



NATIONAL HIGHWAY AUTHORITY OF INDIA

**Construction of Bangalore Chennai Expressway
Phase-III from Km 156.000 Km 156.000 near
190.Ramapuram Village, Gudipala Mandal,
Chittoor District in Andhra Pradesh to Km 262.569
near Irungattukottai Village, Sriperambudur Taluq,
Kanchipuram District in Tamil Nadu**

**SUMMARY ENVIRONMENTAL IMPACT
ASSESSMENT REPORT**

January, 2021





E SUMMARY ENVIRONMENTAL IMPACT ASSESSMENT

E.1 Project Description

The Environment Impact Assessment study has been conducted for the proposed Phase-III of Bangalore-Chennai Expressway (BCE) in 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.

E.1.1 Implementing Agency

The National Highways Authority of India (NHA) is the Implementing Agency for the project including the environmental and social safeguard measures. The NHA 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.

E.1.2 Project Location

- The proposed project is a new Bangalore Chennai Expressway which has been divided into three Phases. The present summary report is related to the Phase-III of BCE which is located in the states of Andhra Pradesh and Tamil Nadu
- The entire length of Phase-III is extended over Chittoor District (from proposed Km 156+000 to Km 168+000) in the state of Andhra Pradesh and Vellore District (from proposed Km 168+000 to Km 179+670), Ranipet District (from Km 179+670 to Km 221+900) Kanchipuram District (from proposed KM 221+900 to Km 248+550 & Km 249+320 to Km 262+100) and Tiruvallur District (from Proposed Km 248+550 to Km 249+320) in the state of Tamil Nadu State.
- The project section of Phase-III takes off from Km 156.000 near 190.Ramapuram Village, Gudipala mandal, Chittoor District in Andhra Pradesh and ends at Km 262.100 near Irungattukottai village, Sriperambudur Taluq, Kanchipuram District in Tamil Nadu.
- The total length of proposed BCE Phase-III is 106.100 Km.
- The geographical extension of the project road section is between 13°7'15.65" and 12°59'32.01" of North Latitude and 79°6'13.35" and 79°59'8.30" of the Eastern Longitude.



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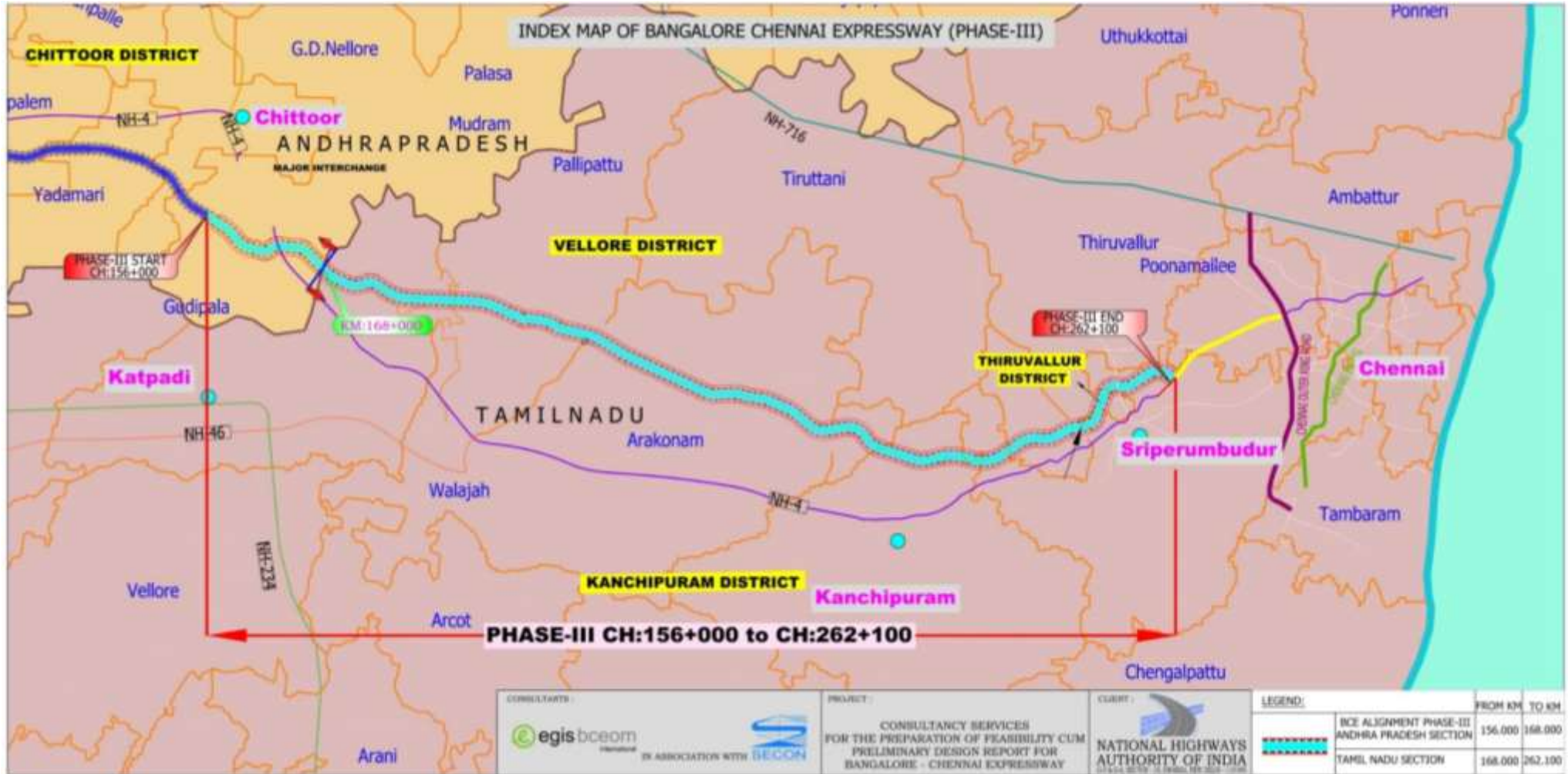


Figure E.1: LOCATION MAP OF BCE-PHASE-III





Salient Features of the Project:

A. General Information:

S. No.	Project Components	Details
1.	Project	Development of new Bangalore- Chennai Expressway Phase-III in the state of Andhra Pradesh and Tamil Nadu.
2.	Administrative locations	Chittoor District in Andhra Pradesh; Vellore, Ranipet, Kachipuram and Tiruvallur Districts in Tamil Nadu
3.	State	Andhra Pradesh and Tamil Nadu
4.	Length of the Project road	106.100 Kms
5.	Terrain	The project road is in plain and Rolling terrain
6.	Major Settlement along the Project	Banavaram, Thirumalpur, Sriperumbudur
7.	Rivers/Streams/Canals	The project mainly crosses rivers namely Ponnai and Kusas Thalai. Apart from these rivers, there are some natural streams/nallahs crosses the project road.
8.	Ponds/Tanks/Reservoirs	Total 29 Nos. of water Tanks/reservoirs will be affected Chittoor: 6 Vellore: 2 Ranipet: 5 Kachipuram: 16 Tiruvallur: 0
9.	Forest area	5.42 Ha of Reserved Forest located at Mahimandalam Village in Vellore district Tamil Nadu.
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
11.	Archaeological/ Heritage Site	Archaeological Survey of India site of Megalithic Cist and Cairns with Bounding Stone Circles, is minimum 128.2m and Maximum 205.8m in Vadamangalam village, Sriperumbudur Taluk, Kanchipuram District. NOC from ASI for this site has been obtained.

B. Other features:

S. No.	Items	Proposed
1.	General ROW	90 m
2.	Carriageway	The proposed road will be of 4 lane dual carriageway configuration with 21 m depressed median expandable to 8 lane. The Paved Dual Carriageway for main expressway shall be 22.50 meters for four lane sections and 21 m wide depressed median including the edge strips.
3.	Design Speed	120 Kmph
4.	Major Bridge	29 Nos across water tanks and 2 streams
5.	Minor Bridge	25 Nos.
6.	ROB	3 No.
7.	No. of Culverts	137 Nos. (130 Nos. along Main Alignment & 5 Nos. along Interchanges and 2 on connecting roads)



S. No.	Items	Proposed
8.	Vehicular Underpass	13 Nos.
9.	Vehicular Overpass	5 Nos.
10.	Light Vehicular Underpass	3 Nos.
11.	Pedestrian/cattle/Small Vehicular Underpass	50Nos.
12.	Interchange	7 Nos.
13.	Rest Area	4 Nos. (Including Both Sides) (Both sides to BCE, At km 188+200,Jambukulam & at km 227+500, Veliyur)
14.	Toll Plaza	6 Nos. (5 Nos on Interchanges and 1no on main alignment of expressway)
15.	Truck Lay Bys	3 Nos. (At Km 174+137 RHS, Melapadi and both sides at km 204+155 Bothsides, Karnavoor)
16.	State Border Check Post	1 No (at Km 167+715 RHS & at Km 169+215 LHS)
17.	Street Light	The street light has been proposed for locations at LVUP, VUP, Interchange, Check Post, Truck lay bye, Way side amenities and Toll Plaza Locations.
18.	High Mast Light	The High mast lighting has been proposed along the project highway locations in interchange locations, Rest area, Toll plaza locations and border check post locations.
19.	Connecting Roads	0.770 km on Main Expressway and 2.870 Km on Interchange locations
20.	Civil Construction Cost of the Project	Rs. 3472.03 crores

E.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 and its tributaries. Apart from this river, there are some local streams/nallahs which cross the project alignment which are ephemeral in nature.

Geology & Soil:

- The Chittoor district is underlain by formations of Archaean, Proterozoic, Jurassic Cretaceous Tertiary and Quaternary ages whereas the geological formation in Vellore and Ranipet districts is underlain by geological formations ranging in age from Archaean to Recent in the crystalline formations comprising charnockites, gneisses and granites. The Kancheepuram district is underlain by a wide range of consolidated and fissured formations, from the oldest Archaeans, followed by semi-consolidated formations of Mesozoic and Tertiary ages to the unconsolidated alluvial formations of Quaternary age. Tiruvallur district has an arenaceous formation called Coromandal Formation of probable Holocene age.
- The soil within the study area is predominantly red loamy soil to red sandy soil and varies from brown clayey soil to black cotton soils.



E.2.1 Seismicity

The project stretch of Phase-III falls under ZONE III of seismic zone of India. This zone is classified as Moderate Damage Risk Zone.

Climate

Climate of Chittoor, Vellore and Ranipet districts in the project region varies from tropical to tropical dry and wet climate. Kanchipuram and Tiruvallur districts generally experience hot and humid climatic conditions throughout the year. The monthly maximum temperature in the project region varies between 40.5 to 29.5°C whereas the monthly minimum temperature varies between 18.2°C to 28.3°C. Relative humidity during morning hours varies from 59.9% to 88.2% while during evening hours it ranges from 39.6% to 75.1%. The average rainfall of project region during South West Monsoon between June to September varies from 85.4 mm to 181.1 mm whereas during North East monsoon between October to December rainfall varies from 135.7 mm to 399.1 mm. The average wind speed in the project area varies from 3.8 Km/Hour to 9 Km/Hr.

Land Use

The land use along the proposed project in Chittoor, Vellore and Ranipet districts is predominantly agriculture land followed by forest and waste land while main land use in Kanchipuram and Tiruvallur districts is agricultural followed by water bodies.

Water Resources

Surface water Resources

The BCE Phase-III alignment is crossing the Ponnai River at Km 179.500 and Kusas Thalai River at Km 215.650 in Vellore district of Tamil Nadu. These rivers are ephemeral. Apart from these rivers, there are few local streams and nallahs 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 6 water tanks in Chittoor district, 2 in Vellore District, 5 in Ranipet District and 16 water tanks in Kanchipuram 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 Safe zone except Vellore District where it comes under over-exploited zone with respect to groundwater utilization but is suitable for artificial groundwater recharge. The water table in the study area during pre-monsoon ranges from 7.5 to 12.2 m bgl while in post-monsoon it ranges from 4.5 to 20 m bgl. The net annual groundwater availability varies from 153857 ha m in Chittoor district, 59280 ha m in Vellore district, 105525 ha m in Kanchipuram District to 72840 ha m Tiruvallur district.

Ground Water Quality

The ground water samples were tested from 4 locations to assess the physico-chemical characteristics of groundwater within project area and found that pH varies between 6.8 to 7.57, TDS (mg/l) varies between 261 to 460, Faecal coliform absent, As, Hg, Lead, Boron are below detectable limit.



Surface Water Quality Results: The pH value ranged between 7.02 to 8.57, DO ranges from 3 to 6.8 mg/l, BOD (3 day 27 deg C) varies from less than 5 to 15 mg/l for all locations, COD ranges from 9 to 46 mg/l, Total Dissolved Solids range from 170 to 1820 mg/l, Total coliform (MPN/100ml) varies between 23 to 170.

Air Quality

To assess the ambient air quality within the project area post-monsoon air quality monitoring was carried out at 5 locations between March-May 2018. All the stations fall in residential and rural zone except Irungattukottai (Industrial). The monitoring results shows that PM₁₀ (µg/m³) varied between 81.0 µg/m³ at Mahimandalam Reserved Forest (Village Road Crossing) and 95.0 µg/m³ at Irungattukottai, which were within the maximum permissible limit of the National Ambient Air Quality Standards i.e. 100 µg/m³. PM_{2.5} were recorded in the range from 38.6 µg/m³ near Mahimandalam Reserved Forest area to 21.4 µg/m³ to 51.5 µg/m³ at Nelvoy Village which is also within the maximum permissible limit of the National Ambient Air Quality Standards of 60 µg/m³. SO₂ levels in ambient air varied between 9.1 µg /m³ and 16.5 µg /m³ which is well within the prescribed limits 80 µg /m³ at all locations. The mean concentration of NO_x in ambient air was recorded between 19.6µg /m³ to 34.1 µg /m³ which is within the prescribed limits of 80 µg /m³. The CO levels in the air samples were found in the range of 0.253 mg/m³ to 0.631 mg/m³ which is within the prescribed limit of 4.0 mg/m³

Noise Quality

Noise level monitoring was conducted at 5 locations, four locations are rural residential zone and one location is industrial. The ambient noise levels were compared with National Ambient Noise Standards. The Leq (Day) at 190.Ramapuram Village and Mahimandalam Reserved Forest (Village Road Crossing) are 56.8 dB(A) and 55.6 dB(A) respectively. Leq (day) time exceeds permissible standards during day time at these two stations. Noise levels at these two stations at night time are within permissible limit. Noise levels at other stations are within permissible limit during day time as well as night time.

Soil Quality

For Soil Quality monitoring, five numbers of soil samples from adjacent agricultural land were collected. The pH level of the soil in the study area is ranging from 7.65 to 8.64. The soil texture varied from Silty Sandy Loam to sandy clay Loam to Silty clay loam along the proposed project alignment. Organic carbon content in the soil varies from 0.63% to 2.43%. Electrical conductivity is normal and favorable for germination as all the samples have results below 1000 µS/ cm. The moisture retention capacity varies from 5.6 to 9.6% and Infiltration rate varies from 17.85 to 26.2 mm/hr

B) Ecological Environment

Phase-III of the Expressway does not pass through any 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. The project alignment is passing through Mahimandalam Reserved Forest Area, Arcot Range, Vellore Forest Division. The RF land to be diverted for expressway is 5.42 Ha. There are about 2018 trees in Mahimandalam RF coming within PRow of the project road. Out of which there are about 778 spontaneously grown trees with girth varying from 31 cm to 90 cm, 110 Red sanders trees which form part of 1974 plantations



done in the Mahimandalam Reserved Forest and remaining 1130 trees which belong to other species.

There are about 9,468 general trees in non-forest area and predominant tree species are Teak, Neem, Eucalyptus, etc. There are about 7,486 horticulture trees/plantations/shrubs likely to be affected and main species are Mango, Coconut, Tamarind, Palm Trees, etc. At some locations, private plantations of Eucalyptus have been recorded. These eucalyptus plantations are done as a cutting crop.

Among the faunal species, 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

Of the total surveyed households, a total of 564 persons are affected due to acquisition of houses and other assets. Among affected person due to acquisition of structures are 314 Male and 250 females. A total no. of 147 households (PAHs) consisting of 144 families (PAFs) will be affected. All the affected PAH and PAF will require to be displaced due to the project.

The analysis of Socio-Cultural profile of the surveyed households shows that along the project corridor, there were households belonging to three religions viz. Hindus (56.25%), Christians (20.14%), Muslims (7.64%), Sikhs (0.69%) however, 15.28% of respondent didn't disclose their religion. Social group-wise most of the affected people represents the backward caste (38.89%), General constitute (5.56%), Scheduled Castes comprises around 25.69%. The Scheduled tribe population constitute 2.08% of total affected households. Observed across the family pattern majority (28.47%) of the affected households are nuclear families and of the remaining 38.89 % percent of the affected households live as joint families.

Most of the households are staying along the roadside from a long time where in nearly 73.40 % of them are living since more than 10 years. About 3.19 % of them are found to have settled in the last 2-6 years. Occupation wise, most of them are engaged into Agriculture where around (13.19%) of the Daily Wages followed by housewife 9.72%, Trade/Business and Non-Agricultural Labours (13.19%) and other occupations such as Agricultural Labours, private service and others. The income levels of majority of the households fall under middle income families (24.31 percent) who are earning between Rs. 50000 to Rs. 100000 per annum. The incidence of lower income families is about 2.78 percent who earn less than Rs. 50000 per annum.

D) Cultural Environment

There is one archaeological site "Megalithic Cist and Cairns with Bounding Stone Circles" at Km 250.400 present within the study area. The distance of proposed project road from the fencing of ASI site is minimum 128.2m and Maximum 205.8m in Vadamangalam Village, Sriperumbudur Taluk, Kanchipuram district. There are 3 religious places within ROW will be impacted.

E.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 about 1085.15 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 9468 general trees and 7486 horticulture Trees/plantations/shrubs are likely to be impacted. The proposed project road is passing through the Mahimandalam Reserved Forest area with 5.42 Ha land of RF is to be diverted. Total 49 number of residential structures, 61 commercial structures, 22 residential cum commercial structures and 15 other (incl. cattle sheds, pump house, sheds, toilet, water tanks, etc.) structures exist within proposed RoW. 12 number of common property resources (CPR) are also impacted. Common Property Resources includes 3 number religious structures and 9 number Government structure.
- (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 involve about 2,27,50,610 cum of excavation from borrow area. 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. 5 borrow areas and 19 quarry areas have been identified as source of earth and aggregates and 4 sand mining areas 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. The 3 religious structures located within the RoW are likely to be affected due to construction of the project. Sewage and domestic solid waste will be generated at the construction worker's 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 Ecologically sensitive area is impacted due to the project. The amenities like hand pumps, water tap, bore wells etc. which come 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 NHA 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, equipment 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 religious structures will be relocated with proper compensation and community consultation to avoid any kind of local conflict.

(iii) Operation Phase

Operation of the BCE Phase-III 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.

E.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 E.1.



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Bangalore – Chennai Expressway-Phase-III

Table E.2: 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 , NO _x , CO, AQI	National Ambient Air Quality Standard (CPCB, 18 th Nov, 2009)	Batching Plant site, HMP and Stone Crusher	Once in a month for 2.5 Years at 12 - locations	24 hourly monitoring for 1 day	Check and modify control device like bag filter/cyclones of hot mix plant	Concessionaire through NABL approved monitoring agency	IE & PIU-NHAI
		PM ₁₀ µg /m ³ , PM _{2.5} µg /m ³ , SO ₂ , NO _x , CO, AQI		Along the project alignment at locations of baseline monitoring in consultation with IE	Once in a month for 2.5 years of construction	24 hourly monitoring for 1 day	-	Concessionaire through NABL approved monitoring agency	IE & PIU-NHAI
	Operation	PM ₁₀ µg /m ³ , PM _{2.5} µg /m ³ , SO ₂ , NO _x , CO, AQI		At Toll Plaza with Real time Continual Monitoring System	Daily (Real time monitoring) through establishment of Continuous ambient air quality monitoring system (CAAQMS) till 20 Years (total 240 months)	Continuous monitoring	Use mitigation measures such as water fogging through anti-smog gun	Concessionaire through Continuous ambient air quality monitoring system (CAAQMS)	IE & PIU-NHAI



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Bangalore – Chennai Expressway-Phase-III

Environment Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	Standards	Locations	Frequency	Duration	Action Plan in case criteria exceeds	Implementation	Supervision
Surface Water Quality	Construction	pH, temperature, DO, BOD, COD, Oil & Grease, Total Suspended Solid, turbidity, Total Hardness, Chlorine, Iron, Total Coliform.	Surface Water Quality Standard as per use based classification for Surface Water as per CPCB Guidelines. (Ref IS: 2296)	At identified locations	Once in a month for 2.5 Years at 2 locations in each package at identified locations by IE/AE	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	Surface Water as per CPCB Guidelines. (Ref IS: 2296)	At identified locations	Quarterly in a Year for 20 Years at 5 locations	Grab Sampling	Check and modify oil interceptors, silt fencing devices	Concessionaire through approved monitoring agency	IE & PIU-NHAI
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 and Camp site	Once in a month for 2.5 Years at 3 locations in each package at identified locations by IE/AE	Grab Sampling			





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Environment Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	Standards	Locations	Frequency	Duration	Action Plan in case criteria exceeds	Implementation	Supervision
	Construction	<i>pH, Temperature, Total hardness, TDS, Iron, Sulphate, Nitrate, Bacteriological, Heavy metals such as Cr, Ni, Pb, Hg, etc.</i>	Ground Water Quality Standard as per IS: 10500, 2012	At Baseline sampling locations	Once in 3 month for 2.5 Years at 5 locations	Grab Sampling	Check and modify oil interceptors, silt fencing devices	Concessionaire through approved monitoring agency	IE & PIU-NHAI
	Operation	<i>pH, Temperature, Total hardness, TDS, Iron, Sulphate, Nitrate, Bacteriological, Heavy metals such as Cr, Ni, Pb, Hg, etc.</i>		At identified locations	Quarterly in a Year for 20 Years at 5 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	24 Hourly data once in a month till 2.5 years of construction period	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



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Environment Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	Standards	Locations	Frequency	Duration	Action Plan in case criteria exceeds	Implementation	Supervision
		Leq dB (A) (Day and Night) Average and Peak values	Ambient Noise Standard (CPCB, 2000)	At Baseline sampling locations and as identified by IE	24 Hourly data once in a month till 2.5 years of construction period	Readings to be taken at 60 seconds interval for every hour and then Leq are to be obtained for Day time and Night time			
	Operation	Leq dB (A) (Day and Night) Average and Peak values		Ambient Noise Quality at Baseline Locations	Quarterly in a Year for 20 Years at 5 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



DRAFT EIA REPORT Bangalore – Chennai Expressway-Phase-III

Environment Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	Standards	Locations	Frequency	Duration	Action Plan in case criteria exceeds	Implementation	Supervision
Soil	Construction	Physical Parameter: Texture, <i>Texture, Grain Size, Gravel, Sand, Silt, Clay, pH, Conductivity, Calcium, Magnesium, Sodium, Nitrogen, Absorption Ratio, heavy metals, oil & grease, etc</i>	-	Near Construction sites along the alignment	Once in 3 months for 2.5 Years at 5 locations	Grab Sampling	-	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		At Baseline sampling locations and as identified by IE	Semi-Annual in a Year for 20 Years at 4 locations	Grab Sampling	-	Concessionaire through approved monitoring agency	IE & PIU-NHAI
Tree Plantation/Green	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



DRAFT EIA REPORT
Bangalore – Chennai Expressway-Phase-III

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	5 years	Replacement of Dead tree with healthy saplings of same species	Concessionaire	IE, PIU NHAI





E.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.
- 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.

E.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 APPCB, TNPCB etc. NHA/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, NHA time to time. Project Implementation Unit (PIU), NHA 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 E.3.

Table E.3: Environmental Cost Estimates

Particulars	Amount (Rs)
Environmental Protection and Mitigation Cost (A)	62,77,74,030
Environmental Monitoring during Construction Phase (B)	70,54,000
Environmental Monitoring during Operation Phase (C)	3,47,20,000
Total (A+B+C)	66,95,48,030

**Environmental monitoring has been considered for 2.5 years' construction and 20 years concession /operation period.*