



Construction of 6 lane Greenfield Economic corridor (Surat-Nashik- Ahmednagar Section) starts at Km 0.000 near Sarpur village, Navsari District in the state of Gujarat and ends at Km 290.700 near Kolhewadi village, Ahmednagar District in the state of Maharashtra.

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PROPOSED TERMS OF REFERENCE(TOR) FOR EIA & EMP STUDY

1.0 INTRODUCTION

The National Highway Authority of India (herein after referred to as the "Authority" or "NHAI") is engaged in the development of the National Highways. As part of this endeavour, NHAI has decided to undertake the project namely "Consultancy services for preparation of DPR for development of stretches for improving direct connectivity in Indian cities (Lot-8/Package-1) Surat-Nashik-Ahmednagar Greenfield Highway" through Public Private Partnership (PPP) on Design, Build, Finance, Operate and Transfer (DBFOT) basis or Hybrid Annuity Mode (HAM) or Engineering Procurement Construction mode (EPC).

- The Letter of Award was communicated vide letter No. NHAI/Bharatmala/DPR/Lot-8/Package-1 /2018/126249 dated 12th November, 2018.
- Letter of commencement was issued on 12th December 2018 vide letter No. NHAI/Bharatmala/DPR/Lot-8/package-1/2018/127519.
- Contract agreement was signed on 12th December 2018.

NHAI has aimed to develop the Surat-Chennai Corridor with reference to the meeting held on 09.08.2018 under the Chairmanship of Secretary (RT&H) at Transport Bhawan, New Delhi. The Surat Chennai Corridor connects two important port cities i.e Surat and Chennai. The existing popular routes for connecting the two major cities i.e Surat and Chennai are

- Via Mumbai, Pune, Satara, Kolhapur, Belgaum, Haveri, Davangere, Chitradurga, Tumukuru and Bangalore – Total Length about 1,604 km
- Via Mumbai, Pune, Solapur, Kalaburgi, Kurnool, Kadapa and Nellore– Total length about 1,567 km
- Via Mumbai, Pune, Solapur, Hyderabad, Nalgonda and Nellore–Total length about 1,614 km



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Surat-Mumbai-Pune – Bangalore-Chennai National Highway -48 is the most preferred route for truck traffic as it has been upgraded to 6 lanes in the recent past and now, it is getting saturated. So, there is a necessity to develop an alternate route for connecting these two important port cities.

As on day there is no direct connectivity to Surat – Chennai corridor, the proposed Surat- Nashik- Ahmednagar greenfield alignment reduces the travel distance and travel time between two major port cities.

In view of the above Competent Authority has aimed to develop the greenfield alignment connecting from Surat to Chennai so that it can serve as an alternative to the existing NH 48 route via Surat, Mumbai, Pune, Bangalore.

Wherever required, consultant will liaise with concerned authorities and arrange all clarifications. Approval of all drawings including GADs and detail engineering drawings will be got done by the consultant from the Concerned Authority. However, if Railways require proof checking of the drawings prepared by the consultants, the same will be got done by MORTH and payment to the proof consultant shall be made by MORTH directly. Consultant will also obtain 'No Objection Certificate' from Ministry of Environment and Forest and incorporate the estimates for shifting of utilities of all types involved from concerned local authorities in the DPR. Consultant is also required to prepare all Land Acquisition plans (i.e. all necessary schedules as per L.A. act) for acquisition of land under NH Act.

The consultant shall prepare the Bid Documents, based on the feasibility report, due to exigency of the project for execution.

Consultant shall obtain all types of necessary clearances required for implementation of the project on the ground from the concerned agencies. The client shall provide the necessary supporting letters and any official fees as per the demand note issued by such concerned agencies from whom the clearances are being sought to enable AA/HD/2229/Form-1/R1



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implementation. The brief scope of work includes preparation of detailed project report for the purpose of firming up the requirements in respect of development and construction of highway and project facilities.

2.0 PROJECT DESCRIPTION

"The Green field alignment starts from proposed Vadodara – Mumbai Expressway of Navsari District near to Toli village in the state of Gujarat with start point coordinates 20°55'17.78"N, 73° 3'47.56"E and ends at road connecting NH-61 near Wakodi village in Ahmednagar District (Des. Ch 290+700) in the State of Maharashtra with end point coordinates 19° 5'41.56"N, 74°49'56.40"E and passes through 39 Villages in the state of Gujarat and 115 Villages in the State of Maharashtra. The project highway between Surat and Ahmednagar traverses through Ambada, Surkhai, Ravaniya, Bedmal, Hathanbari, Bendwal, Wirmal, Kalambari, Deoghar, Mahaje, Golshi, Dhaur, Rasegaon, Dhakambe, Warvandi, Adgaon and Chehedi kh., Deshwandi, Ajampur, sadatpur, Hasnapur, Digras, Vambori, Munjarsumba, Sarolabaddhi. The alignment falls in the districts of Navsari and Valsad in the state of Gujarat and in the district of Nashik and Ahmednagar in Maharashtra. It traverses through plain terrain, rolling terrain and a mixed land use of agricultural, barren, forests can be seen throughout the corridor. The project stretch details are given in the Table -1 below.

Table -1: Project Stretch Details

S. No	Stretch	Length	Major Settlements	District(s)	States
1.	Km 0.000 to Km 290.700	290.700 Km	Sarpur, Dabhalal, Surkhai, kukeri, Mama bacha, Bendwal, Ambedgoan, Adgoan, Telegoan, Rahuri, Khadambe Bk, Vambori etc.	Navsari and Valsad in Gujarat State Nashik and Ahmednagar in Maharashtra	Gujarat and Maharashtra



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2.1 Site and its Environs

The study has been conducted to know the existing amenities in the project road. The Chainage wise features like terrain, land-use, pavement type & condition and carriageway width, shoulder type, condition & width, nature of soil, curve geometry, intersection details, location of water bodies, height of embankment or depth of cut, cross drainage structures, existing utility services, general drainage conditions etc., have been recorded. The road inventory has been referenced to the existing Kilometre & hectometre stones established along the roadside. The salient features and engineering features are given in Table -2 &3.

Table -2: Salient features of the project road

S.No	Parameter	Description
1	Location of the project	The Green field alignment starts from proposed Vadodara – Mumbai Expressway of Navsari District near to Toli village in the state of Gujarat with start point coordinates 20°55'17.78"N, 73° 3'47.56"E and ends at road connecting NH-61 near Kolhewadi village in Ahmednagar District (Des. Ch 290+700) in the State of Maharashtra with end point coordinates 19° 5'3.37"N, 74°50'0.78"E.
2	Terrain	predominantly through plain terrain followed up by hilly and rolling terrain.
3	Major settlements along the project stretch	Navsari, Chikhli, Bansda, Dharampur, Surgana, Adgaon, Nashik, Lakhalgaoon, Niphad, Peth and Sinnar
4	Rivers/canals/ streams	The alignment is passing across River Ambika at Km 7.660, River Kaveri at Km 21.640, River Kharera at Km 33.760 and River Sasu at 45.990, River Man at Two locations at Km 58.460 & Km 60.760 in Gujarat state and River Par at Three Locations at Km 70.660 & Km.82.760 & 85.360, Godavari River at 151.960, Paravara NB Canal at 224.760, Mula River at 249.560 and Dev Nadi at



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S.No	Parameter	Description
		Km.256.340. The alignment is passing across Streams Km.4.728 Km 5.163, Km 6.300, Km 8.835, 14.714 Km 122.884 and Km. 168.818 to 181.254,
5	Forest area and sanctuaries	Forest Area of 438 Ha is required for development of this project and Passing 6km away from Nandur Madmeshwar Bird Sanctuary and Vansda National Park is around 17.5 Kms from the proposed project.
6	Length of existing alignment	-Nil-
7	Existing carriage way width	-Nil-
8	Administrative locations	Surat, Nashik and Ahmednagar Districts
9	States	Gujarat and Maharashtra states.

Table -3: Engineering features of the project road

Sl. No.	Description	Existing Route (Option -I)	Greenfield Alignment (Option -2)	Greenfield Alignment (Option -3)
1	Starting & Ending Chainages	Starts Near Surat and traverses through Nashik district and ends near Ahemdagar district. It follows NH-53, NH-48, SH-181 NH-848, NH-160, SH-50,NH-61.	Chainage: Starting at Design Km.0+000 & Ending Km.318+000	Chainage: Starting at Design Km.0+000 & Ending Km.290+700
2	Length of Proposed alignment	-	295 km	290.7 km



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3	Length of Existing Road	396 km	Nil	Nil
4	Existing ROW	Varies (15m , 45m, 60m)	-	-
5	Proposed ROW, in m	70m ROW	70m ROW & at Tunnel Section-150m ROW	70m ROW & at Tunnel Section-150m ROW
6	Land Acquisition Required (Ha)	1598 Ha.	2539	2402
7	Design Speed, in kmph	100 kmph	100 kmph	100 kmph
8	Proposed Lane Configuration	6-Lane with future widening to 10-lane	6-Lane with future widening to 10-lane	6-Lane with future widening to 10-lane
9	Proposed Pavement	Flexible Pavement	Flexible Pavement	Flexible Pavement
10	Estimated Total Traffic-AADT (PCU)	Homogeneous Section-1 (Surat-Nashik Section):47083 PCUs/Day (Year - 2022) Homogeneous Section-2 (Nashik-Ahmednagar Section) :37004(PCUs/Day) (Year - 2022)	Homogeneous Section-1 (Surat-Nashik Section):47083 PCUs/Day (Year - 2022) Homogeneous Section-2 (Nashik-Ahmednagar Section) : 37004(PCUs/Day) (Year -2022)	Homogeneous Section-1 (Surat-Nashik Section):47083 PCUs/Day (Year -2022) Homogeneous Section-2 (Nashik-Ahmednagar Section) :37004(PCUs/Day) (Year -2022)
11	Interchange (in Nos.)	05	13	12
12	ROB Numbers	04	03	03
13	Major Bridges (in Nos.)	14	18	16
14	Tunnels (in Nos) & Length in (Km)	-	03 & 15.4 kms	02 & 2.57



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15	Viaducts (in Nos & Length	-	13 & 14.1 kms	14 & 15.950 kms
16	Total Civil Cost+ Centages(18%) - in Crore	11,880+2139=14019 Cr.	17022+3064=20086 Cr.	10929+1967 = 12896 Cr.
17	LA Cost (Cr.)	5593	4547	4533
18	Preconstruction Activities (Utility Shifting , Forest (NPV) , Afforestation Compensation Cost, Componsation For Forest Dwellers (Cr.)	650	671	521
19	Total Cost (Cr.)	20,262	25,305	17,950
20	cost per km	51.17	85.78	61.75
21	Recommendation	Not Recommended	Not Recommended	Recommended

2.2 Terrain

Terrain is classified by the general slope of the country across the highway alignment. Based on these criteria, the entire project stretch traverses through plain terrain followed by Rolling and Mountainous terrain.



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Figure 1: Plain Terrain



Figure 2: Mountainous Terrain

2.3 Abutting Landuse

The predominant land-use along the project corridor is agricultural which accounts for about 71% of the total land use followed by Forest bodies 23% and Barren 6%. Prominent crops grown along the study area are Great Millet, Maize, Bajra and Groundnut in Kharif Season and in Rabi Season Wheat, Mustard and Cumin in Gujarat State etc. The Principle crops grown in the Maharashtra State are Paddy, Wheat, bajara, Jowar and Pulses and It is major producer of Oil seeds Groundnut, Sunflower.

2.4 Demographic Details

The project road runs entirely through the districts of Navsari and Valsad in Gujarat state and Nahsik, Ahmednagar in Maharshttra state. The project stretch of 290.700 km connects major towns of the districts like Sarpur, Dabhalal, Surkhai, kukeri, Mama bacha, Bendwal, Ambedgoan, Adgoan, Telegoan, Rahuri, Khadambe Bk, Vambori etc. Located in the eastern part of Gujarat and Maharashtra, the project road will mostly carry a mix of intra-state and inter-state traffic from the surrounding states like Bihar.

Navsari District

According to the 2011 census Navsari district has a population of 13,29,672. Its headquarters are located in Navasari City. This gives it a ranking of 9 th in India (out of a total of 640). Out of the total



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population males are 6,78,165 and females are 6,51,507. The area of the district is 2,246 sq. km and it constitute 2.20% of the population of Gujarat. It has a population density of 592 inhabitants per square kilometer. It's population growth rate over the decade 2001-2011 was 8.15%. Navsari has a sex ratio of 961 females for every 1000 males and a literacy rate of 83.88% (higher than the national average of 74.04%). Male literacy is 88.75% and female literacy is 78.83%. 69.23% of the total population is rural and 30.77% is urban. Out of the total population of 13,29,672 rural population is 9,20,535 and urban population is 4,09,137. Navsari is well connected with major cities by road, rail and air transport. Navsari has Surat Airport as a nearby Airport which is 45km from town.

Demographic Features of Navsari District

DISTRICT: Navsari			
Total Area (sq. kms)	2246	Male population	6,78,165
Population Density (persons/sq km.)	592	Female population	6,51,507
Population Growth (%)	8.15	Sex Ratio	961
Total Population	13,29,672	Literacy rate (%)	83.88

Socio-Economic Features of Navsari District

S.No	Item	Unit	Navsari
1	District Area	sq. km	2246
2	Tehsils	No.	5
3	Towns	No.	13
4	Villages	No.	372
5	Households	No.	2,95,131
6	Decade Growth Rate	%	8.15
7	Main Workers	No.	510,004
8	Marginal Workers	No.	81,830
9	Non-workers	No.	737,838



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Valsad District

According to the 2011 census Valsad district has a population of 17,05,678. Its headquarters are located in Valsad City. Out of the total population males are 8,87,222 and females are 8,18,456. The area of the district is 3008 sq. km and it constitute 2.82% of the population of Gujarat. It has a population density of 567 inhabitants per square kilometer. It's population growth rate over the decade 2001-2011 was 20.92%. Valsad has a sex ratio of 922 females for every 1000 males and a literacy rate of 78.55% (higher than the national average of 74.04%). Male literacy is 84.55% and female literacy is 72.06%. 62.74% of the total population is rural and 37.26% is urban. Out of the total population of 17,05,678 rural population is 1,070,177 and urban population is 635,501.

Valsad is well connected with major cities by road, rail and air transport. Surat Airport is near to the town which is 57.04 km.

Demographic Features of Valsad District

DISTRICT: Valsad			
Total Area (sq. kms)	3008	Male population	887,222
Population Density (persons/sq km.)	567	Female population	818,456
Population Growth (%)	20.92	Sex Ratio	922
Total Population	1,705,678	Literacy rate (%)	78.55

Socio-Economic Features of Valsad District

S.No	Item	Unit	Valsad
1	District Area	sq. km	3008
2	Tehsils	No.	10
3	Towns	No.	22
4	Villages	No.	713
5	Households	No.	13,19,820
6	Decade Growth Rate	%	42.24
7	Main Workers	No.	2,405,288
8	Marginal Workers	No.	148,254



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9	Non-workers	No.	3,527,780
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Nashik District

According to the 2011 census Nashik district has a population of 61,07,187. Its headquarters are located in Nashik City. Out of the total population males are 3,157,186 and females are 2,950,001. The area of the district is 15,530 sq. km and it constitute 5.43% of the population of Maharashtra. It has a population density of 393 inhabitants per square kilometer. It's population growth rate over the decade 2001-2011 was 22.30%. Nashik has a sex ratio of 890 females for every 1000 males and a literacy rate of 82.31% (higher than the national average of 74.04%). Male literacy is 88.71% and female literacy is 76.08%. 57.47% of the total population is rural and 42.53% is urban. Out of the total population of 61,07,187 rural population is 3,509,814 and urban population is 2,597,373.

Nashik is well connected with major cities by road, rail and air transport. Nashik's Ozar Airport is situated 20km from Nashik.

Demographic Features of Nashik District

DISTRICT: Nashik			
Total Area (sq. kms)	15,530	Male population	3,157,186
Population Density (persons/sq km.)	393	Female population	2,590,912
Population Growth (%)	22.30	Sex Ratio	934
Total Population	6,107,187	Literacy rate (%)	82.31

Socio-Economic Features of Nashik District

S.No	Item	Unit	Nashik
1	District Area	sq. km	15,530
2	Tehsils	No.	15
3	Towns	No.	11
4	Villages	No.	1922
5	Households	No.	1,216,185



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S.No	Item	Unit	Nashik
6	Decade Growth Rate	%	22.30
7	Main Workers	No.	2,523,023
8	Marginal Workers	No.	240,305
9	Non-workers	No.	3,343,859

Ahmednagar District

According to the 2011 census Ahmednagar district has a population of 4,543,159. Its headquarters are located in Ahmednagar City. Out of the total population males are 2,342,825 and females are 2,200,334. The area of the district is 17,048 sq. km and it constitute 4.04% of the population of Maharashtra. It has a population density of 266 inhabitants per square kilometer. It's population growth rate over the decade 2001-2011 was 12.44%. Ahmednagar has a sex ratio of 939 females for every 1000 males and a literacy rate of 79.05% (higher than the national average of 74.04%). Male literacy is 86.82% and female literacy is 70.89%. 79.91% of the total population is rural and 20.09% is urban. Out of the total population of 4,543,159 rural population is 3,630,542 and urban population is 912,617.

Ahmednagar is well connected with major cities by road, rail and air transport. Lohegaon Airport, Shiridi Airport and Nashik Airport are near to Ahmednagar.

Demographic Features of Ahmednagar District

DISTRICT: Ahmednagar			
Total Area (sq. kms)	17,048	Male population	2,342,825
Population Density (persons/sq km.)	266	Female population	2,200,334
Population Growth (%)	12.44	Sex Ratio	939
Total Population	4,543,159	Literacy rate (%)	79.05



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Socio-Economic Features of Ahmednagar District

S.No	Item	Unit	Ahmednagar
1	District Area	sq. km	17,048
2	Tehsils	No.	14
3	Towns	No.	19
4	Villages	No.	1584
5	Households	No.	925,826
6	Decade Growth Rate	%	12.44
7	Main Workers	No.	2,039,455
8	Marginal Workers	No.	165,135
9	Non-workers	No.	2,338,569

Economy

The economy of Gujarat is the third largest and Maharashtra is the first largest economy in India. In 2016-17, Uttar Pradesh's GSDP was ₹ 11.62 lakh crore (US\$140 billion). According to 2011 census report Gujarat have 42.58% urban population. Maharashtra have 5,08,18,259 urban population while Gujarat have 2,57,45,083. Gujarat have 22 cities wherein Maharashtra have 34 cities with population more than one million. According to Tendulkar committee 16.63% population of Gujarat and 17.35% population of Maharashtra is poor in 2011-12..

Transport

Transportation of raw materials/machinery into the project site and movement of materials within the site, will be done by tippers or any other passenger vehicles. Also approx. 2600 Construction workers will be transported to site in buses or other passenger vehicles.

Industry

Industrial area as a part of Special Economic Zone (SEZ) in Sinnar in the state of Maharashtra and Advanced Centre for Energetic Materials (ACEM), DRDO Near Nasik are located nearby project alignment.



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Forests

The project corridor traverses through the forest of tentative length 29.16km and 30.39km in the state of Gujarat and Maharashtra respectively.

Rivers

The alignment is passing across River Ambika at Km 7.660, River Kaveri at Km 21.640, River Kharera at Km 33.760 and River Sasu at 45.990, River Man at Two locations at Km 58.460 & Km 60.760 in Gujarat state and River Par at Three Locations at Km 70.660 & Km.82.760 & 85.360, Godavari River at 151.960, Paravara NB Canal at 224.760, Mula River at 249.560 and Dev Nadi at Km.256.340.

The alignment is passing across Streams Km.4.728, Km 5.163, Km 6.300, Km 8.835, 14.714 Km 122.884 and Km. 168.818 to 181.254.

2.13 Land Utilization

A wide variation of land using pattern was observed with respect to environmental factors such as soil characteristics, climate, topography, and vegetation etc. In project area, the land use is characterized by agricultural lands, barren, water bodies, forests, hills and plantation etc. The dry/ barren land and water bodies together accounts for 30-40 per cent of the total land to be acquired for the proposed project road. With regard to land use pattern, a major tract of land is used for cultivation purposes. The project area is a mix of both fertile wet and dry land.



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Fig-3: Land Use Pattern in Project Area

During transect visit in greenfield area, sparsely cultivated land with cotton, onion and grapevines was noticed. A large chunk of number of fallow/barren land parcel was found in Maharashtra side of SA road.

The land price particularly under private transaction, varies from place to place. The market price of agricultural land ranges from Rs. 2 crores to 7 crore per acre in Surat district. Land rate in Surat district is considered to be very high compared to other project districts. In Valsad and Navasari district of Gujarat state, the land value varies from 20 lakh to 50 lakh per acre close to alignment. It is understood that the private land transaction ranges Rs. 15 to 35 lakh per acre respectively proximity to proposed road in Ahmednagar and Nasik district. The land value in villages close to Surat, Navasari, Nasik, Malegaon, Ahmednagar has gone up significantly in last 2 to 3 years because of proximity to urban location and industrial zone.

2.14 Tourism

Tourism activities in the area and states of Gujarat and Maharashtra will be enhanced which in many terms will boost the local economy and build better investment climate for industries creating more employment opportunities to local people.

3.0 SCOPE OF THE STUDY

The viability of the project shall be established considering the requirements with regards to improvement based on highway design,



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pavement design, type of intersections, construction of new bridges and structures, Tunnels, Viaducts road safety features, quantities of various items of works and cost estimates and economic analysis.

The Detailed Project Report would include detailed highway design, design of pavement with options for flexible or rigid pavements, design of bridges and cross drainage structures and grade separated structures, Tunnels quantities of various items, detailed working drawings, detailed cost estimates, economic and financial viability analyses, environmental and social feasibility, social and environmental action plans as appropriate and documents required for tendering the project.

The scope of consultancy services includes:

- Engineering surveys and investigations
- Traffic Surveys & Analyses
- Traffic Demand Estimation
- Highway & Structural design
- Environmental and Social Impact Assessment
- Estimation of Project Cost
- Economic & Financial Analyses
- Preparation of Feasibility study report and Detailed Project Report
- Preparation of Land Acquisition Plans
- Preparation of Bid Documents
- Obtain necessary Forest/ Environmental clearances etc.



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4.0 TERMS OF REFERENCE FOR EIA STUDY

4.1 Study Area

A detailed study of all the environmental features falling within the immediate corridor of impact, which has been considered as 500 m on both sides from center line of the road. The other sensitive environmental issues such as protected areas notified under wildlife (protection) Act 1972, critically polluted areas as notified by Central Pollution Control Board, notified Eco-sensitive areas, interstate boundaries and international boundaries, water bodies of ecological significance etc., were identified within 10 km from the alignment. The detailed information from the RoW as well as the area falling within 500 meters on the either side road were collected from primary sources and the other environmental features within 10 kms aerial distance as explained above were collected from secondary data sources. Rapid EIA studies will be carried out for the proposed project in accordance with the Environmental Impact Assessment Notification, 2006 and amendment thereof as well as MoEF EIA Guidance Manual, 2010. The Environmental Baseline data will be generated based on the EIA Guidance Manual, 2010. Environmental Baseline monitoring report will be prepared as per Standard ToR given in EIA guidance manual by MoEFCC. The details of the EIA study are given below.

4.2 Description of the Environment

The baseline data on various environmental features will be collected from secondary and primary sources from field surveys and investigations in order to describe the environmental settings of the project area. The data on different environmental components along the project corridor will be collected by site reconnaissance survey in order to establish environmental condition of the project area. The study area covers 10 km either side of the project stretch.



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4.3 Baseline Data Generation

(a) Secondary Data Collection:

Secondary data will be collected from secondary sources like publishers, literature from various government and private agencies, NGOs, or institutions on physical, biological and social components of environment. The data will be reviewed for establishing existing environmental and ecological status within the project area.

(b) Field Survey:

Field survey carried out for the identification of the environmental sensitive zones within the study area and physical verification of all the identified sensitive zones with respect to the location of the project alignment and activities proposed. Field surveys are included with the measurement of environmental quality in terms of ambient air quality, water quality, soil quality, background noise level and ecology (Flora, fauna and roadside trees). Procedure for the measurement of environmental quality surveys carried out as per guidelines of the Ministry of Environment and Forests, Government of India. Following details on different environmental features will be collected either from the secondary sources or from field surveys.

(i) Physical Environment:

Topography: Topography, ground conditions, altitude, slope, etc.

Soil and Geology: Soil type and its characteristics, soil erosion and land slide problem, geology of the area.

Water Environment: An inventory survey of all water bodies located within 500 m on either side of the project road sections will be carried out. Details of rivers, streams, springs, lakes, reservoirs within 500 meters of the proposed road right of way will be collected from the site along with their usage and importance for the local population. Study of hydrology of the project road, natural drainage of the project region, existing



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drainage pattern of the project road, runoff flow direction, possible flooding, erosion will be collected. Information on ground water table, ground water availability in the project area, exploitation of ground water was studied from the generated primary data.

Meteorological Data: Meteorological data covering maximum and minimum wind speed, wind direction, rain fall, relative humidity and temperature for last 30 years period will be collected from the nearest India Meteorological Department (IMD), Nashik station. History of special weather phenomenon like cyclones, cloud bursts, etc., will be collected from the nearest meteorological station for a period of 50 years. The wind velocity, wind direction and wind rose, rainfall, temperature and relative humidity along the proposed alignment will be recorded at one location using a micro-meteorological station during the study period.

Environmental Quality: Baseline environmental quality data in terms of water, ambient air, noise levels and soil quality would be generated as follows:

Ground & Surface Water Resources and Quality: Water samples from ground water and surface water resources along the project road alignment will be collected and analysed for the physico-chemical & biological parameters. During the preliminary assessment, seventeen (17) surface water sampling locations will be identified for assessing the water quality. These monitoring locations were identified by considering proximity to the project site, their activities and depending upon its utility by the people in the region. Surface water samples will be analysed for Temperature, pH, Turbidity, EC, Colour, TSS, TDS, Odour, DO, BOD, COD, TKN, Total Hardness, Sodium, Potassium, Calcium, Magnesium, Ammonia, Chloride, Sulphate, Phosphate, Nitrate, Fluoride,



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Surfactants, Dissolved Iron, Copper, Zinc, Manganese, Arsenic, Lead, Mercury, Boron, Chromium, Phenols, Cadmium, Total Coliform and Faecal Coliform. Ground Water is one of the main sources of water in the project corridor for domestic, commercial and other irrigation use hence the rate of extraction of ground water is at a massive scale. For assessing the ground water quality in the study area, twenty (20) sampling locations were identified (bore wells/dug wells). Selection of samples considered as per the utilization of water by the people along the proposed stretch. Ground water samples will be analysed for Temperature, pH, Turbidity, EC, Colour, TSS, TDS, Odour, DO, BOD, COD, TKN, Total Hardness, Sodium, Potassium, Calcium, Magnesium, Ammonia, Chloride, Sulphate, Phosphate, Nitrate, Fluoride, Surfactants, Dissolved Iron, Copper, Zinc, Manganese, Arsenic, lead, Mercury, Boron, Chromium, Phenols, Cadmium, Total Coliform, Faecal Coliform.

Ambient Air Quality: Standard methods/procedures are adopted during environmental monitoring analysis. After a preliminary reconnaissance of the study region and taking into account the meteorological (predominant wind directions, wind speed), topographic conditions, major settlements & its traffic volume and details on existing industrial activities in the study region, thirteen (13) ambient air quality monitoring stations will be identified in the study area spread along Surat-Ahmednagar alignment. The parameters being monitored by air quality monitoring instruments are PM₁₀, PM_{2.5}, SO₂, NO₂ and CO. For assessing the environmental impact, collection and interpretation of baseline data is of prime importance. The primary data for the study period is collecting for 24 hourly, twice a week for all the 4 weeks as per national guidelines. The criteria followed for selecting the AAQM stations is recommended by IS: 5182 and CPCB.

Noise Environment: Keeping in view of the proposed improvement and widening project, field monitoring will be carried out and thirty-four (34) noise monitoring locations proposed for the noise monitoring. The locations were selected based on land use pattern, traffic intersections



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**Proposed
TOR
For EIA & EMP Study**

and diversions along the existing alignment. Precision integrated sound level meter having statistical unit with digital display would be using for 24-hour noise level monitoring in the present study. The noise quality monitoring would be planned and executed as per protocol for ambient level noise monitoring and the Noise levels will be recorded for L_{eq} day and L_{eq} night.

Soil Quality: The soil samples of different area along the project stretch will be collected from ten (10) locations near agricultural areas for assessing the physic-chemical characteristics of the soil in the project area. The quality parameters will include pH, electrical conductivity, sand, silt, clay, texture, moisture retention capacity, infiltration rate, bulk density, porosity, organic matter, Nitrogen, potassium, phosphorous, iron and organic carbon.

Existing Land Use Pattern: Land use pattern will be established along the project road classifying forest area, agriculture land, barren land, urban & rural settlements, water bodies, hills etc., along the project road.

(ii) Biological Environment

Flora and Fauna: Information on vegetation within the study areas will be collected from secondary source as well as through site investigation. The vegetation study includes forest area & roadside plantation within the proposed RoW. List of flora and fauna within 10 km on either side of project road will also be collected.

Ecological Sensitive Locations: Details of ecological sensitive locations, such as Wildlife Sanctuary, National Parks, Bio-Reserve etc., will be collected & studied within 10 km on either side of project road.

Ecological Studies: Terrestrial and aquatic ecological studies will be conducted along & within the proposed RoW. Common trees, shrubs, other vegetation, common fauna, rare and endangered species are



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surveyed, identified and studied. The roadside trees within the proposed RoW will be surveyed for botanical & vernacular name of species, girth wise enumeration etc.

(iii) Socio-Economic and Cultural Environment Socio-economic

Details: Study of demographic details including population, schedule caste, schedule tribe, literacy, occupation pattern in the settlements along the project road, economic and social conditions, life styles, etc., along the project road and study of infrastructure facilities in the settlements along the project road. The social study comprising socio-economic survey along the project road and reflect the number and details of Project Affected Persons (PAPs) along the project road. Following data will be collected:

- Details of the properties, houses, businesses etc.
- Activities likely to be affected by land acquisition and annual financial loses.
- Data covering the vulnerable groups or persons including women, children, elderly.
- People below the poverty line, indigenous people and people in notified settlements
- Data on diseases in the locality and existing health care facilities
- Data on demography including traditional skills and sources of livelihood along the proposed site.

Places of Tourist, Historic, Archaeological and Religious

Interests: Places of tourist interest, historical, archaeological and places of religious interests (if any) will be identified along the project road in the immediate vicinity and also within study area (15 km on either side of the project road).

Common Resources: An inventory of common community resources such as educational institutions, health centres, recreation centres,



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courts, libraries, community centres, public toilets, religious and cultural features etc., situated along the project corridor are prepared.

4.4 Analysis of Alternatives to the Project Road

In-depth study of related maps, topographic sheets, physical inspection and environmental and social screening will be carried out in order to find out the technically and environmentally sound, most feasible and environmentally friendly alignment. Alternatives are considered for the analysis of “without” and “with” project situations and components. The selected alternatives will be compared in terms of their potential natural, physical, biological, social environmental impacts, capital & recurrent costs, suitability under local conditions, institutional training and monitoring requirements. For each alternative, environmental costs and benefits will be quantified and criteria for the selection of alternative will be stated. Analysis of alternative includes alignment selection, finalization of bypasses, road widening to reduce the cutting of tree, minimizing the demolition of structures, grade separators, services roads, vehicular, pedestrian and cattle underpass, quarry materials, road safety, etc.

4.5 Anticipated Environmental Impacts and Mitigation Measures

The project stretch from Surat to Ahmednagar exhibits a symbiotic relationship between the environment and development with both positive and negative and reversible and irreversible impacts. The environmental impact assessment will be conducted in accordance with the requirement of the Ministry of Environment Forests and Climate Change (MoEFCC) norms and guidelines. The collected primary and secondary data are compiled and analyzed to establish a comprehensive database and assess the existing baseline environmental condition. After establishing the baseline status of the study corridor and analysis of the project proposals and activities, the potential impacts on environmental components would be identified for pre-construction, AA/HD/2229/Form-1/R1



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For EIA & EMP Study**

construction and operational stages of the project. On the basis of the existing baseline environmental condition within the project area and the nature and extent of activities envisaged in construction/operation phase, the impacts would be identified and assessed for "Without and With Project Scenario" during construction and operation phases of the project. Wherever practicable, a quantitative analysis will be performed for the impacts by using appropriate modelling method. All potential direct and indirect influence due to the proposed project will also addressed. The scope of work not confined only to alignment but the impacts due to the associated construction activities assessed. The following aspects are given due importance during assessment of impacts and recommending remedial measures:

The engineering design of the road are finalized by considering all environmental safeguards. The project envisages natural drainage network, roadways which will have marginal negative impacts of temporary and localized in nature. Land acquisition for road development is minimal. The Proposed project road may lead to loss of livelihood for very few projects affected peoples. The construction stage is one of the critical stages of the project which may pose maximum impact on the environment. The major impacts associated in this stage from site clearance to the final BT stage of the main carriageway will be identified and appropriate mitigation measures will be suggested. The proposed project can harmonize with the surrounding environment and serve multiple users with the following positive impacts.

- To relieve traffic congestion in towns /cities along the proposed stretch.
- To provide effective linkage within Maharashtra State.
- To Increase access to markets, jobs, education, and health services.

However, some negative impacts are also associated in this stage. The major impact envisaged in this stage is increasing of traffic



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For EIA & EMP Study**

which results in increasing of air and noise pollution. To minimise these impacts, appropriate mitigative measures will be suggested

The air quality due to vehicular movement will be predicted using the CALRoads View software and to predict the cumulative noise impacts, Federal Highways Administration (FHWA) Noise Model or Urban Noise Model will be adopted. The air and noise impacts are aimed to predict the future impacts for “without and with project scenario” by using the traffic study report. The following impact prediction models will be used are:

- Air Modelling : CALRoads View
- Noise Modelling : Federal Highway Administration Noise Model
- Dust Emission Model : US EPA AP 42 Fugitive Dust Emission Model
- Climate Change : Vehicular Emission Assessment Model (Mathematical)

4.6 Public Hearing /Consultation and Information Disclosure

Public Hearing /consultations will be conducted in the affected areas along the project road. The issues discussed during public consultation will be incorporated in the design framework, environmental management and mitigation plan.

4.7 Environmental Monitoring Programme

Environmental monitoring plan for construction and post construction phases of the project road will be formulated to ensure effectiveness of implemented environmental mitigation measures. Cost of Environmental Monitoring Plan for construction and post construction phase of the project will be given in EIA/EMP report.

4.8 Environment Management Plan

EMP is a procedure in which the project proponent will carry out the implementation of mitigation measures and ensure compliance with



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For EIA & EMP Study**

environmental regulations that are binding on the project. The EMP also specifies the organizational requirements and institutional strengthening necessary for sound environmental management of the project. The major components of the EMP are:

- EMP implementing agency
- Monitoring of the EMP implementation
- Training on environmental management
- Budget for EMP implementation

The project specific EMP with budgetary provisions will be given after approval of preliminary EIA report.

4.9 Structure of EIA Report

EIA report is followed the structure as per EIA Notification, 2006 and consists of the following Chapters:

1. Introduction
2. Project Description
3. Description of the Environment
4. Anticipated Environmental Impacts and Mitigation measures
5. Analysis of Alternatives (Technology and Site)
6. Environmental Monitoring Program
7. Additional Studies
8. Project Benefits
9. Environmental Cost Benefit Analysis
10. Environmental Management Plan and Environmental Monitoring Program
11. Summary & Conclusions
12. Disclosure of consultant engaged