

## **EXECUTIVE SUMMARY**

### **0.1 PROJECT DESCRIPTION**

Raipur-Dhamtari section of existing NH-43 connects two district capital cities of Raipur and Dhamtari in Chhattisgarh. The roadways infrastructure is slowly picking up in the state. The National Highway 43, which starts from Raipur and goes up to Vizianagaram. The state has 11 National Highways for an aggregating length of about 2184 km. This corridor development is the part of NHDP Phase IV comprising a road length of about 8959 km. National Highways authority of India (NHAI) has been entrusted with the development of the above mentioned section into 2-lane with paved shoulder configuration. The National Highway 43 connects NH 6 in Raipur and joins with NH 5 in Chittivalasa in Andra Pradesh. The other two important junctions on the road are, with NH 16 in Jagdalpur and with NH 201 in Boriguma in Orissa.

The project road starts from km 3.40 of existing NH 43 from Raipur and ends at km 72 near the start of Dhamtari town. The project road section is shown in Index map placed as **Fig. Es. 01**. The existing road is having two-lane carriageway in the entire road length, except from km 3.4 to 4.4, where it is four-lane with raised median. The section under consideration is being maintained by National Highway Division of Chhattisgarh state PWD.

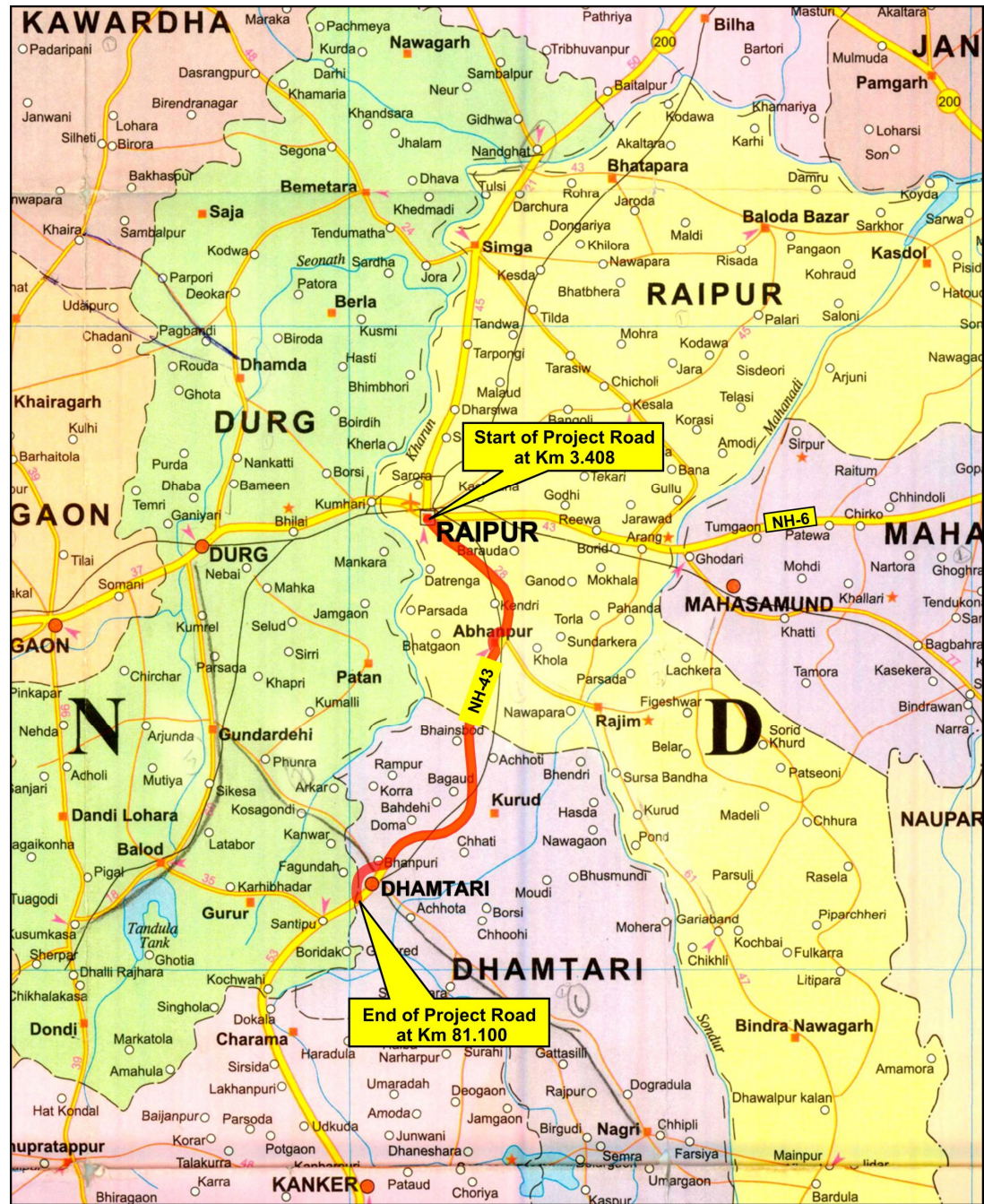
The traffic intensity on this section of NH 43 is moderate. The entire length of road is passing through plane terrain. The land use by the side of the NH includes agriculture activities, residential use and commercial purpose. The existing right-of-way (ROW) is generally of 24.40m. The establishments on both sides of the road in general are outside the available ROW. However, some encroachments were also noticed in the built-up locations of the road. The project road passes through major towns of Raipur and Dhamtari and a number of minor settlements.

The carriageway width of this section of NH-43 for major portion of length is of two lane standard with earthen shoulders on both sides except in the starting (in about 1.0 km) four lane road with central median is existing. There is no median or divider in the rest of the stretch.

There is a narrow gauge rail line connecting Raipur to Dhamtari town. The National Highway No. 43 crosses this line at 4 locations where level crossings are provided. The railway level crossings are located at km 10.600, km 27.000, km 52.000 and at km 68.500 along the National Highway with manned level crossings.

There are in all 61 numbers of culverts (Hume pipes: 34 no., Slab culverts: 27 no.) and 13 bridges (major bridges- 4 no, minor bridges- 9 no.) exist in this section of the road.

Fig. Es 1: Index Map



**0.1.1 Proposed Improvements**

The planned major improvement includes following:

- Km 3.400 to Km 10.00 : 4-lane divided carriageway with paved shoulders
- Km 10.00 to Km 26.100 : 2 lane with paved shoulders
- Km 26.100 to Km 28.200 : Realignment proposal (2 lane with paved shoulders)
- Km 28.200 to Km 72.000 : Upgrading of existing 2-lane + Paved shoulders

Proposed Dhantari Bypass	:	Construction of new 2-lane with paved shoulders
ROBs	:	No
Foot over bridge	:	Davpuri village: near km 5.700 & Dumatarai village: near km 7.800

## **0.2 ENVIRONMENTAL SCREENING OF THE PROJECT**

The environmental screening is taken up to make a preliminary assessment of environmental issues that are relevant to project and to make project environmentally sound and sustainable. The ES preparation led to identification of potential negative environmental impacts and their feasible remedial measures (including avoidance, mitigation and enhancements). The outcome of environmental screening will help design team in assessing technical, economic and financial feasibility of project.

### **0.2.1 Environmental Screening Study Methodology**

The environmental Screening in this project has an approach in which potential environmental issues have been examined at successive levels of detail and specificity at each step in the process. Following is the methodology used:

- Collection and study of documents to know background information on project and related policies and legal issues
- Reconnaissance survey
- Defining scope of work and project influenced study area
- Collection of secondary data
- Generation of primary data for environmental screening and its analysis
- Documentation of secondary & primary data and defining the Environment
- Analysis of alternatives
- Assessment of potential impacts followed by identifying possible mitigation measures

### **0.2.2 Study Area**

As per paragraph (iii) of Form I of EIA Notification 2006, secondary data related to study area has been collected within 15 Km distance on either side of the project road. The primary baseline data has been collected in the proposed right of way and 500 m distance on both sides of the project road.

### **0.2.3 Policy, Legal and Administrative Framework**

Review of the existing legislation, institutions and policies relevant to the Environmental Impact Assessment at the National and State levels has been done and clearance requirements for the project at various stages of the project have been identified.

#### ***Environmental Clearance***

In terms of the provision of Ministry of Environment and Forests 2006 notification, this project will get classified as a category 'A' project of the said notification because of the following features of the road:

- The project road is more than 30 km in length
- The proposed bypasses

Therefore the project will require prior environment clearance for execution.

The requirement of obtaining the clearances from authorities at the state level for the project is indicated in **Table Es.1**.

**Table Es.1: Clearance requirement for the Present Project**

S. No.	Activity	Statutory Authority	Relevant Statute
1	Permission for sand mining from river bed	Department of mining, Govt. of Chhattisgarh. The Collector of the district will grant short-term mining lease.	Chhattisgarh Mineral Rules
2	Setting of hot mix plants, crushers and batching plants	Chhattisgarh Environment Conservation Board(CECB)	Air (Prevention and Control of Pollution) Act, 1981 and the Noise Pollution (Regulation and Control) Rules, 2000
3	Establishment of workers camp, equipment and storage yards	Chhattisgarh Environment Conservation Board(CECB)	Environment Protection Act, 1986 and Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989 and 2003.
4	Storage, handling and transport of hazardous materials	Chhattisgarh Environment Conservation Board(CECB)	Hazardous Waste (Management and handling) Rules, 1989 and Manufacturing, storage and Import of Hazardous chemical Rules, 1989 and 2003
5	Waste water discharge from labour camps and construction camp	Chhattisgarh Environment Conservation Board(CECB)	Water (Prevention and Control of Pollution) Act, 1974
6	Disposal of bituminous wastes	Local Civil Body to identify solid waste disposal sites	Hazardous Waste (Management and Handling) Rules, 1989 and 2003
7	Opening up new quarries	Department of Commerce and Industries, Govt. of Chhattisgarh	Mines and Minerals (Regulation and development) Act, 1957 as amended in 1972
8	Tree felling and removal from non-forest areas	District Level Committee constituted by the State Govt. and chaired by the District Collector	Procedural Guidelines developed by the Department of Environment, under the orders of the Hon'ble High Court; Tree removal will be guided as per state government rules.

### 0.3 DESCRIPTION OF ENVIRONMENT

As defined in the scope of works baseline data on various physical, biological and social aspects has been collected, analyzed and compiled in order to get the picture of the existing environment condition in the project area.

#### 0.3.1 Physical Environment

##### 0.3.1.1 Location of Project

Chhattisgarh State is situating between 17°46–24°8 N latitude and 80°15–84°24 E longitudes. It is situated in central eastern part of the country. The north and south parts of the state are hilly, while the central part is a fertile plain. Raipur District is situated between 22°33'N to 21°14'N Latitude and 82°6' to 81°38'E Longitude. The District is

surrounded by District Bilaspur & Janjgir-Champa in North, District Raigarh in North-East, Mahasamund and part of Orissa State in East, part of Orissa State in South, Dhamtari in South-West and district Durg in West. The district occupies the south eastern part of the upper Mahanadi valley and the bordering hills in the south and the east. Thus, the district is divided into two major physical divisions, Viz., the Chhattisgarh plain and the Hilly Areas.

Dhamtari district is situated between 20<sup>o</sup>42' N Latitude and 81<sup>o</sup>33' E Longitudes. The total area of the district is 2029 Sqkm. and its altitude is 305 meter above mean sea level. The District is surrounded by district Raipur in North & East, by part of Orissa state in South, by district Bastar in South-West, by district Kanker in West and by district Durg in North West. Mahanadi is the principal river of these districts.

### **0.3.1.2 Climate**

#### **Climatic Profile**

Chhattisgarh state experiences a tropical type of climate. The geographical factors like distance from the sea and altitude of the state have influenced the Chhattisgarh climate. The climatic condition during summer months of April to June is hot with temperature rising upto 40°C to 42.5°C and gusts of dry wind blow over the state. During winter the temperature falls to almost 10°C - 15 °C in the months of December and January. Monsoon in Chhattisgarh is experienced during the end of June or July to last week of August. Rainfall in this state is mainly brought by South West monsoonal winds. This wind causes heavy rainfall as it collects moisture while blowing over Bay of Bengal.

#### **Temperature**

During the summer season in the region, the temperature varies from 40 degree to 42.5 degree Celsius. From the month of March, the temperature starts to rise in the region. The summer season prevails from April to middle of June. In summer very dry wind blows and this influences the temperature.

Gradually after September or October the temperature decreases. The winter season is mainly felt in the region during months of November to January. The climate remains moderately cold during winter. Temperature during winter season in the region varies from 10 to 15 degree Celsius. The mean daily maximum temperature is 32.8°C and minimum is 21.1°C.

#### **Rainfall**

The average annual rainfall in Chhattisgarh is 1405.3 mm (maximum average annual rainfall up to 1885.1 mm in Jashpur district). Monthly rainfall for the past 5 year for Raipur and Dhamtari station has been collected from IMD and the data shows that maximum rainfall were observed between June to September and no rainfall/ less observed during the months of November and December.

#### **Wind**

Wind direction, speed and seasonal variation determine the manner in which air pollutants from the vehicle emissions are dispersed. High wind velocities may cause soil erosion both during the wet and dry seasons. Prevailing wind direction for the Raipur station is north.

#### **Humidity**

Raipur and Dhamtari experience wide variation in humidity with daily relative humidity ranging between 67% in the morning reaching up to 89% at night. This is particularly during the rainy season. However it is around 50% to 60% during the other seasons of the year.

### **0.3.1.3 Physiography**

#### **Topography**

The Chhattisgarh state can be divided into 3 physiological zones viz. Bastar plateau, Chattisgarh plain and Northern Hill region. The districts of Raipur (300 m aboveMSL) and Dhamtari (305 m MSL) are situated in the central flat plain of Chhattisgarh. The topography of the project area is generally plain throughout the project length and the slope of the project area is varied less than 1 degree to 2 degree. The loamy and clayey soil of this plain area is very fertile and suitable for agriculture.

#### **Drainage**

Based on the drainage the state can be divided into five basins/ subbasins viz. Ganga basin, Mahanadi basin, Godavari basin, Narmada basin, Sankh sub-basin. The district of Raipur and Dhamtari falls in Mahanadi basin.

#### **Soil**

Red –yellow soil, red sandy soil are predominant in Dhamtari while in Raipur the predominant soils are red-yellow and black soil. The texture changes from sandy loam to clayey, consistency from non-sticky to very sticky, and calcium carbonate from none to abundant, which is very suitable for production of Paddy, Wheat, Udad etc. The soil in the project area is highly fertile with pH ranges vary from 6.6-7.3.

#### **Geology**

The geological structure of Chhattisgarh mainly consists of Archaean and Cudappah rocks but Dharwad, Gondwana, Deccan Trap and old Alluvial Laterite rock systems are also found in some pockets of the State. The project area lies in the Intracratonic basin. Intracratonic basins are a type of sedimentary basins that develop when rifting ceases which leads to lithospheric cooling due to reduced heat flow.

#### **Seismic Hazard**

Chhattisgarh has very low rates of seismic activity. The project area from Raipur to Dhamtari falls in low hazard zone.

#### **Mineral Resources**

The State has huge deposits of the minerals i.e. Iron ore, Coal, Lime stone, Uranium, Bauxite, Dolomite, Tin ore, Gold, etc. Minerals predominantly found in Raipur are Diamond, Granite, Corundum, Gold, Limestone and that of Khadiya in Dhamtari districts.

#### **Construction Material**

11 borrow areas, 3 Quarry locations and 2 sand sources (Mahanadi River at Kathduli and Gadali village) have been identified along the road and surrounding area of project to meet the requirement of construction of road. The Bhilai Steel Plant, NTPC SAIL Power Company (A joint venture of NTPC Ltd. & SAIL), Monnet ISPAT and Energy Ltd. are within 100 km from the project road. The quality and quantity of Fly-ash available with these plants will be examined to assess its suitability as construction material for road embankment and other allied activities.

#### **Land Use Pattern**

Prime land use along the project road in Raipur and Dhamtari district is agricultural land, followed by built up area and waste land. 63% of land in Raipur block and 73% that of Kurud is agricultural land and in Raipur block it is 53% , in Abhanpur block it is. The blocks of Raipur and Abhanpur has high percentage of waste land viz. 17% & 22% The main crops cultivated in the area are Paddy, Wheat, Udad, Pulses, Lakh-Tiwara, Peas, Alsi, Soyabean, Groundnut etc.

#### **0.3.1.4 Water Resources**

Chhattisgarh State has available surface water resources for use around 41720 MCM. It is estimated that 43 lakh ha area can be irrigated as against the existing irrigation potential of 13.37 lakh ha. The water resources are divided into two categories Surface Water and Ground Water Resources.

##### **Surface Water Resources**

The project road lies in Mahanadi river basin, however, nowhere this river or its tributaries lies within the study area or crosses the existing road. Mahanadi main canal and its distributaries are crossing the project road at four locations (Km 12.5, Km 40.0, Km 51.0 and Km 61.5), these distributaries are supplying water to the agriculture fields of surrounding villages. There are 37 ponds located along the project road; out of these 14 ponds will be directly affected due to the proposed project. Most of these ponds are being used for small scale aquaculture and/or other domestic needs like bathing, washing clothes by local villagers and needs to be protected.

##### **Ground Water Resources**

Ground water status as mentioned in Ground water Brochure of Raipur, 2008-2009, by Central Ground water Board, Raipur is not very grim. All the blocks are still in safe category with development stage of 31% in Raipur and Abhanpur blocks. The pre and post monsoon water level varies between 5 to 15 and 2 to 7 mbgl in the blocks of Raipur and Abhanpur. The project area lies in Tarenga formation with ground water contour of 250 to 300m.amsl. The project area is partly falling in Raipur block suitable for artificial recharge.

Pre monsoon and post monsoon depth to water level in Dhantari ranges from 3 to 11mbgl

and 0.99 to 4 mbgl. However the development stage is much higher in Dhantari block i.e. 79.4% making it a semi critical block. That of Kurud is 28.94%. There is much more need of rain water harvesting in this district. Ground water resource is used for drinking and irrigation purposes through dug wells or installing hand pumps. There are 40 hand pumps and wells found along the existing road out of which 21 hand pumps and 1 well are located within direct impact area of the project.

##### **Surface and Ground Water Quality**

Water from ground water resources is suitable both for drinking and irrigation purposes. Water quality along the road was also reported good by the local communities.

By and large, ground water is potable and also meets the quality requirement for irrigation. Ground water is moderately alkaline to near natural in nature. The pH ranges from 7.7 to 8.2. The electrical conductivity values ranges from 500 to 750 micro Siemens at 25° C in Raipur & Abhanpur blocks. The project area in Dhantari has comparatively high EC of 1000 micro Siemens at 25° C.

##### **Air Environment**

Air quality throughout rural Chhattisgarh is good although dust storms may be severe and affect the western two-thirds of the State during the dry season. Deterioration of air quality in and around urban areas results mainly from traffic exhaust and commercial/industrial activity along road. Air quality is observed to be good in most part of the project except at congested settlements, mainly near Raipur and Dhantari and places near rice mills. Sites have been selected for monitoring of air quality. Such sites are spread over zones prescribed by the CPCB.

### 0.3.1.5 Noise Environment

Noise level in the project area is high in congested settlements due to high anthropogenic activity and heavy traffic movement. Sites have been selected for monitoring of noise quality. Such sites are spread over zones prescribed by the CPCB.

## 0.3.2 Ecological Resources

### 0.3.2.1 Forest Resources

The state of Chhattisgarh being placed in Deccan bio-geographical area, houses an important part of that rich and unique biological diversity. What is more conspicuous is that the state is significantly rich in endemism with respect to many plants having medicinal importance. The forests of the state fall under two major forest types, i.e., Tropical Moist Deciduous forest and the Tropical Dry Deciduous forest. The state of Chhattisgarh is endowed with about 22 varied forest sub-types existing in the state. The legal forest area (as per the legal definition) of the state is 59772 sq. km. This accounts for 44.2 % of geographical area of the state. The reserve, protected and un classed constitute a 43.3%, 40.21% and 16.65% respectively

Sal (*Shorea robusta*) and Teak (*Tectona grandis*) are the two major tree species in the state. Other notable overwood species are Bija (*Pterocarpus marsupium*), Saja (*Terminalia tomentosa*), Dhawra (*Anogeissus latifolia*), Mahua (*Madhuca indica*), Tendu (*Diospyros melanoxylon*) etc. Amla (*Embilica officinalis*), Karra (*Cleistanthus collinus*) and bamboo (*Dendrocalamus strictus*) constitute a significant chunk of middle canopy of the state's forests. From the management point of view, there are four types of forests in the state of Chhattisgarh. These are Teak, Sal, Miscellaneous and Bamboo forests

Biogeographically, the State falls in Deccan bio-region comprising representative fauna of central India like the tiger (*Panthera tigris*), leopard (*Panthera pardus*), gaur (*Bos gaurus*), sambhar (*Cervus unicolor*), chital (*Axis axis*), nilgai (*Boselaphus tragocamelus*) and wild boar (*Sus scrofa*). The state is a proud possessor of rare wildlife like the wild buffalo (*Bubalus bubalis*) and hill myna (*Gracula religiosa*) which have been declared as rare and endangered. Apart from the species diversity, the state is also endowed with rich genetic diversity. The variation in the genetic composition of individuals within or among floristic and faunal species is large. The Districts forest area is given in **Table Es 2**. The area under the project road does not have any reserve or protected forest even though Raipur and Dhamtari districts have forest cover area of around 6500 sq.km. There are few undemarcated protected forests in Raipur within 15 km of the road on left hand side mostly in Abhanpur block namely Ugatara A, Ugatara B, Ghorabhatti doma, Tamaseoni A, Tamaseoni B, Thanand, Kathia, Torla, Sunderkhera A, Sunderkhera B, Jhodia & Kolyan.

**Table Es 2: District-wise Forest Area (in Sq. Km.)**

S. No.	District	R.F.	P.F.	U.P.F.	Total
1.	Raipur	1908.550	1888.460	615.770	4412.780
2.	Dhamtari	2056.320	69.220	0.000	2125.540

Source: Department of Forest, Govt. of Chhattisgarh

### 0.3.2.2 Flora

#### Trees within Immediate COI

The area passes through light vegetation cover of uniformly distributed trees along the road. Tree inventory along the proposed alignment revealed that there are approximately 13248 trees (standing within PROW from km 3.4 to km 26.1 and ROW from km 28.2 to km 72.00) are coming under the widening/upgradation proposal of alignment. The tree species comprise of Neem, Babool, Peepal, Bargad, Sheesam, Amaltas, Karanj, Jamun,



Sagon, Eucalyptus, Mango, Semal, Krishna Chuda etc. Most of the trees along these existing chainages are mature with good girth size.

### ***Fauna***

Project road does not pass through any reserve/protected forest area, National Park and Wild Life Sanctuary. No wildlife except snakes, rodents, mongooses, civets etc are present within the immediate corridor of impact. No endangered or rare species were reported/ observed during the site visit. The stretches of project road do not fall on migratory route of wild animals. The proposed bypass/realignment neither causes fragmentation of any wildlife habitat nor did such bypass/realignment cut across any wild animal migration route. However, domesticated animals were seen along the project road near the major settlements.

### **0.3.3 Socio-Economic Environment**

Chhattisgarh is generously bestowed with natural resources like forests, minerals and surface water. Agriculture and allied activities account for nearly 80 per cent of the work force in the state.

Raipur is primarily a commercial city and now serves as a regional hub for trade and commerce for a variety of local agricultural and forest products. There are several small-scale industries, which include oil milling, soap manufacturing and electrical welding. The traditional face of the city is changing, and the city of Raipur and its neighborhoods are now becoming an important regional commercial and industrial destination for the coal, power, steel and aluminium industries. Close to Raipur, several industries have developed. Raipur has developed, maintained and is managing approximately an area of 3,112 hectares of industrial land.

There are large possibilities of development in Dhamtari because of a large no. of natural resource – Rivers, Dams, Canals, Minerals, Mountains and fertile Agriculture land. The main source of livelihood in the district is agriculture and agriculture labour. Traditional occupations are also practiced. The main crop is paddy. In the forest areas, collection of minor forest produce is an additional source of livelihood. Animal husbandry is another important source of livelihood. However, in the rural areas, most people do not find employment all year round. The people feel that the promotion of small industries and transport and communication facilities can also generate employment. Dhamtari enjoys a high literacy, and is ranked at third place in the State.

The people of the likely affected villages are either engaged in agriculture or industrial work.

### ***Settlement***

The project road is passing through major settlements of Deopuri, Sadani Darwar, Dumartarai, Mana, Chhati, Abhanpur, Nimora etc. Apart from these settlements it also passes through many small settlements at many places. The total number of settlements along/close to present road are 52 nos. including both villages and urban areas of Raipur and Dhamtari districts.

### ***Religious Structure***

There are 44 religious structures located along the existing road including 43 temples and 1 gurdwara. Out of them 28 structures would be directly affected. Efforts will be made to avoid/ minimize impacts on most of these structures during design and construction phase.

### **Population**

The project road falls in Raipur and Dhamtari districts of Chhattisgarh. As per 2001 census the total population of both districts are 3723521 out of which 2712319 are in rural and rest 1011202 are in urban area. District wise census data is given in **Table Es.3**.

**Table ES.3: Census data of Raipur and Dhamtari districts**

<b>District</b>	<b>Area</b>	<b>Men</b>	<b>Women</b>	<b>Total Persons</b>	<b>Sex Ratio</b>
Dhamtari	Rural	305,531	307,476	613,007	<b>1004</b>
	Urban	46,993	46,591	93,584	
	<b>Total</b>	<b>352,524</b>	<b>354,067</b>	<b>706,591</b>	
Raipur	Rural	1,047,633	1,051,679	2,099,312	<b>980</b>
	Urban	476,292	441,326	917,618	
	<b>Total</b>	<b>1,523,925</b>	<b>1,493,005</b>	<b>3,016,930</b>	
<b>Grand Total</b>		<b>1,876,449</b>	<b>1847072</b>	<b>3723521</b>	

### **Sex Ratio**

Sex ratio is a sensitive indicator of the status of women in society, at a given point of time. The sex ratios of Raipur and Dhamtari districts are 980 and 1004 females per 1000 males respectively.

### **Literacy Level**

Literacy is an important indicator in showing the status of social development. As per Census 2001 overall rate of Raipur and Dhamtari district are 68.51% and 74.89% respectively.

### **Educational Institute**

There are 13 schools & 1 college located within and close to the ROW.

### **Industries**

Chhattisgarh is rich in agriculture, forests, electricity and mineral resources but the industrial development is very slow in the State. Only 9% of the total working population is employed in the industries while the national average is 24%. Various industries of the state are steel, cement, aluminium, tin, mining, thermal power production plants, cotton clothes, rice mills, flour mills, oil mills, chemical industries, silk, jute, lac, bidi, foods, plastics industries, and other large, medium or small scale industries. There are 12 Rice Mill and 1 Plywood industry exists along the road.

### **Agriculture**

Bastar plateau, Chhattisgarh plains and Northern hills are the prime geographical landmarks that have been marked as the productive areas of Chhattisgarh Agriculture. In the year 2002, out of the entire land area of 13787000 hectares, the net irrigated region of Chhattisgarh was around 10, 72, 000 hectares. This indicates the extensive contribution of agriculture towards the economy of Chhattisgarh. Except from a total of 10, 13, 000 hectares which has been recognized as unsuitable for farming, the remaining lands of the state are extremely fertile and gives a high production of crops round the year. Maize, rice, paddy, jowar, groundnut, gram, oilseeds and wheat are the chief crops of Chhattisgarh that gives a high yield in the respective cropping season.

#### 0.4 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

The proposed improvement will aim at improving all aspects related to highway in sustainable manner however there may be some adverse environmental impacts. The likely potential impacts on environmental parameters and proposed mitigation measures are detailed in the matrix at **Table Es 4**.

**Table Es 4: Impact Mitigation Matrix**

Subject	Potential Impact	Mitigation Measures
<b>Physical Environment</b>		
Topography	<ul style="list-style-type: none"> <li>• Impacts very low, but permanent.</li> </ul>	<ul style="list-style-type: none"> <li>• No mitigation measure is required.</li> </ul>
Geology	<ul style="list-style-type: none"> <li>• Impacts low level through removal of stones aggregate and sand from identified quarries.</li> </ul>	<ul style="list-style-type: none"> <li>• Rehabilitation work where necessary.</li> </ul>
Soils	<ul style="list-style-type: none"> <li>• Physical &amp; chemical contamination of soil.</li> <li>• Compaction and structural damage.</li> <li>• Soil erosion.</li> </ul>	<ul style="list-style-type: none"> <li>• Dumping of construction waste at approved locations</li> <li>• Reuse of construction waste.</li> <li>• Storage of construction material in accordance with the IRC norms.</li> <li>• Avoiding work during periods of heavy rainfall.</li> <li>• Rehabilitation of borrow areas for productive use.</li> <li>• Conservation of topsoil for reuse in planting pits and rehabilitation of borrow areas, sodding /grass turving and implementation of soil erosion control plan.</li> <li>• Provision of silt fencing</li> </ul>
<b>Climate</b>		
Temperature/ Rainfall / Humidity	<ul style="list-style-type: none"> <li>• Low spatially restricted short-term impact.</li> </ul>	<ul style="list-style-type: none"> <li>• No mitigation measure is required.</li> </ul>
<b>Land</b>		
Loss of Productivity	<ul style="list-style-type: none"> <li>• The land acquisition for various sections are as follows:                             <ul style="list-style-type: none"> <li>➤ Km 3.4 to km 26.100 : 47.67 hectare</li> <li>➤ Abhanpur realignment: 13.80 hectare</li> <li>➤ Dhantari Bypass : 68.04 hectare</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Payment of compensation for acquisition of lands/structures</li> <li>• Top soil from agricultural areas will be removed for use in surrounding land where needed and rehabilitation of borrow areas.</li> </ul>

Subject	Potential Impact	Mitigation Measures
	<ul style="list-style-type: none"> <li>The land will be diverted for this project including agricultural land which affects the productivity at the micro-level. Impact significant at micro level and insignificant at macro-level.</li> </ul>	
Induced Development	<ul style="list-style-type: none"> <li>Insignificant change in the land use pattern through usage of land along bypass/realignment.</li> </ul>	<ul style="list-style-type: none"> <li>Civil authorities to control any induced development using the prevailing regulatory framework.</li> </ul>
<b>Water Environment</b>		
Surface water	<ul style="list-style-type: none"> <li>37 ponds are located along the road.</li> <li>Degradation of some water quality parameters like pH, COD, BOD, TDS, Turbidity etc.</li> <li>Marginal/partial filling of some ponds coming within PROW/ROW</li> </ul>	<ul style="list-style-type: none"> <li>Efforts will be made to save as much pond as possible by providing appropriate widening options.</li> <li>Measures shall be taken to prevent the wastewater produced in construction from entering directly into streams, water bodies or the irrigation systems.</li> <li>Use of sediment traps, silt fencing, sodding / grass turfing etc. for minimization of soil movement;</li> <li>Avoidance of lead-based paints in painting components of bridges</li> <li>Implementation of a protocol for storage of topsoil, construction waste away from water course etc.</li> <li>Location of onsite refueling and repairing stations away from water resource.</li> <li>Collection, storing and disposal of oily waste to the pre-identified disposal sites. All spills and collected petroleum waste will be disposed off in accordance with rules, regulations and guidelines.</li> <li>Monitoring of water quality during construction and operation.</li> <li>Minimum pressure on existing water sources during construction will be ensured. Water required for construction shall be arranged in such a way that the water availability and supply to nearby communities remain unaffected</li> <li>Existing water courses/ drainage facilities disturbed during execution of project will be restored to the original or better condition.</li> </ul>

Subject	Potential Impact	Mitigation Measures
		<ul style="list-style-type: none"> <li>• Use of community water sources in or near settlements for construction purpose will be avoided. However few may be used for drinking and other requirements in the labour camps.</li> <li>• Water availability is a major concern so surface water bodies (pond) will be upgraded/ enhanced and new water harvesting locations will be identified.</li> <li>• Huge pond at km 8.23 in Dumartarai &amp; 3.5 km at Panchpedi Naka (50 m away in the left hand side) will be saved from further degradation as sewage water from a PWD road side drain is contaminating it.</li> </ul>
Ground water quality	<ul style="list-style-type: none"> <li>• 40 Hand Pumps/wells are located along the existing road. Out of these 18 may require to be shifted.</li> <li>• They may be impacted due to road widening</li> <li>• No Impact on availability of ground water.</li> </ul>	<ul style="list-style-type: none"> <li>• Out of these water sources some hand pumps are likely to be impacted due to widening of the road.</li> <li>• Relocation of ground water facility in consultation with communities.</li> <li>• Provision of separate water facilities for construction camp.</li> </ul>
<b>Air Environment</b>		
Air	<ul style="list-style-type: none"> <li>• Increased gaseous pollution along with fugitive dust emissions.</li> </ul>	<ul style="list-style-type: none"> <li>• Asphalt plant, Crusher, Batching Plant, will be sited 1000 m in down wind direction from nearest settlements.</li> <li>• Plants, machinery and equipment shall be handled in a manner, which minimizes generation of dust.</li> <li>• Vehicles and construction equipments to be maintained properly.</li> <li>• All stockpiles shall be located sufficiently away from environmentally sensitive receptors and regular wetting of stockpiles of aggregates will be carried out.</li> <li>• Vehicles delivering loose and fine materials like sand and fine aggregates will be fitted with tailboard to reduce spills on existing roads and haul roads.</li> <li>• Provision of bypass /realignment will relieve population of congested settlements.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>• Construction phase impact low to moderate, spatially restricted and reversible.</li> </ul>	<ul style="list-style-type: none"> <li>• Construction plant &amp; machinery to be located 1 Km away from settlements.</li> <li>• Noise shall be mitigated by using low-noise equipment and observing good maintenance of machinery.</li> </ul>

Subject	Potential Impact	Mitigation Measures
	<ul style="list-style-type: none"> <li>• During operation phase beneficial impact in the initial phase persistence of such beneficial impact will depend on the future traffic volume &amp; quality of maintenance of road.</li> </ul>	<ul style="list-style-type: none"> <li>• Construction vehicles and equipments fixed or mobile to be equipped and maintained with effective muffler system.</li> <li>• Proper traffic management near sensitive receptors.</li> <li>• Putting up “no horn” signage near sensitive receptors.</li> <li>• At construction sites, especially close to the environmentally sensitive receptors, noisy construction work such as crushing, concrete mixing and batching, mechanical compaction, etc., will be scheduled to coincide with period when people would least likely be affected by operation of construction machines</li> <li>• To protect construction workers from severe noise impacts, workers exposed to excessive noise will be given ear plugs, helmets, etc. or their working hours at noisy location shall be reduced.</li> <li>• To avoid congested settlements of Dhamtari and Abhanpur bypass/realignment have been proposed, this will save above settlements from increased levels of noise during construction.</li> </ul>
<b>Ecology</b>		
Flora	<ul style="list-style-type: none"> <li>• Approximate 13238 trees are found within ROW</li> </ul>	<ul style="list-style-type: none"> <li>• Compensatory plantation for each tree removed as per Chhattisgarh State Forest Department guidelines.</li> <li>• Payment of compensation for loss of bamboo and banana clumps.</li> </ul>
Fauna	<ul style="list-style-type: none"> <li>• No endangered/rare species were reported in the project area.</li> </ul>	<ul style="list-style-type: none"> <li>• No mitigation measures required. Construction workers will be made aware about the provision of the Wild life (Protection) Act 1972 as forest areas come within the area of indirect influences in some stretches.</li> </ul>
<b>Socio Environment</b>		
Socio Environment	<ul style="list-style-type: none"> <li>• Displacement of people.</li> <li>• Demolition of Structure.</li> <li>• Loss of land under agriculture.</li> <li>• Influx of construction workers.</li> </ul>	<ul style="list-style-type: none"> <li>• Resettlement of people as per provisions of RAP.</li> <li>• Bypass at Dhamtari and realignment at Abhanpur have been proposed to minimize displacement of people and demolition of structures at congested settlements.</li> <li>• Compensation for loss of structures private, community and public.</li> <li>• Compensation for loss of land under agriculture.</li> <li>• Employment of local labour in unskilled and semi skilled activities.</li> </ul>

Subject	Potential Impact	Mitigation Measures
		<ul style="list-style-type: none"> <li>• Setting up migrant workers camp at least 1 Km away from settlements.</li> </ul>
Archeological Monuments / Historical structure.	<ul style="list-style-type: none"> <li>• No archeological monument present in project corridor.</li> </ul>	<ul style="list-style-type: none"> <li>• No mitigation measures required.</li> </ul>
Religious Structures/cultural property	<ul style="list-style-type: none"> <li>• Total 44 religious structures are located along the road but only 28 will be impacted.</li> </ul>	<ul style="list-style-type: none"> <li>• Most of the religious structures will be saved by careful selection of left/ right/ concentric widening and bypass route.</li> <li>• Relocation of Impacted structures in consultation with community.</li> </ul>
<b>Public Health and Road Safety</b>		
Public health and road safety	<ul style="list-style-type: none"> <li>• Psychological impacts on project affected people.</li> <li>• The potential for disease and illness may increase owing to unhygienic conditions at worker camps.</li> <li>• In absence of personal protection equipments the safety of construction workers may be at risk at the work places</li> <li>• Traffic Control and Safety</li> <li>• Loss of Access</li> <li>• Discomfort arising of air, noise pollution.</li> </ul>	<ul style="list-style-type: none"> <li>• Continued consultation with PAPs and the competent authority for speedier settlements of appropriate compensation package and resettlement.</li> <li>• By Ensuring sanitary measures at construction camp to prevent water borne disease and vector borne disease.</li> <li>• Stagnation of water in all areas including gutters, used and empty cans, containers, tyres, etc shall be prevented. Approved chemicals to destroy mosquitoes and larvae should be regularly applied.</li> <li>• Training will be imparted to workers to reduce transmission of communicable diseases like HIV/AIDS</li> <li>• Provide appropriate personal protective equipments like earplugs, gloves gumboot, and mask to the work force.</li> <li>• Safe traffic management at construction area by erecting and maintaining such barricades, including signs, markings, flags, lights and flagmen as may be required for the information and protection of traffic approaching or passing through the section of the roads under construction.</li> <li>• Provision of safe and convenient passage for vehicles, pedestrians and livestock to and from roadsides and property accesses connecting the project road</li> <li>• The existing access will not be disturbed for any construction activity without providing adequate alternative arrangements.</li> <li>• On completion of the works, all temporary obstructions to access shall be cleared away, all rubbish and piles of debris that obstruct access be</li> </ul>

Subject	Potential Impact	Mitigation Measures
		<p>cleared.</p> <ul style="list-style-type: none"> <li>To reduce discomfort arising of air, noise pollution, construction activities will be scheduled to coincide with period when people would least likely be affected by operation of construction machines.</li> </ul>

## 0.5 ENVIRONMENTAL MONITORING PROGRAMME

The air, water (surface & ground), noise and soil quality parameters will be monitored at designated locations as per the frequency mentioned in monitoring plan and the results will be compared with the prescribed Standards (National Ambient Air Quality Standards, CPCB standards etc.). soil quality also has to be monitored according to CPCB standards in the construction and operation stage along the project road and construction site to compare the concentrations of heavy metals (Pb, Cd, Cr etc.) before and after the project. Monitoring of storage area, drainage arrangements and sanitation in construction camps & sites are also to be done according to standards given in reporting form and to the satisfaction of PIU.

The project involves felling of about 13248 trees. Such lost vegetation will be required to be replaced by compensatory plantation (in the ratio of 1:10) as per policy of the Chhattisgarh State Government. These compensatory plantations will have to be monitored by the implementing agency with the help of the Forest Department.

## 0.6 ADDITIONAL STUDIES

### Public Consultation

Community consultations were held with Project Affected Persons (PAPs), other stakeholders and the general public to determine their view about the proposed road and incorporate their suggestions while finalizing the alignment. A Village level consultation was held at Lalpur, Devpuri and dumartarai on 19/08/2010, at Pachpedinaka & Manabasti on 21/08/2010 and at Gotiyardih & Chatti on 22/08/2010.

With respect to the conversations done with PAPs and also the local urban and rural authorities and their feedbacks on social and environmental issues, the following recommendations have been made. This has been done keeping in view to solve the problems of local people as well as not to harm the purpose of present road project

**Table Es 5: Key Issues and Recommendations**

Sl. No	Key issues	Recommendations
<b>Environmental</b>		
1.	Ground water scarcity	Rain water harvesting through either up gradation of existing ponds, proposing new harvesting ponds.
2.	Surface water quality	<ul style="list-style-type: none"> <li>Enhancement of ponds through</li> <li>Stopping sewage inflow</li> <li>Removal of dumped garbage</li> <li>Removal of aquatic weeds.</li> <li>Deepening</li> <li>Beatification of pond banks – construction of ghats, planting trees of floral species (This</li> </ul>



Sl. No	Key issues	Recommendations
		plantation is recommended to be a part of compensatory afforestation).
3.	Noise pollution	<ul style="list-style-type: none"> <li>• Removing traffic bottlenecks</li> <li>• High pressure horn should be banned.</li> <li>• Vegetative noise barriers along the school boundaries. This plantation is recommended to be a part of compensatory afforestation.</li> <li>• Provision of “No Horn” signages near sensitive receptor like schools, hospitals, religious structures etc,</li> </ul>
4.	Air pollution	Compensatory plantation along the road selecting trees of dense foliage will curb air pollution.
<b>Social</b>		
5.	Land Acquisition	Land Acquisition in settlement should be as minimum as possible to reduce demolition of structures.
6.	Conflict amongst different authorities with regard to right of way along NH-43	Proper coordination between Raipur Development Authority (RDA) and NHAI to decide width of ROW keeping in view the future requirement to avoid repeated demolition of structures.
7.	Compensation	Compensation should be given at market rate and preferably one year prior to start demolition of structures.
8.	Resettlement	Most of the PAPs from Panchpedi Naka to Abhanpur are not interested in Cash Compensation. They want to be resettled and rehabilitated in New Raipur and housing colony in Dumartarai. Resettlement and Rehabilitation will be carried out as per NHAI, Govt. of India R&R Policy
9.	Consideration of other proposed roads as alternatives, if feasible	The Proposed RDA Ring roads may serve in releasing the traffic pressure on NH – 43 particularly in municipal limit. So further study on future traffic volume shall take into account the proposed development in the area, ring roads and bypasses while recommending land width for acquisition.

## 0.7 PROJECT BENEFITS

The ultimate aim of the developmental activities, such as NH-43 is to promote societal welfare of people of the region in particular and of Chhattisgarh State in general. Most of the Raipur's and Dhantari's future projects related to residential colonies; commercial establishments, medium and small-scale industries are coming up in the vicinity of the project road. This is putting heavy pressure on existing services which are not able to address the present and emerging infrastructure needs. Therefore, upgraded NH- 43 will play an important role for the development of surrounding area in addition to linking the region with other part of the country.

It is expected that there will be reduction in accident rate due improvement in road geometry and by provision of road furniture. The main economic benefits generated by the project will be vehicle operating cost savings. Lowering transportation cost for users and improving access to goods and services enables new and increased economic and social activity. Reductions in adverse environmental impacts of transportations – Reduced emissions, noise and other impacts are also the direct benefits of highways projects. Indirect benefits would be that of surface water body enhancement, enhancement of the aesthetics, plantation of more number of trees as a result of compensatory plantation etc. are difficult to quantify and value them; as a result, they are less often included in cost - benefit analysis of transportation investment.

There will be a change in the patterns of settlement, agricultural land use and location of industries, trading and other services and non-farm unorganized sector activities, increased agriculture production and better prices for the produce as well as lower prices for agricultural inputs. All the above would reflect in the changes in the pattern of economic activities, income generation, price evolution, employment condition and ground rent prevailing in the region of Raipur and Dhamtari district area.

The project will also provide a better connectivity and major tourist destinations of sanctuaries of Raipur district namely Udanti and Barnawapara sanctuaries and Sitanadi sanctuary in Dhamtari district.

#### **0.8 ENVIRONMENT MANAGEMENT PLAN**

In order to ensure that implementation of mitigative measures pertaining to the identified adverse environmental impacts are carried out properly, there is a need for sound environmental management plans. The main objectives are to look for better ways of doing things so that negative impacts of the proposal are eliminated or minimized and the benefits are enhanced. The proposed measures have been suggested for two stages: construction stage and post –construction stage to mitigate the various adverse impacts and enhance positive impacts.

#### **0.9 ENVIRONMENTAL BUDGET**

An environmental budget for **Rs 6,58,24,500/- (Rupees Six Crore Fifty-eight Lac Twenty-four Thousand Five Hundred only)** has been drawn up.

#### **0.10 COST ESTIMATE**

The cost of Civil Works work out to **Rs 273.10 crores** and cost per km for Civil Works comes to **Rs 3.43 crores**

The following provision has been made for the cost of Resettlement and Rehabilitation including Land Acquisition, Environmental Costs, Cost of Relocation of Utilities & Agency Costs :-

- R&R including land acquisition cost - Rs -114.10 crores
- Environment cost - Rs 6.58 crores
- Cost of relocation of utilities - Rs 1.36 crores
- Agency Cost - Rs. 16.38crores

The total cost of this Project including contingencies, supervision cost, land acquisition, R&R, environment & agency costs works out to **Rs 411.52** crores. The total cost per km works out to **Rs 5.17** crores.