRC:103 and section 800 of MORTH Specification shall be used for providing these safety features in the project.

(ii) Road Sign:

Traffic signs include roadside signs, overhead signs and curb mounted signs along the entire Project section. Mandatory/Regulatory/Cautionary Signs and informatory signs shall be provided as per specifications given in 6-Laning Manual, IRC:67 and Section 802 of MORT specification. All the signboards will be suitably placed. Clustering and proliferation of traffic signs shall be avoided to avoid confusions among the road users

There shall be corresponding road marking with Stop Sign, Give Way Sign, Merging or Diverting Traffic Sign, Lane Closed Sign, Road Narrowing Signs, Compulsory Lef/Right signs, cautionary signs for sharp curves or any other traffic safety signs shall be provided at appropriate locations as per IRC:67.

(iii) Road Marking:

Carriageway marking, marking of intersections, marking of hazardous locations, parkins area, layout marking for service lane, etc shall be done with proper thermoplastic paints or as specified. All road markings shall conform to the IRC:35

(iv) Road Delineators:

The roadway indicators, hazard markers and object markers shall be provided conforming with the specifications as per IRC:79.

(v) Pavement Markers:

Retro reflective type two way markers (Road studs or solar studs) shall be provided conforming to ASTM and D4280 for ensuring improvised visibility during night time or wet weather conditions. The location of these markers should be as per 8-Laning Manual**.** The pavement markings shall cover road marking for the entire Project Expressway

(vi) Attenuators

Attenuators shall be provided at hazard markers locations as per IRC:79., structural columns, illumination lamp posts approaching traffic islands of toll plaza and at exit ramps. The attenuators modules shall be moduled from HDPE plastic. The size, numbers and locations should be as per international standards.

(vii) Roadside and Median Safety Barriers:

The roadside and Median safety barriers shall be provided as per specifications of Expressway 8-Laning Manual. W metal beam crash barrier will be provided throughout the Project stretch on the shoulders and outside the median. The design quality and placement should conform to the specification.

(viii) Hectometer/Kilometer stones:

Road boundary stones, Kilometer Hectometer Stones shall be provided as per IRC Specification.

(ix) Solar Based Beacons Flashing Signals:

Such type of signals shall be provided at uncontrolled pedestrian crossings, near public gathering places, like educational institutes, worship places, hospitals, cross roads and median openings.

B. Traffic Management During Construction:

The main objective of this section is to lay down procedures and provide guidance, which are to be adopted to ensure the safe and efficient movement of traffic at site undertaking the construction.

- Road users are accommodated through and around the construction zones safely with minimum of delays;
- Traffic control and the construction activities are coordinated to provide for safe and efficient flow of traffic together with efficient, safe and rapid progress of the construction activities;
- Where construction activities are taken place at multiple sites along the same or on parallel routes, construction activity and the movement of road users is coordinated to ensure that the total delay along the route or on signed alternative routes is within acceptable limits; and
- Driver's behavior is effectively influenced so that the speeds are reduced to the desired levels on the approaches to and within the construction zones.

a. PREPARATION OF TRAFFIC MANAGEMENT PLAN

The Specifications laid down under the Manual for Specifications and Standards for Expressways (**IRC:SP:99-2013)** shall be followed. The Concessionaire shall prepare traffic safety plan in consonance with the work program and submit to National Highways Authority of India (NHAI) for approval. Traffic

safety plan should be prepared based on guideline described in the following sections, which has been prepared in accordance with the Standards and specifications of requirements of IRC:SP:87-2010 Manual for Six Laning, IRC SP: 55-2001 and IRC: 67-2001 and other codes specified under IRC:SP:87-2010

The traffic safety plan will include the following:

- Detailed layout plan showing traffic control devices for CD/ Bridge works with or without diversions;
- Detailed layout plan showing traffic control devices for road works;
- Detouring especially at urban areas;
- Organizational set up for traffic safety including defined responsibilities;
- Estimates of traffic control devices and its monthly distribution;
- Estimates and deployment of trained flagmen;
- Vehicle exclusively for transporting traffic control devices.

Guiding Principle

The guiding principles for safety in road construction zones are to:

- Warn the road user clearly and sufficiently in advance;
- Prove safe and clearly marked lanes for guiding road users;
- Provide safe and clearly marked buffer and work zones; and
- Provide adequate measures that control driver's behavior through construction zones.

Traffic Control Zone

The "Traffic Control Zone" includes all those areas of carriageway in advance of the actual work site which required for advance warning of hazard as well as safety zones, the transition zones and the working zones itself. Generally traffic control zone is divided into three components viz. the Advance Warning Zone, the Transition Zone and Working Zone. All construction zones will have a working zone, which is flanked by a transition zone for each direction of approaching traffic and an advance warning zone will precede these in turn.

Advance Warning Zone

The "advance warning zone", is the area to warn the road user of the approaching hazard and to prepare them for the change in driving conditions. It should provide information on:

- The presence of hazard through the signs of "Road Works Ahead", "Men at Work", "Work in Progress".
- Any changes affecting traffic arrangements such as a reduction in speed limit, number of lane, diversion etc. through corresponding signs.
- The length of advance warning zone depends on approach speed of vehicle and is recommended as 200-300m.

Working Zone

The "working zone" is where actual work is being undertaken. It contains the work area and a working space, as well as lateral and longitudinal buffer zones to create safety for workers and road users. The minimum lateral and longitudinal buffer zones depends on restricted speed and are recommended as 0.5m and 5-15m respectively.

The construction area with buffer zones will be delineated, as a minimum requirement, with sign boards and delineator like painted wooden sticks of 1.5-2m height with interval of 5-10m with sand bags in between. The sticks will be tied up with reflective tape. Depending on availability of space, painted drums may also be

used. When construction zone runs for kilometres, alternative regulatory traffic signs of "Speed Limit", "Overtaking Prohibited", and "Keep Left" should be placed in every 500m interval.

Traffic Control Devices

Traffic control devices are the equipment and installations over and on the road which individually or collectively warn, inform and guide road users, modify their behaviour and ensure safety passage and safe working area. The primary traffic control devices used in work zones are signs, delineator, barricades, cones, pylons, pavement markings and flashing lights.

Traffic Signs

The traffic signs are categorised into three major categories i.e. Regulatory, Warning / Cautionary and Informatory / Guiding Signs. The various types of traffic signs used in road construction are given in IRC SP: 55 and IRC: 67. Generally, following signs are used in traffic control zone during construction:

Regulatory signs: Speed Limit, Keep Left, No Overtaking etc.

Warning signs: Men At Work, Work in Progress, Narrow Road Ahead, Diversion Ahead, Single File Traffic etc.

Informatory / Guiding signs: Diversion, Detour, Diverted Traffic etc.

The shapes, sizes and colours of signs should be as per IRC Four Laning Manual and as per IRC SP: 55 and IRC: 67 and should be uniform along the whole project road to avoid any confusion of road users. Whenever possible, symbols will be used instead of letters. Inscriptions may be added to pictorial signs at the bottom of the sign. Traffic signs will be written in both English and local language. Standard shape, size and colour for various types of signs, will be used conforming the requirement of IRC specification during road construction. The correct position and size of signs are important to ensure that it can be observed. The following principles should govern the positioning of signs:

- The location should have clear visibility;
- They should be so placed that driver would have adequate time for responses;
- As general rule signs should be placed on left hand side of the road. In case of hilly roads, the signs shall be generally fixed on the valley side of the road; and
- Signs should be removed when they are not required.

For kerbed road, extreme edge of sign board towards road will not be less that 0.6m from the edge of the kerb. Whereas, for un-kerbed road, extreme edge of sign board towards road will be at 2-3m away from the edge of carriageway. The bottom of the sign board will be at 1.5-2m above the carriageway level. Warning signs will be of reflective nature for providing adequate vision during night.

Delineators

Delineators are channelising devices such as cones, traffic cylinders, tapes, and drum and should normally be retro-reflectorised.

Flagmen

Control of traffic through work area is an essential part of road construction and maintenance. Flagmen will be posted at about 50m ahead of working zone wearing yellow cap with hand held signaling devices such as Red flags, and signs paddles for Stop, Go Slow etc. Flags used for signaling should be minimum 600mm by 600mm in size, made of good red cloth and securely fastened to a staff of approximately 1m in length. Sign paddles should be at least 600mm wide and provided with a rigid handle. The background colour of Stop should be red and its shape will be octagonal conforming to IRC: 67. The word STOP should be in white, in middle of the sign. The background of SLOW should be yellow with black letters and borders.

Vehicle for Transportation of Traffic Control Devices

Contractor/s is advised to provide one vehicle exclusively for transporting traffic control devices at all the time. Various types of traffic signs and delineators will be carried by the vehicle and wherever any sign / delineator are found absent, the same will be installed.

b. POST ACCIDENT EMERGENCY ASSISTANCE PLAN:

Post accident assistance plan will be implemented in accordance with the standards and specifications stipulated under Manual for Specifications and Standards for Expressways (**IRC:SP:99-2013)**.There will be provision of one Expressway traffic Patrol vehicle, one crane and one well equipped ambulance at every 50 Km intervals. The Concessionaire has to ensure regular patrolling of Expressway section and to adopt effective communication system to monitor the expressway and respond quickly in case of any emergency situations. In case of breakdown of vehicles, the expressway should be cleared by using necessary machinery within short duration time. In case of any accident the ambulance will give necessary assistance to the accident victims and take them to nearest hospital. The emergency numbers along with the contact number of representative of Concessionaire and NHAI will be displayed on board in English and local languages at a regular interval as per IRC specifications.

c. CONCLUSIONS

The general objectives are for the Concession Company to make the Bangalore-Chennai Expressway Phaase-I and the service roads as safe as possible for all users.

The Concession Company shall follow all relevant Indian publications on road safety, especially The Manual for Safety in Road Design (A guide for Highway Engineers) prepared in September 1998 for MOST and Manual for Specifications and Standards for Expressways (**IRC:SP:99-2013)**.

A formalised safety audit procedure must be followed [to optimise the safety process, and ensure safety is properly and formally considered] by the Concession Company during the detailed design during the Construction and post construction periods.

ANNEXURE-9.9

EXPLOSIVE MANAGEMENT

1. INTRODUCTION:

In the quarrying of stones explosives are used. The explosives contain chemicals and the use of explosives should be properly managed to avoid pollution of environment. Therefore an explosive management plan is mentioned. Explosives use management will have the primary goal of limiting loss of ammonia nitrates to quarried material, pit areas, and water bodies, which could subsequently leach into runoff. Explosives storage will be controlled and runoff from storage areas contained although it is expected that all blasting activities will be completed during winter months prior to any freshet runoff.

2. OBJECTIVE:

The objectives of the Explosives Management Plan can be described as follows:

- Communicate a methodical approach to explosives management for the Project.
- Ensure that infrastructure constructed for explosives is compliant with all applicable regulations.
- Ensure that structures are constructed to prevent any safety or environmental incidents relating to onsite explosives storage.
- Ensure that handling of explosives is done in a manner that will minimize the possibility of safety or environmental incidents.
- Prescribe safe and environmentally sound measures for disposal or destruction of explosives.
- Prescribe procedures for safe blasting.
- Prescribe procedures for dealing with spills of explosives materials.
- Indicate the chain of responsibility for explosives management.

3. TRANSPORTATION OF EXPLOSIVE MATERIALS:

The handling of explosives to the site and on the site will be carried out by the supplier and blasting contractor under a license to conduct such work.

Transportation of explosives from the explosive supplier to the quarry areas will be conducted in such a manner as to safeguard human health and prevent impacts on the environment. The transfer will be arranged so that:

- Delays between the points of transfer are minimized
- Explosives are not left at any location other than designated locations
- Explosives are not left unattended during transportation.

4. TYPES OF EXPLOSIVE USED:

- Bulk ammonium nitrate fuel oil (ANFO);
- Emulsion (bulk and packaged);
- Non-electric initiation tubes ;
- Pentolite boosters;
- Electric detonators;

- Detonating cord; and
- Inline delays.

5. BEST MANAGEMENT PRACTICES:

Only trained and certified persons will work with explosives. The explosives personnel will undertake formal training and on-the-job training to ensure compliance with legislation. Internal audits and inspections of all components related to the explosives management will be conducted on a regular basis by qualified personnel, and the results recorded according to quality and safety standard operating procedures. All recommendations and orders made by regulators and inspectors will be responded to and acted upon accordingly.

- Specific fire procedures as per the Federal Explosives Act
- First Aid
- Transportation of Dangerous Goods (TDG)
- Blasting Certificate
- Workplace Hazardous Materials Information System (WHMIS)

6. STORAGE:

All explosives and accessories will be stored at the planned magazine site and explosive storage facility site. The magazine and the explosive storage facility are 300 m apart and roughly 1,800 m from any other infrastructure as per the distance requirements

ANNEXURE -9.10

ENVIRONMENT HEALTH SAFETY MANAGEMENT PLAN

The Contractor will prepare their own Safety manual on Occupational Health and Safety for safety of all personnel working under the project and will be in line with the General Rules and Regulations on Occupational Health and Safety (OHS) in Building and Other Construction Workers (Regulation of Employment and Condition of Service) Act, 1996 and Factory Acts.

1.0 SAFETY OF WORKERS:

The Occupational Health and Safety program will aim to ensure that the workplace is safe and healthy by addressing the hazards and risks at the workplace; outlining the procedures and responsibilities for preventing, eliminating and minimizing the effects of those hazards and risks; identifying the emergency management plans for the workplace or workplaces; and, specifying how consultation, training and information are to be provided to employees at various workplaces.

Some of the risks/hazards associated with workplaces are due to working close to or at blasting sites, excavation area, excavation of trenches for spill and approach channels, hill cutting, construction of spillway and associated with the various project construction activities. Other risks associated with the project construction phase include risk of increase of vector borne and other different diseases.

1.1 PPEs REQUIREMENT:

Risks to the health and safety of workers can be prevented by provision of Personal Protective Equipment (PPEs) to all workers. This will be included in the construction cost for the Contractor. Depending on the nature of work and the risks involved, contractors must provide the following protective equipment without any cost to the workers.

i. Helmet shall be provided to all workers or visitors visiting the site for protection of the head against impact or penetration of falling or flying objects.
ii. Safety belt shall be provided to workers working at heights (more than 20 ft) such as roofing, painting and plastering.
iii. Safety boots shall be provided to all workers for protection of feet from impact or penetration of falling objects on feet.
iv. Ear protecting devices shall be provided to all workers and will be used during the occurrence of extensive noise.
v. Eye and face protection equipment shall be provided to all welders to protect against sparks.
vi. Respiratory protection devices shall be provided to all workers during occurrence of fumes, dusts, or toxic gas/vapour.
vii. Safety nets shall be provided when workplaces are more than 25 feet (7.5 m) above the ground or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors or safety belts is impractical.
viii. First Aid Box with all essential first aid items will be kept and maintained at the work site.

ix. The Contractor will have to make arrangement with nearby doctor/ health centre for attending injured person due to accident.

The specific PPE requirements for each type of work are summarized below.

Table 1: PPE Requirement List

Type of Works	**Type of PPEs requirement**
Elevated work	Safety helmet, safety belt (height greater than 20 ft), footwear for elevated work.
Handling work safety	Helmet, leather safety shoes, work gloves.
Welding and cutting work	Eye protectors, shield and helmet, protective gloves.
Grinding work	Dust respirator, earplugs and eye protectors.
Work involving handling of chemical substances	Dust respirator, gas mask, chemical-proof gloves. Chemical proof clothing, air-lined mask, eye protectors.
Wood working	Hard hat, eye protectors, hearing protection, safety footwear leather gloves and dust respirator.
Blasting	Hard hat, Safety Shoes, eye and hearing protection
Concrete and masonry work	Hard hat, eye protectors, hearing protection, safety footwear leather gloves and dust respirator.
Excavation, heavy equipment, motor graders, and bulldozer operation	Hard hat, safety boots, gloves, hearing protection.
Quarries and Borrow area operations	Hard hat, eye protectors, hearing protection, safety footwear leather gloves and dust respirator.

2. PROPOSED HEALTH MANAGEMENT PLAN:

Health Management Plan for people in the adjoining area of the project and workmen engaged in the project is prepared based on the information collected on the existing health status, prevailing disease and other information on the health and hygiene. The information was collected from the existing PHCs and District Hospital and the health workers of the area.

There are adequate health facilities in the project affected area with primary health centers in each block and Community health center.

2.1 Likely impacts on health due to the project:

2.1.1 Health Impacts in Construction Phase:

Possible impacts on health of the local resident and impacts on the workmen engaged in construction site are detailed below.

2.1.2 Health Impacts due to deterioration of the Work Place Ambient Air and Mitigation Measures:

Due to the running of Construction Machineries and Heavy Vehicles, emissions like SO_2, No_x and dust emission due to movement of heavy vehicles and Earth Moving equipment will take place. The emissions may cause respiratory problems like asthma and other dieses.

Mitigation Measure*:*

- Wet excavation of exposed surfaces shall be adopted. Frequent water sprinkling at least thrice a day shall be carried out in the project activity area. Service roads along banks of main canal and branches shall be metaled.
- The heavy vehicles like trucks, excavators, diggers, scrappers, dozers etc shall comply to specified BS standard like BS III or BS IV.
- The vehicles are to be maintained routinely to avoid untoward emission
- Idle running vehicles and construction equipment should be avoided.

2.1.3 Anticipated Health impacts due to Water Pollution:

- To accommodate the influx of labour force during construction make-shift arrangements shall be provided. The sanitation of the labor camp area is normally not kept hygienic and tidy. This may cause water born dieses like Typhoid, Cholera & Gastroenteritis etc.
- The localized stagnation of water in borrow pit areas is expected during construction which may spread bacteria related diseases if suitable preventive action is not taken.

Mitigation Measures:

- Proper sanitation and hygiene facilities will be provided at camp site to avoid disease related to sewage pollutants.
- Antibacterial insecticides need be sprayed on accumulated water in borrow pits during rainy season.
- The project proponent shall undertake various awareness program by organizing different camps where awareness on prevention and control of various diseases such as Malaria, Dengue, Cholera, Gastroenteritis, STD, AIDS, and Cancer etc. shall be focused.
- Temporary labor camps shall be provided with sewage facilities and the hygiene of the camp shall be looked onto.
- The laborers shall be provided with fuel gas for cooking.
- Construction site will have health/first aid facility including adequate supply of sterilized dressing materials and appliances and suitable transport to take the injured person to the nearest hospital.
- Drinking Water shall be provided to the camp and at work site.

Controlling Water borne diseases

Various measures recommended for control of water borne diseases are given below.

- It is recommended that details of incidence of various water borne diseases in the project areas and blocks be collected to detect any particular trend.
- Detailed water quality monitoring program be designed and implemented. In areas showing incidence of water-borne diseases, intensive water quality monitoring need to be done.
- Adequate training at village level needs to be given. Drinking water must be regularly tested for the following tests;
    - Orthotolodine tests for chlorine
    - Lead Acetate paper test for bacterial infection.
- Development of sanitation facilities in the project area

- Disposal of solid waste and sewage from various sources at appropriate sites located at suitable distance from drinking water sources. The sites can be selected in consultation with the local administration.
- Provision of on-site chlorination facilities at appropriate locations in the area.
- Provision of chlorine tablets to the population which cannot be served with chlorinated water.

2.5 Health Impacts due to improper Solid Waste Disposal:

Solid Wastes if not disposed off or dumped properly may cause air or water pollution which will affect health and hygiene of the residents in the area**.**

Waste Management Plan:

- People or labor staying during construction and operation phase of the project site may generate wastes from different sources. Wastes are the Primary problems during the construction phase of the project which may affect the human life as well as the construction process and the environment.
- After completion of the project, the site will be covered with vegetation. Landscaping will be done in open areas with gentle gradient in the land surfaces so as to avoid soil erosion.
- Water drainage system for draining the surface runoff will be provided. Proper storage of the construction materials will be ensured.
- Waste collection site to be maintained for the collection of the construction waste. Construction waste will be dumped in the designated area.
- Paint brushes, roller, excess paints and containers of paints will be disposed off as per Hazardous Waste Management Rule 2016. Similarly, solid waste generated in the site due to human activities will be collected and disposed properly.
- Construction and Demolition Waste shall be disposed of as per Construction and Demolition Waste Rules 2016.

2.6 Anticipated Health Impacts in Operation phase and Health Facilities:

The spillway:

- In the operation phase of the project solid waste generated from different sources will be properly collected and disposed to maintain hygiene condition.
- No indiscriminate disposal of garbage will be allowed within the complex. Proper waste collection system shall to be maintained.
- Solid waste generated from the residential area will be separated as biodegradable and non biodegradable which will collected and stored differently. Stored bins send to the approved agency for final disposal.
- All hazardous wastes will be disposed as per hazardous waste management and handling rules.

To ensure good health of the Workmen and local people in the area the following activities also will be looked into:

✓ **Public Awareness Program**

It is proposed that a detailed health awareness program be implemented in the project and the surrounding areas. The objectives of the program are to:

- Enhance knowledge, awareness about various diseases and actions to be taken in case of an epidemic.
- Develop community education messages to provide the community with information about recognizing the illness, how to prevent transmission and when to seek treatment.
- Initiate proper communication with the community as soon as epidemic or public health problem is identified.

As a part of the awareness program, locals should be made aware of the following measures about various commonly prevalent diseases in the area.

- Signs and symptoms of the disease
- Feasible and cost-effective preventive measures
- When to come to the health facility for consultation and treatment
- Immunization recommendations, if any.

The message should be clear and concise in local language. Special care should be taken that sentiments and cultural beliefs of the target population are not hurt. The awareness programs could use the following means of communication.

- Radio
- Television
- Newspaper
- Meeting with health personnel, community, religious and political leader.
- Posters
- Presentations at markets, health centers, schools women's & other community groups, service organizations, religious centers.

Select and use a community liaison or health staff to serve as spokesperson for interaction within media and provide information related to the epidemics

✓ **Vaccination Program:**

The borrow pits developed due to construction activities provide harboring ground waterfor increase of mosquito population and develop the risk of malaria, dengue and elephantiasis during rains. Proper preventive measures need be taken to maintain hygienic conditions in the area. Besides, arrangement must be made to distribute medicines and anti-malaria drugs as and required. Various vaccination program shall be arranged periodically for workmen and locals of the project site.

✓ **Health Check up of Workmen of the Project and adjoining areas:**

Inspite of various mitigation measures to abate air, noise and water pollution, still health workmen and locals may be affected. Therefore, periodic health checkup need to be done. The project authorities should plan for check up of heart, lung, eye and audiometric test, existence of Communicable diseases among the work force etc.

✓ **Health Extension Activities**

The health extension activities will have to be carried out in the villages situated within the study area. It is important to inculcate hygienic habits of environmental sanitation especially with

respect to water pollution by domestic wastes. There would be possibility of the transmission of communicable diseases due to migration of labor population from other areas at the construction site. It is proposed to strengthen the health institutions like community centers and primary health centers already available in these blocks. The project authorities can take the initiative and release certain funds at least for first five years to streamline the medical assistance for malaria and gastroenteritis disorders.

The doctors from the Hospitals and Health Centers may be organized to work as a part of the command area health system and the dispensaries in various blocks will make regular visits to the villages and organize health promotional activities with the active participation of the local village leaders, NGOs and available local health functionaries. The health functionaries would undertake the following tasks as a part of health promotional activities;

- Collect water samples to ascertain the potability of water from different sources so as to monitor regular disinfection of drinking water source.
- Maintain close surveillance on incidence of communicable diseases in these villages.
- Maintain close liaison with the community leaders and health functionaries of different departments, so that they can be mobilized in case of an emergency.

However, the Directorate of Health Services under Health Department is to be consulted for suggesting a conducive Health Management Plan with physical and financial propositions for implementation. The project authorities would provide funds as a part of Corporate Social Responsibilities (CSR) program.

Budget Estimate for Health Management Plan

Sl. No.	Particulars
1	Free Medicine for laborers and affected people in the adjoining area
2	Periodical Health Check up of Workers and local people
3	Vaccination and immunization program
4	Spraying of insecticides to prevent spread of Malaria and other vector borne diseases
5	Expenses towards workmen getting treatment in the local hospitals.

✓ **Disease Prevention**

Communicable Diseases:

Communicable diseases pose a significant public health threat worldwide. Health hazards typically associated with large development projects are those relating to poor sanitation and living conditions, sexual transmission and vector-borne infections. Communicable diseases of most concern during the construction phase due to labor mobility are sexually-transmitted diseases (STDs), such as HIV/AIDS. Recognizing that no single measure is likely to be effective in the long term, successful initiatives typically involve a combination of behavioral and environmental modifications which are mentioned as below.

Recommended interventions at the project level include:

- Providing surveillance and active screening and treatment of workers
- Preventing illness among workers in local communities by:
    - Undertaking health awareness and education initiatives, for example, by implementing an information strategy to reinforce person-to-person counseling addressing systemic factors that can influence individual behavior as well as promoting individual protection and protecting others from infection, by encouraging condom use.
    - Training health workers in disease treatment.
    - Conducting immunization programs for workers in local communities to improve health and guard against infection.
    - Providing health services.
- Providing treatment through standard case management in on-site or community health care facilities. Ensuring ready access to medical treatment, confidentiality and appropriate care, particularly with respect to migrant workers.
- Promoting collaboration with local authorities to enhance access of worker's families and the community to public health services and promote immunization

Vector-Borne Diseases:

Reducing the impact of vector-borne disease on the long-term health of workers is best accomplished through implementation of diverse interventions aimed at eliminating the factors that lead to disease. Project proponent, in close collaboration with community health authorities, can implement an integrated control strategy for mosquito and other arthropod-borne diseases that might involve:

- Prevention of larval and adult propagation through sanitary improvements and elimination of breeding habitats close to human settlements.
- Elimination of unusable impounded water.
- Increase in water velocity in natural and artificial channels.
- Considering the application of residual insecticide to dormitory walls.
- Implementation of integrated vector control programs.
- Promoting use of repellents, clothing, netting, and other barriers to prevent insect bites.
- Use of chemoprophylaxis drugs by non-immune workers and collaborating with public health officials to help eradicate disease.
- Monitoring and treatment of migrating populations to prevent disease spread.
- Collaboration and exchange of in-kind services with other control programs in the project area to maximize beneficial effects.
- Educating project personnel and area residents on risks, prevention, and available treatment.
- Monitoring communities during high-risk seasons to detect and treat cases.
- Distributing appropriate education materials.

ANNEXURE -9.11

CONSTRUCTION AND LABOUR CAMPS MANAGEMENT

1.0 INTRODUCTION:

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

2.0 PRE-CONSTRUCTION STAGE:

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

Table 1: Selection Criteria for Camp site.

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

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

a) Photograph of the proposed camp site in original condition;
b) Activities to be carried out in the site;
c) Environmental mitigation measures to be undertaken to prevent land, air, water and noise pollution;

d) Detailed layout plan for development of the construction and labourer camp that shall indicate the various structures to be constructed in the camp including temporary drainage and other facilities; and
e) Restoration plan of camp site to previous camp conditions.

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

2.1 SETTING UP OF LABOUR CAMP:

The contractor shall provide free of cost in the camp site, temporary living accommodation to all the migrant workers employed by him till completion of construction/maintenance work is in progress.

- The Contractor agency will setup their camping locations at different places as would be identified.
- Each labour camp may house 50 imported labourers.
- These camps should be located away from the existing village or semi urban households to prevent likely social conflicts.
- Necessary permissions may be obtained from the respective revenue/municipal authorities.
- Temporary house structures should be provided by the contractor agencies to accommodate the labourers and their families, with provision of minimum infrastructure facilities, like water supply, sanitation and electricity etc.
- A minimum area of 6 sq.mts per person shall be provided.
- The rooms of labourer shall be well lighted and ventilated.

The facilities to be provided for the labourers are discussed below:

a) Drinking Water

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

- The contractor shall provide for a continuous and sufficient supply of potable water in the camps, in earthen pots or any other suitable containers.
- If any water storage tank is provided, the bottom of the tank will be kept at least 1mt. above from the surrounding ground level.
- The contractor shall identify suitable community water sources for drinking. Only in the event of non-availability of other sources of potable water, the Contractor shall obtain water from an unprotected source only after the testing for its potability. Where water has to be drawn from an existing open well, the well shall be properly chlorinated before water is drawn from it for drinking. All such wells shall be entirely closed in and be provided with dust proof trap door.
- Every water supply or storage shall be at a distance of not less than 15m from any wastewater / sewage drain or other source of pollution. Water sources within 15m

proximity of toilet, drain or any source of pollution will not be used as a source of drinking water in the project.

- A pump shall be fitted to cover well used as drinking water source, the trap door shall be kept locked and opened only for cleaning or inspection, which shall be done at least once a month.
- Else a new well can be constructed and a pump will be fitted to the well for drinking water purpose of the labourers at the camp.

b) Washing and Bathing Facilities

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

c) Toilets Facilities

Each labour camp should be provided with community toilets with septic tank and soak pit arrangement. Sanitary arrangements, latrines and urinals shall be provided in every work place separately for male and female workers. The arrangements shall include:

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

d) Supply of Free Fuel

- These labour forces may adopt unscrupulous methods of cutting trees and bushes for meeting their fuel wood requirement which would destroy the adjacent green cover and affect the local ecology.
- The project authorities would ensure supply of free fuel to these labourers through the contract agencies so as to prevent such unscrupulous activities.
- Arrangement may be made with the local Civil Supply Authorities for Supply of kerosene oil at a fixed quota.
- Use of LPG gas cylinders may also be encouraged for intending labourers.

The contract specification should include these fuel supplies free of cost to the labour force within the bid value of relevant contract items.

e) Waste Disposal

- Disposal of sanitary wastes and excreta shall be into septic tanks.

- Kitchen waste water shall be disposed into soak pits/kitchen sump located preferably at least 15 meters from any water body. Sump capacity should be at least 1.3 times the maximum volume of wastewater discharged per day. The bottom of the pit should be filled with coarse gravel and the sides shored up with board, etc. to prevent erosion and collapse of the pit. New soak pits shall be made ready as soon as the earlier one is filled.
- Solid wastes generated in the kitchen shall be reused if recyclable or disposed off in land fill sites.
- Provide segregated garbage bins in the camps and ensure that these are regularly emptied and disposed off in a hygienic manner as per the Comprehensive Solid Waste Management Plan approved by the Environmental Expert of PMU.
- The camping area should be periodically sprayed with Bleaching powder and other disinfectants.

f) Medical and First Aid Facilities

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

First Aid Box will be provided at every construction camp site and under the charge of a responsible person who shall always be readily available during working hours. He shall be adequately trained in administering first aid-treatment. Formal arrangement shall be prescribed to carry injured person or person suddenly taken ill to the nearest hospital.

The first aid box shall contain the following.

- 6 small sterilized dressings
- 3 medium size sterilized dressings
- 3 large size sterilized dressings
- 3 large sterilized burns dressings
- 1 (30 ml) bottle containing 2 % alcoholic solution of iodine
- 1 (30 ml) bottle containing salvolatile
- 1 snakebite lancet
- 1 (30g) bottle of potassium permanganate crystals
- 1 pair scissors
- Ointment for burns
- A bottle of suitable surgical antiseptic solution

In case, the number of labour exceeds 50, the items in the first aid box shall be doubled.
The contract agency should arrange to carry out the following anti-malarial measures.

- Supply of mosquito nets.

- Supply of mosquito repellents to the labourers.
- Periodic cleaning of the area to destroy stagnant water pockets as well as spraying of disinfectants through health workers.
- Supply of preventative medicines to all labour force free of cost.
- Ensure imparting free treatment to the affected people through local health centres.

g) Provision of Shelter during Rest

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

h) Crèches:

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

2.2 FIRE FIGHTING ARRANGEMENT:

The following precautions need to be taken:

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

2.3 INTERACTIONS WITH HOST COMMUNITIES:

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

3.0 CONSTRUCTION STAGE:

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

The following precautions need to be taken in construction camps.

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

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

4.0 POST CONSTRUCTION STAGE:

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

- Oil and fuel contaminated soil shall be removed and transported and buried in waste disposal areas.
- Soak pits, septic tanks shall be covered and effectively sealed off.
- Debris (rejected material) should be disposed off suitably
- Ramps created should be leveled.
- Underground water tank in a barren/non-agricultural land can be covered. However, in an agricultural land, the tank shall be removed.
- If the construction camp site is on an agricultural land, top soil can be spread so as to aid faster rejuvenation.

- Proper documentation of rehabilitation site is necessary. This shall include the following: –
    - Photograph of rehabilitated site;
    - Land owner consent letter for satisfaction in measures taken for rehabilitation of site;
    - Undertaking from contractor; and Certification from Engineer in charge.

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