PROPOSED TERMS OF REFERENCE(TOR)

FOR EIA & EMP STUDY

1.0 Introduction

The National Highways Authority of India (NHAI) is engaged in the development of the National highways in the state of Uttar Pradesh. As part of this endeavor, NHAI has decided to upgrade some of the existing National Highways in the State of UP to National Highway standard. It was also decided to take up the preparation of DPR for these highways which are being upgraded to National Highway Standard. The consultancy services for preparation of Feasibility Report cum Detailed Project Report (DPR) of 4 laning of Ghazipur Ballia – UP/Bihar section from Km 0.000 to 128.000 of NH-31 and Construction of 2/4 laning Flyover at Ballia (Chandra Shekhar Mod to Satish Chandra College) was awarded to Aarvee Associates.

The Letter of Acceptance was communicated vide letter No. NHAI/ Tech/ NH-19/ Pkg-I/ 2016/ 103661 dated 31st July 2017. The Agreement for consultancy services was concluded with NHAI on 04/09/2017. Letter of commencement was issued vide letter No. NHAI/ Tech/ NH-19/Pkg-I/DPR/2016/105592 dated 08.09.2017.

Final DPR for the existing road "Special Repair and Maintenance work from Ghazipur to UP/Bihar border NH-31 from Km 405 to Km 535 including construction of New MJB at Km 412.130 and rehabilitation of MJB at Km 533 on EPC mode" submitted vide our letter no. AA/HW/NHAI/2114/18-19/9105 dated 26.03.2019. As per the directions from project authorities, the alignment proposals were reviewed in view of the MoRTH Circular No. NH-15017 / 21 / 2018 – P & M dated 26.02.2018. The greenfield alignment option including comparison table showing the cost comparison of widening of the existing alignment option via-a-via widening of was prepared and the same was reviewed at various levels and it was decided that green field alignment with spur providing connectivity to Buxar was approved during the meeting held in Ministry under the Chairmanship of Secretary and the Minutes of Meeting were communicated vide letter No. NHAI/Tech/ NH-19/Ghazipur-Ballia/ DPR/2016/122312 dated 13.08.2018.

The District Administration of Ballia held public consultations regarding the proposed elevated flyover and communicated their decisions vide MoM dated 1393/ 14 – 1 dated 20.10.2018. The MoM inter-alia state that widening of the existing road to four lane standards would serve the traffic problems in Ballia town and elevated flyover is not required since construction of the said flyover would result in acquisition of land and

structures for the purpose of flyover.

Public consultation meeting on the project alignment was held in the office of District Magistrate Ballia on 05.09.2018 wherein the committee recommended that the bypass alignment for Ballia be considered on the south side. This will require modification of the alignment approved earlier in a length of approximately 38.50 km. The said modification was reviewed during the meeting held on 08.12.2018 at NHAI HQ, New Delhi under the chairmanship of Member (P) and agreed by Member. Variation with financial implication for new Greenfield alignment was approved from RO, Varanasi vide letter no. NHAI/UP (E)/GM (T)/NH-19/Ghazipur-Ballia/DPR/14 dated 27.10.2020. Accordingly, the Inception & Alignment report for the approved Greenfield alignment were prepared and submitted vide our letter no. AA/HW/NHAI/2114/20-21/2820 & 2966 dated 06.11.2020 & 16.11.2020.

2.0 Project Description

The highway project is a Greenfield Alignment passing through Ghazipur and Ballia districts of UP/Bihar. The total length of the highway is 115.460 km. It traverses mostly through plain terrain and a mixed land use of residential and agricultural can be seen throughout the corridor. Details of the project stretch are given in Table 2.1

Table 2.1: Project Stretch Details

S. No	Stretch	Length	Major Settlements	District(s)
1	Stretch from Ghazipur Ballia–UP/Bihar Section	115.460 km	Ghazipur, Muhammadabad, Ballia, Ramgarh, Bairiya	Ghazipur and Ballia in UP, Saran in Bihar
2	Buxar Spur	17.300km	Bathor, Ramghar, kumkumpatti	Ghazipur and Ballia

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.

Salient features of the project road

S.No	Parameter	Description
1	Location of the project	The project road starts near Hridaypur village on NH-29 in the state of Uttar Pradesh and ends at Bihar Border near on NH-19 Bahoran Tola village on Raghunathpur- Chappra Road.
2	Terrain	Plain
3	Major settlements along the project stretch	Ghazipur, Muhammadabad, Ballia, Ramgarh, Bairiya, Bathor, Ramghar, kumkumpatti
4	Rivers/canals/ streams	The alignment is passing across River Ghaghara at Km 114.043, Tamsa River at Km. 48.000 and Stream Crossing at Km 91.195
5	Forest area and sanctuaries	Protected Forest Area in Existing stretch for a length of 8.51 km i.e., 19.64 ha of forest area will be acquired.
6	Length of existing alignment	132.760 km
7	Existing carriage way width	17 – 24 m
8	Administrative locations	Gazipur & Ballia in Uttar Pradesh & Saran in Bihar.
9	States	Uttar Pradesh & Bihar

Engineering features of the project road

Sl. No.	Description	Existing Alignment NH-31- (Option -I)	Greenfield Alignment (Option -2)	Greenfield Alignment (Option -3)
1	*Starting & Ending Chainages*	Existing Chainage: km. 405.000 to km. 535.000 of NH-31 Design Chainage: km. 405.000 to km. 535.000	Existing Chainage: km. 523.800 to 535.000 Design Chainage: 0.000 to 104.260 Greenfield Alignment 104.260 to 115.460 Upgradation of Existing	Design Chainage: From 0.000 to 114.000 (Greenfield Alignment) From 114.000 to 118.190 (Upgradation of Existing Alignment)

Sl. No.	Description	Existing Alignment NH-31- (Option -I)	Greenfield Alignment (Option -2)	Greenfield Alignment (Option -3)
			Alignment 0.000 to 17.300 - Buxar Spur	
2	*Length of Proposed alignment*	130 km	115.460 km (Gazipur-Ballia) 17.300 (Buxar Spur)	118.190 km
3	*Length of Existing Road Widening & Curve Improvement*	130 km	11.200 km	4.190 km
4	*Length of Bypass*	Nil	1.430 km	118.190 km
5	*Number of Bypasses*	Nil	1 No. near Chand Diyar Village	1 No. near Ibrahimbad uparwar
6	*District*	Gazipur & Ballia	Gazipur & Ballia	Gazipur & Ballia
7	*Design Speed, in kmph*	100 kmph	100 kmph	100 kmph
8	*Existing ROW*	17-24m	10 - 20m	30 m
9	*Proposed ROW, in m*	Available RoW of 24m for entire stretch	60m at Greenfield Alignment 45m where Existing Alignment is retained	60m at Greenfield Alignment 45m where Existing Alignment is retained
10	*Proposed Lane Configuration*	2-Lane with Paved Shoulder	4-Lane with Paved Shoulder	4-Lane with Paved Shoulder
11	*Proposed Pavement*	Flexible Pavement	Flexible Pavement	Flexible Pavement
12	*Estimated Total Traffic-AADT (PCU)*	14951 Vehicles 13303 PCUs (2020)	14951 Vehicles 13303 PCUs (2020)	14951 Vehicles 13303 PCUs (2020)
13	*Interchange (in Nos.)*	Nil	2	1

Sl. No.	Description	Existing Alignment NH-31- (Option -I)	Greenfield Alignment (Option -2)	Greenfield Alignment (Option -3)
14	*Flyover (in Nos.)*	Nil	2	2
15	*Vehicular underpass (in Nos.)*	1	12	12
16	*Vehicular overpass (in Nos.)*	1	NIL	NIL
17	*LVUP (in Nos.)*	Nil	17	19
18	*SVUP (in Nos.)*	Nil	Nil	Nil
19	*ROB Numbers*	Nil	2	2
20	*Major Bridges (in Nos.)*	4	3	3
21	*Minor Bridge (in Nos.)*	12	18	16
22	*Culvert (in Nos.)*	162	90	126
23	*Toll Plaza*	-	2	1
24	*No. of lanes*	-	16	16
25	*Rest Area*	Nil	Nil	Nil
26	*Truck Lay Bye*	Nil	2	2
27	*Bus Shelters*	-	26	26
28	*Total Civil Cost in Crore*	963.210	2771.65	2993.00
29	*Civil cost per km*	7.39	18.64	29.30
30	*Pre-Construction Activities: LA, EC, Forest, CRZ etc.*	-	Will be Initiated	Will be Initiated
31	*Recommendation*	Not Recommended	Recommended	Not Recommended

2.2 TERRAIN

Terrain is classified by the general slope of the country across the highway alignment. Based on this criterion, the entire project stretch traverses predominantly through Plain terrain (70%) followed by Rolling terrain (30%).

2.3 ABUTTING LANDUSE

In terms of land use, majority of adjoining lands were observed to be used for agriculture purposes (70%) and the rest is barren land (30%). Important crops grown along the project stretch are Wheat and Sugarcane. Moderately built-up areas and a mix of fast and slow traffic characterize this corridor. Different types of residential/ commercial structures (Permanent/Semi permanent) are noticed in the built-up section.

2.4 DEMOGRAPHIC DETAILS

The project road runs entirely through the districts of Ghazipur and Ballia. The project stretch of 130 km connects major towns of the districts like Ghazipur, Mohammadabad, Ballia and Bariya. Located in the eastern part of Uttar Pradesh, the project road mostly carries a mix of intra-state and inter-state traffic from the surrounding states like Bihar.

2.4.1 Ghazipur District

According to the 2011 census Ghazipur district has a population of 3,620,268 roughly equal to the nation of Lithuania or the US state of Oklahoma. Its headquarters are loacted in Ghazipur City. This gives it a ranking of 79th in India (out of a total of 640). Out of the total population males are 1,856,584 and females are 1,766,143. The area of the district is 3,378 sq. km and it constitute 1.82% of the population of Uttar Pradesh. It has a population density of 1,072 inhabitants per square kilometer (2,780/sq. km). Its population growth rate over the decade 2001-2011 was 19.26%. Ghazipur has a sex ratio of 951 females for every 1000 males and a literacy rate of 74.27% (higher than the national average of 74.04%). Male literacy is 85.77% and female literacy is 62.29%. 92.44% of the total population is rural and 7.56% is urban. Out of the total population of 3,622,727, rural population is 3,348,855 and urban population is 273,872. Average literacy of rural population is 73.62% and that of urban population is 82.05%.Ghazipur is well connected with major cities by road, rail and air transport. Ghazipur Airport is situated in Ghazipur Road on Ghazipur-Mau road. Ghazipur is 76km far from Varanasi.

Table 2.4.1: Demographic Features of Ghazipur District

District: Ghazipur			
Total Area (sq. kms)	3378	Male population	1,856,584
Population Density (persons/sq. km.)	1072	Female population	1,766,143
Population Growth (%)	19.2	Rural population (%)	92.44%
Literacy rate (%)	71.8	Urban population (%)	7.56%
Total Population	3,620,268	Sex Ratio	951

Table 2.4.2: Socio-Economic Features of Ghazipur District

S.No	Item	Unit	Ghazipur
1	District Area	sq. km	3378
2	Tehsils	No.	6
3	Towns	No.	8
4	Villages	No.	3367
5	Households	No.	544,861
6	Decade Growth Rate	%	19.2
7	Main Workers	No.	766,881
8	Marginal Workers	No.	437,721
9	Non-workers	No.	2,415,666

2.4.2 Ballia District

Ballia district is the easternmost part of the Uttar Pradesh state and borders on Bihar State. It comprises an irregularly shaped tract extending westward from the confluence of the Ganga and the Ghaghra, the former separating it from Bihar in the south and the latter from Deoria and Bihar in the north and east respectively. The boundary between Ballia and Bihar is determined by the deep streams of these two rivers. It is bounded on the west by Mau, on the north by Deoria, on the north-east and south-east by Bihar and on the south-west by Ghazipur. The district lies between the parallels of 25º33' and 26º11' North latitudes and 83º38' and 84º39' East longitudes.

According to the 2011 census Ballia district has a population of 3,223,642, roughly equal to the nation of Mauritania or the US state of Iowa. This gives it a ranking of 108th in India (out of a total of 640). The district has a population density of 1,081 inhabitants per square kilometre (2,800/sq mi). Its population growth rate over the decade 2001-2011 was 16.73%. Ballia has a sex ratio of 933 females for every 1000 males, and a literacy rate of 73.82%.

Ballia is located 117km far from Azamgarh, the administrative capital of the district, 145 km far from Varanasi, the religious capital of Uttar Pradesh and 155 km distant from Gorakhpur city. Nearest airport is Lalbahadur Sastri International Airport, Varanasi.

Table 2.4.3: Demographic Features of Ballia District

District: Ballia				
Total Area (sq. kms)	2981		Male population	1,672,902
Population Density (persons/sq. km.)	1087		Female population	1,566,872
Population Growth (%)	17.4		Rural population (%)	90.61%
Literacy rate (%)	70.9		Urban population (%)	
Total Population	3,239,774		Sex Ratio	939

Table 2.4.4 Socio-Economic Details of Ballia district

S. No	**Item**	**Unit**	**Ballia**
1	District Area	sq. km	2981
2	Tehsils	No.	6
3	Towns	No.	11
4	Villages	No.	2361
5	Households	No.	478,420
6	Decade Growth Rate	%	17.4
7	Main Workers	No.	569,522
8	Marginal Workers	No.	449,961
9	Non-workers	No.	2,220,291

2.5 ECONOMY

The economy of Uttar Pradesh is the fourth largest economy in India after Maharashtra, Karnataka and Tamil Nadu. In 2016-17, Uttar Pradesh's GSDP was ₹12.37 lakh crore (US$190 billion). According to 2011 census report Uttar Pradesh have 22.3% urban population. Maharashtra have 5,08,18,259 urban population while Uttar Pradesh have 4,44,95,063. State have 7 cities with population more than one million. After partition in 2000, the new Uttar Pradesh state produces about 92% of the output of the old Uttar Pradesh state. According to Tendulkar committee 29.43% population of Uttar Pradesh is poor in 2011-12 while Rangrajan committee gave the report of 39.8% poor for same period in state.

In 10th Five-year planning between 2002 and 2007 state registered 5.2% annual economic growth. In 11th Five-year planning between 2007 and 2012 state touched 7% annual economic growth. But after that it fell on 5.9% in 2012-13 and 5.1% in 2013-14 one of the lowest in India. The state's debt was estimated at 67 per cent of GDP in 2005. In 2012, the state was one of the highest receivers of overall remittances to India which stood at $0.1 billion (Rs. 3,42,884.05 crore), along with Kerala, Tamil Nadu, and Punjab.

Comparative Study of National and state income

Preliminary estimates of state income i.e., Net State Domestic Product (NSDP) at current price is estimated at Rs. 9762.97 billion in 2014-15 as compared to 8627.46 billion in 2013-14, showing a growth of 13.2% against 10.55% in the previous year.

Per capita state income (i.e. Per capita NSDP) at current prices is estimated at Rs. 40,373 in 2014-15 recording a growth rate of 11.37%, against 8.26% in the previous year.

2.6 TRANSPORT

The state has the largest railway network in the country and the sixth highest railway density. As of 2011, there were 8,546 km (5,310 mi) of rail in the state. Allahabad is the headquarters of the North Central Railway and Gorakhpur is the headquarters of the North-Eastern Railway. Other than Zonal Headquarters of Allahabad and Gorakhpur, Lucknow and Moradabad serve as divisional Headquarters of the Northern Railway Division. The railway stations of Lucknow NR, Kanpur Central, Varanasi Junction, Agra Cantt, Gorakhpurand Mathura Junction were included in the Indian Railways list of 50 world-class railway stations.

The state has a large, multimodal transportation system with the largest road network in the country. The state is well connected to its nine neighboring states and almost all

other parts of India through the national highways. It boasts 42 national highways, with a total length of 4,942 km (9.6% of the total NH length in India). The Uttar Pradesh State Road Transport Corporation was established in 1972 to provide economical, reliable, and comfortable transportation in the state with connecting services to adjoining states and boasts as being the only State Transport Corporation that runs in profit in the entire nation. All cities are connected to state highways, and all district headquarters are being connected with four lane roads which carry traffic between major centres within the state. One of them is Agra Lucknow Expressway, which is a 302 km (188 mi) controlled-access highway constructed by Uttar Pradesh Expressways Industrial Development Authority (UPEIDA) to reduce vehicular traffic in previously congested roads. This expressway is country's largest Greenfield Expressway which reduced the travel time between Lucknow and Agra from 6 hours to 3.30 hours. Other district roads and village roads provide villages accessibility to meet their social needs as also the means to transport agriculture produce from village to nearby markets. Major district roads provide a secondary function of linking between main roads and rural roads. Uttar Pradesh has the highest road density in India, (1,027 km per 1000 km2) and the largest surfaced urban-road network in the country (50,721 km).

The state has excellent civil aviation infrastructure with Chaudhary Charan Singh International Airport in Lucknow and Lal Bahadur Shastri International Airport in Varanasi, providing international service. and four domestic airports located at Agra, Allahabad, Gorakhpur and Kanpur. The Lucknow Airport is the second busiest airport in North India after the Indira Gandhi International Airport, New Delhi. The state has also proposed creating the Taj International Airport at Kurikupa near Hirangaon, Tundla in Firozabad district. An international Airport is also proposed at Kushinagar.

The Lucknow Metro is being constructed in the city of Lucknow as an alternative mode of transport. The capital city is witnessing a swift rise in the number of immigrants and this has called for the transformation of Public modes of transport.

2.7 INDUSTRY

UP has also witnessed rapid industrialization in the recent past, particularly after the launch of policies of economic liberalization in the country. As of March 1996, there were 1,661 medium and large industrial undertakings and 296,338 small industrial units employing 1.83 million persons. The per capita state domestic product was estimated at Rs 7,263 in 1997–98 and there has been visible decline in poverty in the state. Yet, nearly 40 percent of the total population lives below the poverty line. There are numerous types of minerals and many industries have come up based upon these

minerals. There are a number of cement plants in Mirzapur in the Vindhya region, a bauxite-based aluminium plant in the Banda region and Sonbhadra region. In the hilly regions of the state many non-metallic minerals are found which are used as industrial raw materials. Coal deposits are found in the Singrauli region.

The state is poor in mineral resources. The only considerable deposits are of limestone in Mirzapur district. These are being extracted and are used largely in cement manufacture.

Uttar Pradesh has booming electronics industries, especially in UP-Delhi-NCR and Lucknow-Kanpur Corridor. It produces almost all types of durables.

Cottage industries, such as handloom and handicrafts, have traditionally provided livelihood to a large number of people in the state: -

- Varanasi is a world-famous centre of handloom woven, embroidered textiles; the main products are Zari-embroidery and brocade-work on silk sarees. Lucknow is a centre of 'Chikan' embroidery, renowned for its grace and delicacy, a skill more than 200 years old. Uttar Pradesh produces about 15% of the total fabric production of the country, employs about 30% of the total workforce of artisans in India and is responsible for an annual production of about US$0,1 million in the state.
- The state has two major production centres of leather and leather products, with over 11,500 units; Agra and Kanpur are the key centres. About 200 tanneries are located in Kanpur.
- Moradabad is renowned for brass work and has carved a niche for itself in the handicraft industry throughout the world. Lately other products that are also produced here like iron sheet metalwares, aluminium artworks, wood works and glassware's have also become popular with the numerous foreign buyers and are therefore being exported in large quantities. On an average Moradabad exports goods worth Rs. 30–40 billion each year, which constitutes 40% of total exports from India under this category.
- Meerut is the biggest gold market of Asia. It is the biggest exporter of sports related items and music instruments of the country.
- Bulandshahr is renowned for Khurja Pottery worldwide. There are nearly 23 export oriented units and they are exported to foreign countries such as the United Kingdom, USA, Australia, New Zealand, United Arab Emirates, etc. Sikandrabad industrial area, developed by UPSIDC, has a large number of national and multinational companies working here successfully.

2.8 AGRICULTURE

Uttar Pradesh is a major contributor to the national food grain stock. In 2013-14 state produced 50.05 million tons of foodgrain which is 18.90% country's total production. Partly this is due to the fertile regions of the Indo-Gangetic plain and partly owing to irrigation measures such as the canals and tube-wells. Lakhimpur Kheri is a densely populated sugar producing district in the country. It has been the most common producer of food grains in India since the 1950s due to high-yielding varieties of seed, greater availability of fertilizers and increased use of irrigation [1]. Western Uttar Pradesh is more advanced in terms of agriculture as compared to the other regions in the state. Majority of the state population depends upon farming activities. Wheat, rice, pulses, oil seeds and potatoes are the major agricultural products. Sugarcane is the most important cash crop throughout the state. Uttar Pradesh is one of the most important state in India so far as horticulture is concerned. Mangoes are also produced in the state.

Uttar Pradesh supports about 15% of India's total livestock population. Of its livestock in 1961, 15% were cattle, 21% buffaloes, 13% goats and 8% other livestock. Between 1951 and 1956 there was an overall increase of 14% in the livestock population. There are about 8,000 km² of water area, including lakes, tanks, rivers, canals and streams. The fishing area in the state is over 2,000 km² and there are more than 175 varieties of fish.

2.9 MINERAL POTENTIAL

The State of Uttar Pradesh has a Long and Interesting history of Mining of Minerals. In the early days Copper, Lead, Iron ore and Placer Gold have been mined on a small scale in parts of Himalayas, Bundelkhand and South-Eastern districts. In addition Vindhyan Sand Stone as building and Mill Stone were also mined in the districts of Agra, Allahabad and Mirzapur.

Prior to 1900, the Copper ores were mined on a small scale in erstwhile Garhwal, however, the development of Modern Technology and decline in the prices also lead to the decline of small scale Mining. Mining activity during 1920 and 1930 further declined due to various reasons. The Geologists have been examining the ground for search of both Industrial and Metallic Mineral deposits which could be developed in relation to present day Technology and Economics. In the post independence period, this effort was considerably intensified with the creation of Directorate of Geology& Mining in 1955 and the State witnessed spurt in the mining activity with the development and setting up of Cement factory in Churk. The Silica Sand deposits near Shankargarh in Allahabad were mined to meet the increasing demand of the Glass and Foundry Industries. The activities

in the traditional building stone industry also increased considerably. Through the continuous efforts of the exploration Geologists, mineral deposits like Soapstone, Diaspore, Pyrophyllite, Bauxite, Rock Phosphate, high grade limestone and Cement grade Limestone, Dolomite, Coal etc. could be evaluated and a vast potential for their expansion established.

2.10 FORESTS

Uttar Pradesh, with a geographical area of 2,40,928 km2 constitutes 7.3% of the total area of the country. It has 70 districts falling in two of the fourteen main physiographic zones of India viz the Northern Plains or the vast Gangetic Plains having highly fertile alluvial soil including 64 districts and the Central Highlands or the smaller Southern hill plateau covering 10 districts. Agra Allahabad, Chandauli and Mirzapur fall partly in both zones. The main forest types in the state are Tropical Semi Evergreen (0.21%), Tropical Moist Deciduous (19.68%), Tropical Dry Deciduous (50.66%), Tropical Thorn (4.61%) and Littoral and Swamp forests (2.35%).

The recorded forest area in undivided U.P. in 1951 was 30,245 sq. km. Additional areas were notified gradually and by 1998-99 the forest cover went up to 51,428 sq. km. In 1999 Uttaranchal was separated from U.P. and Uttar Pradesh was left with only 16,888 sq.km. of recorded forest. The 2011 State of Forest Report reports the recorded forest area as 16,583 sq.km, a decline of 305 sq.km. of recorded forest area.

In terms of district wise forest cover, while the State of Forest Report for 2003 mentioned 10 districts with a forest cover less than 1%, the 2011 report indicated 11 districts. The new entrant here is Ghazipur which has shown a declining trend in forest cover from 2003 to 2011 (1.39% to 0.92%). Two of the districts Ballia and Moradabad are still below 1% but have shown an improvement over 2003, Azamgarh, Deoria, Mainpuri have exhibited a decline while Badaun, SantKabir Nagar, Sant Ravi Das Nagar and Varanasi have not reported any change.

According to Uttar Pradesh status of Environmental and Related issues, Uttar Pradesh has forest and tree cover of 21720 sq. km, which is 9.01% of its geographical area.

Table 2.10.1: Forest cover details of Uttar Pradesh state

S.No	Item	Area (Sq. Km)
1	State geographical area	240,298
2	Recorded forest area	16583

3	Forest cover	14338
4	Tree cover	7382
5	Forest and tree cover	21720
6	Forest and tree cover against geographical area	9.01%

Table 2.10.2: Position of forestry and wildlife sector in UP state as compared to India

S. No	Item	India	U.P.
1	Geographical area	32,87,263	2,40,928
2	Recorded forest area	7,69,538	16,583
a	Reserved forest	4,22,536	11,660
b	Protected forest	2,13,982	1,420
c	Unclassed forest	1,33,020	3,503
	Percentage recorded forest area	23.41%	6.88%
3	Forest cover	6,92,027	14,338
a	Very dense	83,471	1,626
b	Moderately dense	3,20,736	4,559
c	Open forest	2,87,820	8,153
	Percentage of forest cover	21.05%	5.95%
4	Tree cover	90,844	7,382
	Tree cover percentage	2.76%	3.06%
5	Total forest and tree cover	7,82,871	21,720
	Percentage of total forest and tree cover	23.81%	9.01%

2.11 RIVERS

A Fascinating network of Perennial rivers has shaped the culture of Uttar Pradesh and nurtured its populace like a loving mother for thousands of years that's why people worship and celebrate most of their festivals on the bank of these rivers. The main rivers are gangaes, Gomti, Gangi, Beson, Magai, Bhaisai, Tons and Karmnasa. The state is well drained by a number of rivers originating in either the Himalayas to the north or the Vindhya Range to the south. The Ganges and its main tributaries—the Yamuna, the Ramganga, the Gomati, the Ghaghara, and the Gandak rivers—are fed by the perpetual snows of the Himalayas. The Chambal, the Betwa, and the Ken, originating from the Vindhya Range, drain the southwestern part of the state before joining the Yamuna. The Son, also originating in the Vindhya Range, drains the southeastern part of the state and joins the Ganges beyond the state borders (in Bihar).

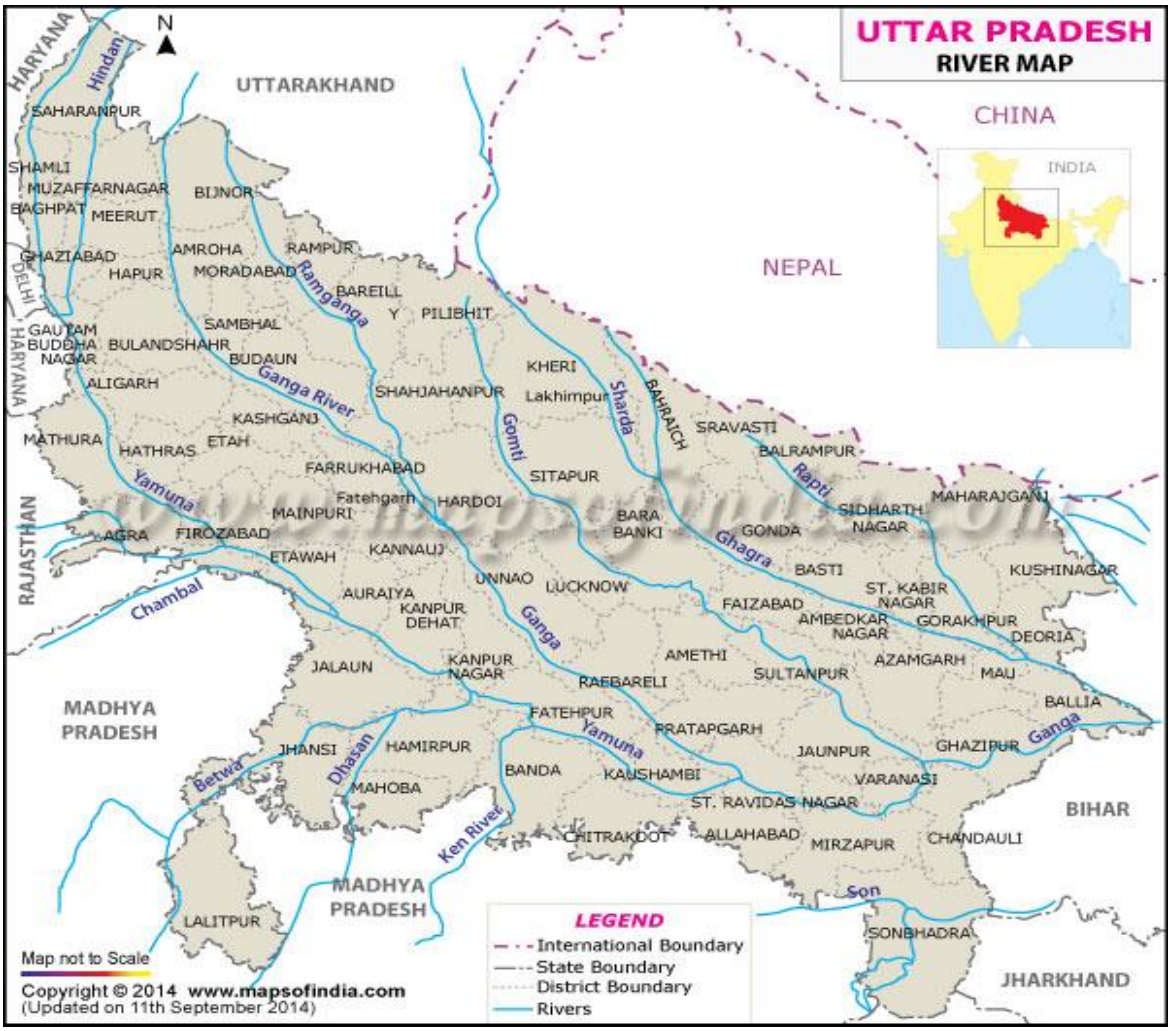

Figure 2.11: River map in Uttar Pradesh state

2.11.1 Ghazipur District

Ghazipur district is well flourished with many rivers flowing through it like Ganga, Gomti, Beson, Magai and Bhasai river. The River Ganges travels 90 K.M , Gomti 30 K.M , Gangi 50 K.M, Beson 95 K.M , Magai 25 K.M, Bhaisai 30 K.M and Tons river travel 20 K.M. The Gangaes and gomti flows from north-west to southeast in district. Ganges plays the important role in Transportation on the way from Allahabad to Calcutta for carrying goods through water. In British period the transportation of opium was carried to china from Ghazipur to Bay of Bengal. At That time The Steamers and Boats was running from Varanasi to Calcutta for Transportation of People and goods. In 1887 the famous poet Ravindra Nath Tagore came from Calcutta through Ganges. The brief description of the important rivers that flow through the project influence area are given below:

Ganga

The Ganges also Ganga is a trans-boundary river of Asia which flows through the nations of India and Bangladesh. The 2,525 km (1,569 mi) river rises in the western Himalayas in the Indian state of Uttarakhand, and flows south and east through the Gangetic Plain of North India into Bangladesh, where it empties into theBay of Bengal. It is the third largest river in the world by discharge.

Gomti

Gomati River, also called Gumti, tributary of the Ganges (Ganga) River, central Uttar Pradeshstate, northern India. It rises in northern Uttar Pradesh about 32 miles (51 km) east of Pilibhit and is intermittent for the first 35 miles (56 km) of its course, becoming perennial after its junction with the Joknai. Below this point it flows generally southeastward for some 500 miles (800 km), receiving its only major tributary, the right-bank Sai River, near Jaunpur and emptying into the Ganges near Saidpur. It drains a basin of about 7,240 square miles (18,750 square km).

2.11.2 Ballia District

Ballia district is the easternmost part of the Uttar Pradesh state and borders on Bihar State. It comprises an irregularly shaped tract extending westward from the confluence of the Ganga and the Ghaghra, the former separating it from Bihar in the south and the latter from Deoria and Bihar in the north and east respectively. The boundary between Ballia and Bihar is determined by the deep streams of these two rivers. The brief description of the important rivers that flow through the project influence area are given below:

Ghaghara

Ghaghara, also called Karnali is a perennial trans-boundary river originating on the Tibetan Plateau near Lake Mansarovar. It cuts through the Himalayas in Nepal and joins the Sharda River at Brahmaghat in India. Together they form the Ghaghra River, a major left bank tributary of the Ganges. With a length of 507 kilometres (315 mi) it is the longest river in Nepal. The total length of Ghaghara River up to its confluence with the Ganges at Doriganj in Bihar is 1,080 kilometres (670 mi). It is the largest tributary of the Ganges by volume and the second longest tributary of the Ganges by length after Yamuna.

Tamsa

The Tamas River (also known as the Tons River) is a tributary of the Ganges flowing through the Indian states of Madhya Pradesh and Uttar Pradesh. The Tamas rises in a tank at Tamakund in the Kaimur Range at an elevation of 610 metres (2,000 ft). It flows through the fertile districts of Satna and Rewa. At the edge of the Purwa plateau, the Tamas and its tributaries form a number of waterfalls. The river receives the Belan in UP and joins the Ganges at Sirsa, about 311 kilometres (193 mi) downstream of the confluence of the Ganges and Yamuna. The total length of the river is 264 kilometres (164 mi). It has a total drainage area of 16,860 square kilometres (6,510 sq mi).

Ganga

The Ganges also Ganga is a trans-boundary river of Asia which flows through the nations of India and Bangladesh. The 2,525 km (1,569 mi) river rises in the western Himalayas in the Indian state of Uttarakhand, and flows south and east through the Gangetic Plain of North India into Bangladesh, where it empties into theBay of Bengal. It is the third largest river in the world by discharge.

2.12 SOILS

The state has three distinct physiographic divisions from north to south viz. The Shiwaliks, the Gangetic plain and the Southern High lands, Plateaus, and Scarplands which are further divided into subunits given in the figure. The Project influence area that passes through Jaunpur and Ghazipur districts fall in Alluvial plains.

Figure 2.12 : Physiological map of Uttar Pradesh state

This riverian plain is featureless, its monotony is broken by red-stone hillocks of Aravalli hills on the western part of Mathura district, whereas on micro level by the river bluffs, levees and dead arms of the river channels. There are, in addition extensive ravinous lands along the rivers Yamuna, Chambal, Sengar and Kuwari occurring in the districts of Agra, Etawah and Kanpur etc. Older alluvial plain (Bhanger) occupying relatively higher elevation and recent alluvial plain (Khadir), occupying relatively lower elevations. A plain which lies along the river courses and rivulets is known as active flood plain which is formed as a result of meandering action of these rivers and rivulets.

2.13 LAND UTILIZATION

The overall picture regarding land use patterns in India constitutes divergent situations in regard to land use patterns across different states. In this part of Uttar Pradesh have

already not very much suitable for agriculture. However, one pattern that was consistent almost all the districts is the increasing trend in land under non-agricultural use due to increasing urbanization and industrialization, this trend is inevitable. The land use system is highly dynamics which undergoes significant changes according to the changes socio-economic and natural environment. Transformation lands from different land use to agriculture to fulfill the demand of food, fuel, wood, fodder and timber and on the other hand increasing the non-agricultural land use means to development of urbanization and industrialization. The main causes for expansion of urban area in this area because of settlement and development of rural-urban fringe areas in the border districts of capital delhi area e.g. Ghaziabad, Gautam Buddha Nagar etc. Increasing population and dependent of agriculture are highly influence on agricultural and non-agricultural land use pattern. For development of urban areas and concentration on environment this regards Mics. Tree groves and garden are unchanged for social forestry and awareness. Also Western Uttar Pradesh is not very much uniform topography, in northern part is hilly mountain area, central and eastern part are upper ganga plain suitable for agriculture and in Sothern part are the desert area. Pasture and other grazing land are decreasing which influence for animal husbandry. Culturable waste land and barren land are decreasing due to increasing other than agricultural land. Current fallow land was increasing due to less concentration chemical fertilizer and irrigation.

Table 2.13: Land Utilization details of Uttar Pradesh State

Land Use	Area (in thousands) (ha)	Percentage
Total geographic area	24093	NA
Reporting area for land utilization	24170	100.00
Forests	1658	6.86
Not available for land cultivation	3268	13.52
Permanent pastures and other grazing lands	65	0.27
Land under misc. tree crops and groves	374	1.55
Culturable Wasteland	440	1.82
Fallow lands other than current fallows	540	2.23
Current fallows	1408	5.83
Net area sown	16417	67.92

2.14 TOURISM

Situated in the northern part of India, bordering with the capital of India New Delhi, Uttar Pradesh is one of the most popular and an established tourist destination for both Indians and non-Indians alike in India. The most populous state of India, Uttar Pradesh contains a large number of historical monuments and places of religious significance. Geographically, Uttar Pradesh is very diverse, with Himalayan foothills in the extreme north and the Gangetic Plain in the centre. It is also home of India's most visited sites, the Taj Mahal, and Hinduism's holiest city, Varanasi. Kathak, one of the eight forms of Indian classical dances, originated from Uttar Pradesh. Uttar Pradesh is at the heart of India, hence it is also known as The Heartland of India. Cuisine of Uttar Pradesh like Awadhi cuisine, Mughlai cuisine, Kumauni cuisine are very famous not only in India but also many places abroad.

Uttar Pradesh is known for its rich culture and tradition. It is home to Ayodhya and Mathura birthplace of Lord Rama and Lord Krishna respectively. Uttar Pradesh attracts a large number of both national and international tourists. Taj Mahal, one of the New Seven Wonders of the World in Agra is also located in Uttar Pradesh.

There are different places one can visit in Uttar Pradesh. Agra, Jhansi, Lucknow and Meerut are historical cities famous for their monuments. Mathura, Vrindavan, Gokul, Varanasi, Ayodhya and Allahabad are holy cities for Hindus and Kushinagar and Sarnath are important Buddist places among the main four pilgrimage sites related to the life of Gautama Buddha. Noida is the most developed urban city of Uttar Pradesh.

Iron Ore is abundantly available in the neighboring Districts of Karnataka viz., Raichur, Bellary, which is suitable for setting up of Steel Plants. Due to availability of these resources already, many Sponge Iron units have come in the District and there is scope for mini steel plants.

3.0 Scope of the Study

The report contains the findings of the study to identify risks, identification of most likely risks, health and Environmental hazards/Impacts along the Right of Way (RoW) & possible natural and man made disasters happening in the project area and suggesting suitable remedial measures in all stages of the project i.e. Design phase, Construction phase, and Operation phase and preparation of Disaster Management Plan.

The scope of the environmental report is given below:

- Reconnaissance survey, environmental screening and categorization framework for the proposed project to include the environmental aspects from the planning stage of the project.
- Review of National, state and local environmental regulatory requirements on environmental aspects, including necessary clearances from State and Central Government in the context of proposed expressway project.
- Collecting secondary baseline data from relevant sources for various environmental attributes around the project site.
- Conduct environmental analysis of alternatives for different project components and provide specific inputs to technical analysis of alternatives.
- An environmental impact assessment for the proposed project to identify and quantify potential impacts of the project.
- Impact prediction and assessment of key aspects of the project such as ambient air, noise, water etc., and assessment of other aspects of the project with sustainable mitigative measures.
- Suggesting a typical environmental management plan with appropriate line estimates duly addressing the key environmental attributes.
- Suggesting post project environmental studies to be carried-out.

The objectives of the study are:

- ✓ Identify the hazards
- ✓ Decide areas of hazards in the project and how it shows impact.
- ✓ Evaluation of risks and decide on precautions
- ✓ Record of findings and its implementation
- ✓ Assessment of hazards likely likely happening due to result from the proposed project and suggesting suitable mitigation measures.
- ✓ Preparation of Disaster Management Plan in order to support in the event of road accidents (major road mishaps, gas tanker explosions, fire hazards etc.) and natural calamities (floods, cyclones, earth quakes etc.).

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 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 15 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 15 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 MoEF and the same is enclosed in Appendix V. The details of the EIA study is 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 15 km either side of the project stretch.

4.3 Baseline Data Generation

(a) Secondary Data Collection:

Secondary data will be collected from secondary sources like publishes, 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 it 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 drainage pattern of the project road, runoff flow direction, possible flooding, erosion were 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 Indian Meteorological Department (IMD) station i.e 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 are being recorded 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. Surface water samples will be collected from different water bodies/rivers/streams along the project stretch and ground water samples from most commonly used ground water sources along the project road. 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, Surfactants, Dissolved Iron, Copper, Zinc, Manganese, Arsenic, Lead, Mercury, Boron, Chromium, Phenols, Cadmium, Total Coliform, Faecal Coliform etc., and 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, Phenol, Cadmium, Total Coliform, Faecal Coliform etc.

  Ambient Air Quality: Ambient air quality monitoring process will be carried out all along the project stretch covering different category of land use (residential, commercial/industrial, sensitive zones like schools, college and hospital) with a frequency of twice a week for one month. The ambient air quality monitoring are being carried out for Particulate Matter (size less than 10 µm) or PM10, Particulate Matter (size less than 2.5 µm) or PM2.5, Sulphur Dioxide (SO2), Nitrogen Dioxide (NO2) and Carbon Monoxide (CO) by following the MoEF guidelines.

  Noise Environment: The noise monitoring will be carried out along the project alignment covering sensitive locations such as residential, hospitals, schools, sanctuaries etc. The noise monitoring will be done for 24 hrs at each location. During nigh time and day time, equivalent noise levels will be generated for each monitoring locations to have an idea of noise pollution levels in the study area.

Soil Quality: The soil samples of different area along the project stretch will be collected for assessing the physico-chemical characteristics of the soil in the project area. The quality parameters are pH, electrical conductivity, sand, silt, clay, texture, moisture retention capacity, infiltration rate, bulk density, porosity, organic matter, nitrogen, potassium, phosphorous, Pb, 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 & road side 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 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 effected 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, 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 environmental 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 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 environmental impact assessment will be conducted in accordance with the requirement of the Ministry of Environment & Forests (MoEF) 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, 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 modeling 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:

- Alignment of the project road and topographical changes.
- Roadside drainage to avoid water logging, erosion & environmental degradation. Impact on soil along the project road.
- Impact of solid waste generated and solid waste management plan. Impact on borrow area and quarries.
- Impact on road safety.
- Impact on ambient air quality due to air pollution during construction activities and vehicle movement. Prediction of ambient air quality due to projected vehicular traffic would be carried out using computer based CALRoads View software (CAL3QHCR).
- Impact of noise level during construction activities and vehicle movement. Prediction of noise levels would be carried using Federal Highways Noise Administration (FHWA) model during operation phase.
- Assessment of impacts of road construction on ground and surface water sources in the study area.
- Impact of solid waste generated during construction phase of the project.
- Nature, quantity and disposal of construction spoils, wastes and waste water. Impacts of flora and fauna and ecological resources due to construction and operation of the project.

- Public health & sanitation, and occupational health & safety of construction workers.
- Impact on safety of local people during construction and operation phases. Population affected and socio-economic impacts.

4.6 Public Consultation and Information Disclosure

Public 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

After detailed analysis of all the environmental impacts and issues, a proper and adequate Environmental Management Plan (EMP) will be prepared with the aim to avoid, mitigate or eliminate the adverse impacts due to the project. This will cover roles and responsibilities for mitigation operations, emergency response procedures & supervision, financing, monitoring and reporting. EMP also includes the prospects of environmental enhancement within the project area. EMP will envisage the plans for the proper implementation of mitigation measures to reduce the adverse environmental impacts due to project activities during construction and operation phase. The following issues are addressed in the EMP:

- Preventive, mitigation, compensatory & enhancement measures for minimization & abatement of the undesirable impacts caused during the construction and operation stage.
- Details of management plans (compensatory plantation, solid waste management plan, borrow area management plan, occupational safety and health plan) including their implementation schedule and supervision programme.
- Identified/recommended institutional set up for implementation of the EMP including institutional requirements, staffing and training.
- Environmental monitoring programme during construction and operation phase

including performance indicators, monitoring mechanisms, implementation programme and cost.

- Resettlement action plan for affected families as per NHAI Policy and NRRP 2007. Environmental Management Budget considering the environmental aspects for the project.

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. Analysis of Alternatives (Technology and Site)
4. Description of the Environment
5. Anticipated Environmental Impact & Mitigation Measures
6. Public Consultation
7. Risk & Disaster Management Plan
8. Project Benefits
9. Environmental Monitoring Program and Environmental Management Plan
10. Summary & Conclusion
11. Disclosure of consultant engaged