



NATIONAL HIGHWAYS AUTHORITY OF INDIA

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

SUMMARY ENVIRONMENTAL IMPACT ASSESSMENT REPORT

KANCHEEPURAM DISTRICT

ENGLISH VERSION

January, 2021

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E SUMMARY ENVIRONMENTAL IMPACT ASSESSMENT-KANCHEEPURAM DISTRICT**E.1 INTRODUCTION**

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 present summary Environmental Impact Assessment (SEIA) report is for the project section falling within Kancheepuram district covering 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.

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.

E.2 PROJECT DESCRIPTION

- 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 Kancheepuram district of 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 covering a total length of 106.100 Km.
- 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 Taluk, Kancheepuram District in Tamil Nadu.
- A total of 39.430 km of BCE Phase-III passes through Kancheepuram district. The project length traverses in Kancheepuram district between Km 221+900 to Km 248+550 (length - 26.650km) and again from Km 249+320 to 262+100 km (Length-12.780 Km). This project section falls in Kancheepuram and Sriperambudur Taluk of Kancheepuram district covering about 37.16% of the total length of BCE Phase-III.



SUMMARY EIA Bangalore – Chennai Expressway-Phase-III- Kancheepuram District

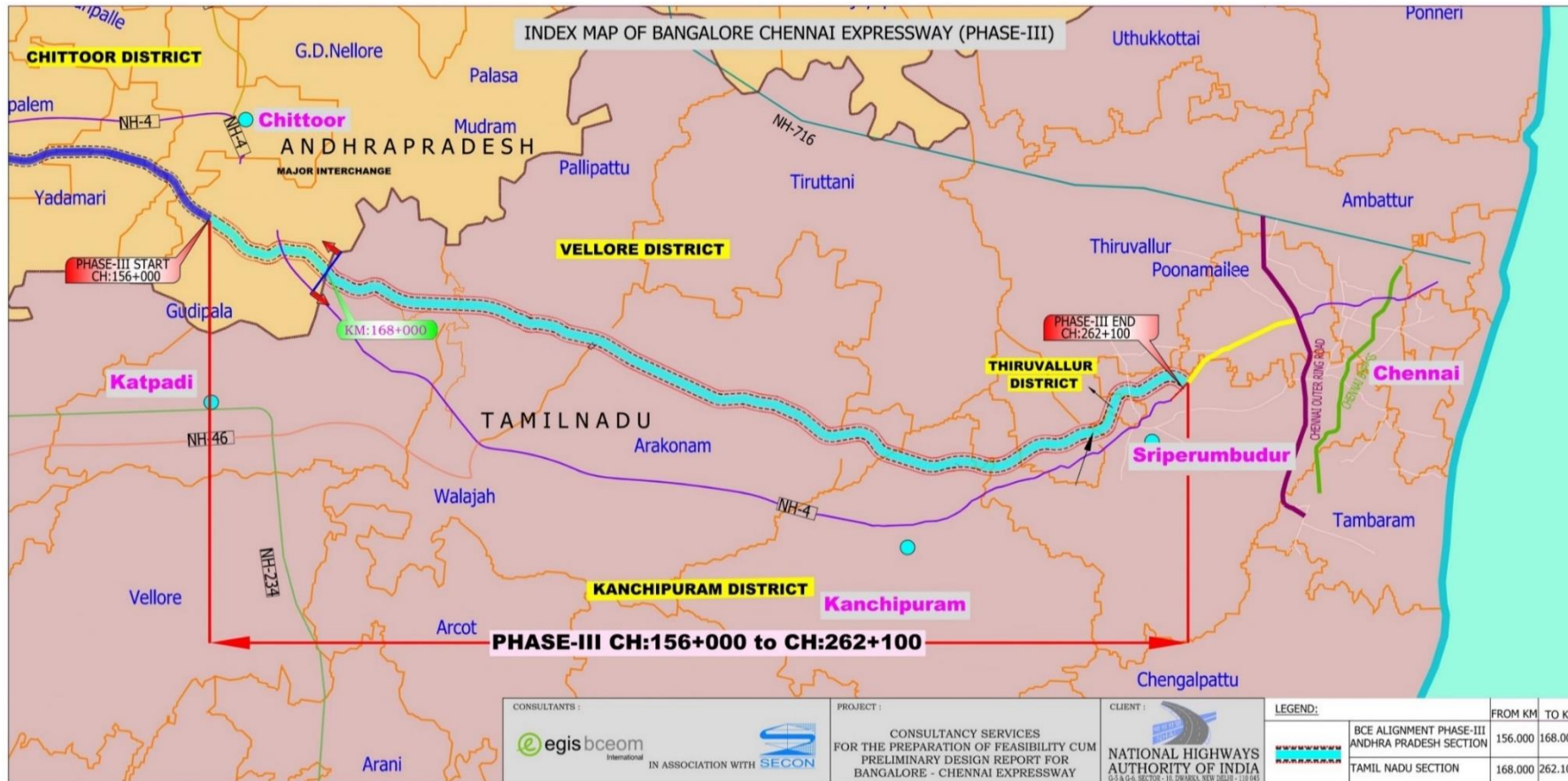


Figure E.1: LOCATION MAP OF BCE-PHASE-III



E.2.1 Project Location in Kancheepuram District

The geographical extension of the project road section in Kancheepuram district is between 12°56'32.13"N Latitude 79° 39' 34" E Longitude at Govindawadi Village of Kancheepuram Taluk to 12°59'32" N Latitude and 79°59'8.31"E Longitude at Irunattukottai village of Sriperumbudur Taluk.

E.2.2 Salient Features of the Project in Kancheepuram District:

A. General Information in Kancheepuram District:

S. No.	Project Components	Details of BCE Phase-III	Kancheepuram District
1.	Project	Development of new Bangalore- Chennai Expressway Phase-III in the state of Andhra Pradesh and Tamil Nadu.	
2.	Administrative Location of Project Alignment	Chittoor District in Andhra Pradesh; Vellore, Ranipet, Kachipuram and Tiruvallur Districts in Tamil Nadu	Kancheepuram and Sriperumbudur Taluk in Kancheepuram District
3.	No of Villages	Andhra Pradesh and Tamil Nadu	13 in Kancheepuram Taluk and 17 in Sriperumbudur Taluk
4.	Length of the Project road in Tiruvallur District	106.100 Kms	39.43 Km
5.	Terrain	The project road is in plain and Rolling terrain	Plain and Rolling
6.	Major Settlement area along Project	Banavaram, Thirumalpur, Sriperumbudur	The alignment does not pass through any habitation area. The major settlement near the project alignment are Govindavadi, Podavur, Keeranallur, Sogandi, Molachur, Nemeli, Irungattukottai.
7.	Rivers/Streams/Canals	The project mainly crosses 2 rivers namely Ponnai and Kusas Thalai. Apart from these rivers, there are some natural streams/nallahs crosses the project road.	River: Nil
8.	Ponds/Tanks/Reservoirs	Total 29 Nos. of water Tanks/reservoirs will be affected. In Chittoor: 6, Vellore: 2, Ranipet: 5, Kancheepuram: 15, Tiruvallur: 0	15 Irrigation Tank

S. No.	Project Components	Details of BCE Phase-III	Kancheepuram District
9.	Forest area	5.42 Ha of Reserved Forest located at Mahimandalam Village in Vellore district of Tamil Nadu.	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	Nil
11.	Archaeological/ Heritage Site	1 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.	1 Along the project alignment at proposed Km 250.600 one archaeological site is located at a distance ranging from 128.2 m to 205.8 m in Vadamangalam Village, Sriperumbudur Taluka of Kancheepuram District in Tamil Nadu. Due NOC from National Monuments Authority, Government of India has been obtained

B. Other features:

S. No.	Items	Proposed for Entire BCE Phase-III	Proposed in Project Section in Kancheepuram District
1.	General ROW	90 m	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.	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	120 Kmph

S. No.	Items	Proposed for Entire BCE Phase-III	Proposed in Project Section in Kancheepuram District
4.	Major Bridge	29 Nos across water tanks and 2 streams	13
5.	Minor Bridge	25 Nos.	13
6.	ROB	3 No.	1 (Km 223+695 to Km 223+793 at Govindavadi)
7.	No. of Culverts	137 Nos. (130 Nos. along Main Alignment & 5 Nos. along Interchanges and 2 on connecting roads)	42
8.	Vehicular Underpass	13 Nos.	5 Nos. (Molachur, Ayakolathur, Nemili, Thimmayyapalle and Veppalai)
9.	Vehicular Overpass	5 Nos.	Nil
10.	Light Vehicular Underpass	3 Nos.	Nil
11.	Pedestrian/cattle/ Small Vehicular Underpass	50Nos.	15
12.	Interchange	7 Nos.	2 (Govindavadi and Molachur)
13.	Utilities	IOCL pipeline at 3 Location (251+015, 253+925, 255+480)	IOCL pipeline at 3 Location (251+015, 253+925, 255+480)
14.	Rest Area	4 Nos. (Including Both Sides) (Both sides to BCE, At km 188+200, Jambukulam & at km 227+500, Veliyur)	2 (at Km 227+500 both side near Veliyur)
15.	Toll Plaza	6 Nos. (5 Nos on Interchanges and 1no on main alignment of expressway)	Main alignment = 1 at Km 253+320 Near Kiloy Village Interchanges: 1 at Km 224+685 (Interchange with SH-58 in Govindavadi), 1 at Km 247+832 (Interchange with SH in Molachur) Total No. on Interchanges: 2
16.	Truck Lay Bys	3 Nos. (At Km 174+137 RHS, Melapadi and both sides at km 204+155 Both sides, Karnavoor)	Nil
17.	State Border Check Post	1 No (at Km 167+715 RHS & at Km 169+215 LHS)	Nil

S. No.	Items	Proposed for Entire BCE Phase-III	Proposed in Project Section in Kancheepuram District
18.	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.	The street light has been proposed for locations at LVUP, VUP, Interchange, Check Post, Truck lay bye, Way side amenities and Toll Plaza Locations.
19.	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.	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.
20.	Connecting Roads	0.770 km on Main Expressway and 2.870 Km on Interchange locations	1 at 224.685 with SH-58 at Govindawadi)
21.	Civil Construction Cost	Rs. 3472.03 crores	Rs. 1290.31 Cr. (Based on Cost/Km)

E.3 DESCRIPTION OF THE ENVIRONMENT

A) Physical Environment

Physiography: The project stretch is located over flat to rolling terrain. No river crosses the project alignment in district however tanks and nalah/drain passes through out project alignment in the district

Geology & Soil: Kancheepuram district has semi-consolidated formations representing upper Gondwanas of Jurassic to Lower Cretaceous in age and the marine bed of cretaceous age. The major part is covered by brown clayey soil.

Seismicity

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

Climate

Kancheepuram districts generally experience hot and humid climatic conditions throughout the year. The mean maximum and mean minimum temperatures of Kanchipuram districts range from 38.2° to 20.9°C. Relative humidity during morning and evening hours varies from 82.6% to 57.6%. The average wind speed in the project area varies from 4.3 Km/hr to 9.0 Km/hr.

Land Use

The land use along the proposed project in Kancheepuram districts is predominately agricultural.

Water Resources

Surface water Resources

The BCE Phase-III alignment in Kancheepuram district does not cross any river but passes through 16 irrigation tanks.

Ground Water Resources

The project area falls under Safe zone and the present gross ground water draft for all users is 69419 Ha m. Net ground water availability in Kancheepuram district is 105525 Ham. The water table varies between 5-30 mbgl along the project area.

Ground Water Quality

The ground water samples were tested in vicinity to the district at Km 225.700 at Govindavadi and Km 262.100 Irungattukottai to assess the physico-chemical characteristics of groundwater within project area and found that pH varies between 6.8 to 7.57, TDS was found in the range of 460 mg/l at Govindavadi and 400 mg/l at Irungattukottai. Total hardness was recorded to 245 mg/l at Govindavadi and 237 mg/l at Irungattukottai. Npo biological contamination observed in both the samples. The heavy meatal in terms of As, Hg, Lead, Boron were below detectable limit.

Surface Water Quality Results: The surface water samples were tested in vicinity to the district at Km 242.700 in Podavur and Km 261.855 in Iragattukottai to assess the water quality of surface water in project area and found that the pH value ranged between 7.02 to 8.57, DO ranges from 6.5 mg/l to 6.7 mg/l, BOD (3 day 27 deg C) varies from less than 8 mg/l to 15 mg/l, COD ranges from 42 to 28 mg/l, Total Dissolved Solids range from 170 mg/l to 210 mg/l, Total coliform varies between 23 MPN/100ml to 30 MPN/100ml.

Ambient Air Quality

To assess the ambient air quality within the project area influence area in Kancheepuram district at km 225.800 (Moolapattu, Village residential zone) and Km 262.100 (Irungattukottai industrial zone) considering the spatial relationship of various land uses along the project road, Meteorological condition. The post-monsoon air quality monitoring was carried out at these locations between March-May 2018. The monitoring results shows that PM₁₀ ($\mu\text{g}/\text{m}^3$) varied between 85.4 $\mu\text{g}/\text{m}^3$ at Moolapattu village and 95.0 $\mu\text{g}/\text{m}^3$ at Irungattukottai, which were within the maximum permissible limit of the National Ambient Air Quality Standards i.e. 100 $\mu\text{g}/\text{m}^3$. PM_{2.5} were recorded in the range from 48.3 $\mu\text{g}/\text{m}^3$ near Irungattukottai industrial zone to 43.3 $\mu\text{g}/\text{m}^3$ at Moolapattu Village residential zone which is also well within the maximum permissible limit of the National Ambient Air Quality Standards of 60 $\mu\text{g}/\text{m}^3$. SO₂ levels in ambient air varied between 16.6 $\mu\text{g}/\text{m}^3$ and 16.5 $\mu\text{g}/\text{m}^3$ which is well within the prescribed limits 80 $\mu\text{g}/\text{m}^3$ at all locations. The mean concentration of NO_x in ambient air was recorded between 31.8 $\mu\text{g}/\text{m}^3$ to 32.3 $\mu\text{g}/\text{m}^3$ which is within the prescribed limits of 80 $\mu\text{g}/\text{m}^3$. The CO levels in the air samples were found in the range of 0.480 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 2 locations near project influence in Kancheepuram district, one location in Moolapattu village which is a rural residential zone and one location at

Irungattukottai which represents industrial area. The ambient noise levels were compared with National Ambient Noise Standards. The daytime mean equivalent noise level was recorded to 52.8 Leq dB(A) at Moolapattu and 62.2 Leq dB(A) at Irungattukottai. Similarly, the mean night time ambient noise was recorded to 43.5 LeqdB(A) at Moolapattu and 49.7 Leq dB(A) at Irrungattukotai. Both Day and Noise levels at both the location were found within permissible limit.

Soil Quality

For Soil Quality monitoring, soil sample from adjacent agricultural land at Km 247.900 (near Molachur Village) was collected. The pH level of the soil in the study area was 8.64. The soil texture was sandy clay Loam along the proposed project alignment. Organic carbon content in the soil found was 1.51%. Electrical conductivity is normal and favorable for germination as all the samples have results below 1000 $\mu\text{S}/\text{cm}$. The moisture retention capacity was 6.7% and Infiltration rate was 26.2 mm/hr

B) Ecological Environment

In Kancheepuram district, the project does not pass through and ecological sensitive area neither the project is located in any Eco sensitive zone. There is no forest area located around project section in Kancheepuram district.

There are about 2820 trees likely to be affected due to the proposed Phase-III project. The pre dominant species found are Teak, Neem, Mankathuvel, Kathi Savuku, Ayal vagai, Echa Tree, etc. There are 363 horticulture trees and 215 horticulture shrubs within Right of Way in Kancheepuram district likely to be affected.

There is no rare, threatened or endangered flora of fauna exist in the project alignment.

C) Social Environment

The project section in Kancheepuram district passes through 29 villages in Kancheepuram district, Tamil Nadu.

According to the 2011 census, Kancheepuram district had a population of 39,98,252 with a sex-ratio of 986 females for every 1,000 males, much above the national average of 929. The literacy rate of Kancheepuram District was reported to 84.49%, (89.89% male, whereas 78.32% female literacy rate).

The project section passes through agriculture land. 77 structures affected in Kanchipuram district due to proposed project. The project section in Kancheepuram district will involve acquisition of 450.658 ha. of Land (104.157 ha. of Government land and 346.501 ha. of Private land).

D) Cultural Environment

Along the project alignment at proposed Km 250.600 one archaeological site is located at a distance ranging from 128.2 m to 205.8 m in Vadamangalam Village, Sriperumbudur Taluka of Kancheepuram District in Tamil Nadu. Anticipated Environmental Impact and Mitigation Measures.

E.4 ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

A) Anticipated Impacts

In Kancheepuram District, the Project length is only 39.430 Km passing through Kancheepuram and Sriperumbudur Taluk. The overview of the anticipated environmental impacts of the project in Kancheepuram has been presented as below:

- (i) **Pre-construction Phase:** The proposed Bangalore-Chennai Expressway Phase-III is a new alignment. The construction of expressway will be carried out in phased manner to develop it to 8 lane expressway. In the first phase it is proposed to construction 4 lane dual carriageway road with depressed median of 21 m so that the road can be widened in future without any land acquisition and can be widened in future from inside towards depressed median without disturbing the outside features within the RoW. In general, 90 m wide RoW has been proposed for development of Expressway. The environmental impacts associated with the pre-construction stages mainly include impacts due to design and location of the project as well as site preparation for construction. The main issues involve in the preconstruction stage are acquisition of land and properties, tree felling, encroachment of water tanks acquisition of common property resources, relocation of public utilities etc. Most of the impacts of preconstruction stage are permanent in nature.

Acquisition of Land:

The project alignment has been finalised in such a manner that there is minimum impact on environment and population. All the village settlement areas have been avoided in order to avoid acquisition of properties and mass displacement of population. Altogether for entire BCE-Phase-III alignment, acquisition of 1085.154 Ha of land is required, out of which 833.914 belongs to private land and 251.239 Ha belongs to Government.

In Kancheepuram District, the project involves acquisition of 450.659 Ha, out of which 346.502 Ha land is private land whereas the remaining 104.157 Ha of land belongs to Government land. The affected private land is mainly agriculture land.

Acquisition of Properties

The project also requires acquisition of structures falling in proposed RoW of 90 m. In Kancheepuram District a total number of 83 structures will be acquired, out of which 77 structures are private structures, 4 Government structures and 2 are temples. Among 77 affected private properties, 19 are residential structures, 38 commercial structures and 15 areas residential cum commercial structures and 5 are boundary wall/sheds. Out of 77 affected structures 48 are pucca structure, 28 are semi pucca and 1 is Kuccha structures.

Affected Persons & Families:

Due to acquisition of structures 77 households covering a population of 228 persons will be displaced in Kancheepuram district.

Impact on Ecological Resources:

Since there is no forest or ecologically protected area located in the project area, no impact on such features envisaged. However, a total number of 2820 trees falling within the proposed RoW would require to be felled in Kancheepuram district.

Impact on Water bodies

The project section in Kancheepuram District will cross 16 irrigation tanks, however appropriate structure is proposed to minimise the impacts.

Impact on Archaeological/ Heritage Site

The project alignment has avoided the Archeological site located in Vadamangalam Village, Sriperumbudur Taluka of Kancheepuram District by keeping alignment away from this site. No area from this site is affected due to location of the project. The necessary statutory permission has been obtained for this site from Archaeological Survey of India.

- (ii) **Construction Phase:** During construction period the major environmental issues will be related to dust generation, emission of gaseous emissions, borrow area and quarry operations, pollution due to operation of plants and equipments, contamination of land and soil, contamination of water bodies and public as well as worker's health and safety. These anticipated impacts will mainly temporary and localised in nature and are likely to persist for short duration till the construction activities are over in a particular area. However, there are some long term adverse impacts due to construction. These impacts however can be mitigated effectively through proper planning, scheduling and by application of environmental friendly construction practices.

The microclimate is likely to be affected due to removal of trees and creation of impervious surface. For construction of project road project section in Kancheppuram district, will require about 82,36,254 cum of soil, 52,825 cum of sand and 2,20,352 cum of stone aggregates which will be met through different borrow areas and quarry, which may lead to disturbance to land and disfiguration of area due to haphazard excavation at borrow areas. The acquisition of agricultural land would cause loss of productive soil. 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. For meeting the earth requirement for construction of Expressway, 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. Transportation of construction materials and movement of vehicles over 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. The noise levels in the project area during construction will increase though it will be intermittent and temporary in nature. In the project section of Kancheepuram District, there is no settlement area or sensitive environmental features along the project road, so there will not be impacts on these features due to dust generation or increased noise levels during construction. 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:** In the project section of Kancheepuram District no significant adverse environmental impact is anticipated during operation stage. In general, soil pollution due to accidental vehicle spills or leaks is a low probability in the area, but potentially disastrous to the receiving environment, if they occur. Since there is no water body located around the project section, contamination of water body due to oil spillage is not anticipated in Kancheepuram district. However, the project will lead to higher traffic volume and speed, which will have impact on the ambient air quality by increasing the pollutant load. But the green belt development has been proposed all along the project

road which will act as natural sink for pollutants, thereby will help in reducing the adverse impacts. The increase in traffic volume and speed is likely to increase in Noise Pollution Level along the expressway in the Kancheepuram district, but due to absence of any settlement area in the vicinity of the project road in Kancheepuram the impact of noise pollution will be insignificant. Moreover, noise barriers have been proposed at 11 locations in Kancheepuram district along the settlement areas which are located in the close vicinity of the project and greenbelt development throughout the project length will actually help in mitigating the impacts.

The development of Expressway will have positive impacts on overall socio-economic condition of the entire project influence states by providing better connectivity and speedy transportation facilities.

B) Environmental Mitigation Measures

(i) Pre-construction Phase: As per IRC SP:99-2013 guidelines, for Expressway the required RoW is between 90m to 120m. The project section is the part of Expressway which is a new alignment. To minimize the land acquisition and impact on structures the minimum Right of Way has been considered, i.e. 90 m. 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) and Land Acquisition Act. Religious structures will be compensated/relocated as per directions of the competent authority.

All the affected household/families have been identified in the Kanchipuram district. The acquisition of land and private properties will be carried out in accordance with the RAP and entitlement framework for the project. The Compensation will be paid in accordance with the NHA Act and Policy and new land acquisition Act, Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act (RFCTLAR&R) and will be decided by the Competent Authority of the State Government appointed by the NHA.

The requisite permission for cutting of 2820 trees will be obtained from line department in Kancheepuram District prior to cutting of trees. Compensatory tree plantation will be carried out in the ratio of 1:10, so a total number of 28,200 trees will be planted as compensatory plantation within the available space in ROW and in other identified land in consultation with Forest Department in Kancheepuram District.

(ii) Construction Phase:

- 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 will be provided next to water bodies mainly during the rainy season.
- To minimize the requirement of borrow areas the excavated materials generated for road bed preparation will be reused for construction. As per estimation about 3,67,894 Cum of excavated earth will be generated, which will contain soil and ordinary rock

boulders. About 70% of the excavated material will be will be reused tfor construction. In addition, it is proposed to use fly ash in embankment for further reduction is material requirements from borrow areas. The operational stone quarries with valid licence available in Kancheepuram district will be utilized for meeting the aggregate quantity.

- Dust control measures such as regular water sprinkling in construction areas, camp site, plant site and other allied sites will be carried out to control dust. All the construction plants and equipments will be fitted with dust control and pollution control equipments and adhere to the emission standards.
- 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 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.
- To avoid any adverse impact on IOCL pipeline crossing, bridges are proposed over the IOCL pipelines.
- In any circumstances, no encroachment upon the archaeological site located in Kancheepuram District will be allowed. There will not be plant site, stockyard, camp site, disposal site of construction wastes will be located within of along the archaeological site.

(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 and well as noise level. Further, the Noise Barriers provided along villages settlement falling within 500 m from centre line of the project. In the project section of Kancheepuram District such noise barriers have been proposed in 11 villages. The greenbelt development and noise barriers will help in reducing noise levels generated due to heavy traffic movement on this expressway. 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.5 ENVIRONMENTAL MONITORING PROGRAMME

Provisions have been made for monitoring of environmental attributes during construction and operation phase of the project for the entire section of BCE-Phase III. The details of the parameters, frequency and duration are given in Table E.2.

Table E.2: Environmental Monitoring Plan for BCE Phase III

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



Environment Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	Standards	Locations	Frequency	Duration	Action Plan in case criteria exceeds	Implementation	Supervision
	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
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	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



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	for 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	<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	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			



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



Environment Component	Project Stage	Regular Monitoring Parameters				Institutional Responsibilities			
		Parameters	Standards	Locations	Frequency	Duration	Action Plan in case criteria exceeds	Implementation	Supervision
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
		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			



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	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
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



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



Proposed Environmental Monitoring Programme Kancheepuram District:

During Construction period the environmental monitoring will be carried out as per above monitoring programme. The above Monitoring included the project section of Kancheepuram District also in order to assess the impacts on different environmental quality components. The proposed monitoring locations in Kancheepuram district are as Below:

Table E.3: Environmental Monitoring Plan for BCE Phase III in Kancheepuram District

S.N.	Component	Location of Monitoring	No. of Locations
1	Ambient Air Quality	Batching Plant site, HMP and Stone Crusher for project section in Kanchipuram District Section	3
		Along the Project alignment of Kancheepuram District at 2 locations near construction site/baseline location	2
2	Surface Water Quality	At 2 locations in each at baseline/surface water body near construction zone	3
3	Ground Water Quality	At Plant site & camp site	
		At baseline locations	2
4	Ambient Noise Level	At Plant sites (Stone crusher, HMP & Batching Plant) and Camp site	3
		Near Construction site	2
5	Soil Quality	Near Plant site	1

E.6 ADDITIONAL STUDIES

Under additional studies during EIA study, Social Impact Assessment and R&R studies has been carried out for the project. 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 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.

Under SIA the project affected persons and families have been identified and surveys for establishing their socio-economic profile. This in turns helped in formulating Resettlement & rehabilitation plan for project affected person. The summary of affected persons and families due to the Proposed Project section in Kancheepuram District is presented below:

Table E.4: Impact of the Project PAHs, PAFs, PAPs and PDPs

Impact of the Project		No.
A.	Project Affected Population in Kancheepuram District	
1	No. of PAHs	77
3	No. of PAFs	76
2	No. of PAPs	228
4	No. of PDHs	77
5	No. of PDFs	76
B.	Affected Structures in Kancheepuram District	
1	Total number of Affected Private Structures	77
a	Residential	19
b	Commercial	38
c	Residential Cum Commercial	15
d	Others	5

E.7 PROJECT 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
- 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.
- The BCE will cater to many routes to different Tourist Places like Chennai, Kanchipuram, Vellore, Kanipakam, Tirupati, Bangalore, etc.
- It will pass through business corridor and will be used for transportation of different type of materials like food grains, fruits, vegetables, Fertilizers, Petroleum, building materials, Textiles, Household Goods, Mineral oils, Heavy Machinery, etc. are expected to be transported through this Expressway.

E.8 ENVIRONMENTAL MANAGEMENT PLAN

Environmental Management Plan (EMP) is the key to ensure effective implementation of environmental safeguard measures during different stage of the project. The desired results from the environmental mitigation measures proposed in the project may not be obtained without proper planning of the implementation of mitigation measures. The project specific EMP has been formulated for mitigating of offsetting the anticipated adverse impacts arising out of the project

activities. Environmental Management Plan includes EMP Implementation Framework, supervision monitoring and reporting requirements.

Several mitigation measures have been identified based on the anticipated environmental impacts as different stages of the project. suggested along with the agency responsible for implementing, supervision and monitoring of the Environment mitigation measures during pre-construction, construction and operation stages.

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 TNPCB etc. The NHAI is responsible for acquisition of land and properties, relocation of temples and other properties and payment of compensations to the affected persons as well as permission for tree felling. For Kancheepuram the NHAI has established Project Implementation Unit, headed by the Project Director. The NHAI disburses the compensation amount to Competent Authority for Land Acquisition (CALA) appointed by the District Authority. The verification of land and properties and valuation of the losses is already in progress in Kancheepuram district and disbursement of compensation is in progress.

Prior to commencement of construction, the Concessionaire will do preparatory activities such as possession of site for construction, establishment of camp site, Plant site, borrow area identifications, etc. For establishment of stone crusher plant, hot mix plant, batching plant in Kancheepuram district, the Concessionaire shall be responsible for obtaining NoC (Consent to establish and Consent to Operate) from Kancheepuram Pollution Control Board and shall be responsible for all the compliances to the conditions of the NOC. and concerned departments shall be responsible for those activities

Construction Phase

During this phase the Concessionaire shall also be responsible for implementation of the environmental protection measures during construction. They have to ensure that all the mitigation measures set forth in EMP is implemented 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 E.5.

Table E.5: 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.*

E.9 CONCLUSION

The proposed development of Bangalore Chennai Expressway will aid in infrastructure development and will act as a catalyst to boost the economic progress of the influence state. Benefits of the project will better service levels of the road, reduction in travel time and accidents, better connectivity. In Kancheepuram district there is no significant impacts anticipated due to the project except for acquisition of land and properties. With best management practices and a proper environmental management & monitoring plan in place during construction and operation stages, the proposed project is not expected to cause any significant adverse effects on the surrounding environment.

The project will have overall positive impacts by virtue of encouragement of the economic along the project stretch, thereby improvement of socio-economic condition of the area along the project corridor.