

# STUDY OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) PROCESS IN NATIONAL HIGHWAY-24 SECTION OF BAREILLY- SITAPUR

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## ABSTRACT

*The National highway Authority of India (NHAI) has been entrusted with the development, maintenance and management of the National Highways by the Government. Under NHDP Phase - III programme of 4/6 – laning of 10,000 Km which includes the High Density corridors / sections of National Highways in the country. Under, the said programme, National Highway Authority of India (NHAI) has taken the rehabilitation and strengthening of existing 2-lane highways to 4/6-lane dual carriageway configuration of Bareilly- Sitapur Section modified Chainage (Km.-262.000 to Km.-413.200) of NH-24 in the State of Uttar Pradesh, overall project length is 151.2 Km through Public private Partnership (PPP) on Design, Built, Finance, Operate and Transfer (the “DBFOT”) basis.*

*Infrastructural development, particularly faster movement and transportation of goods in a country like India, is a guiding factor for economic development, the road transport required better raiding quality of the roads for uninterrupted and safe movement and hence is it become necessary to develop good highways to cater the all the type of traffic.*

**KEYWORDS-** National Highway-24, Bareilly-Sitapur, EIA, PIU, MoRT&H

## INTRODUCTION

In India, the development of infrastructure is based on the faster movement of the transportation of goods and it's become guiding factor for Economic development. Proper transportation of goods requires comprehensive road transport system and increasing road traffic required bigger size of roads in cross section with good riding quality so that uninterrupted and safe movement shall be carried out by the vehicles. Hence it becomes necessary to convert highways from 2 lane to 4/6 lanes.

In the recent liberalized economic environment of India, transport system in general and road transport in particular is considered to improve the international comparativeness of exports and attract foreign investments. The ongoing ambitious National Highway development Project (NHDP) of the Government of India and likewise massive expansion of state roads and rural roads are prime objective to development in road sector with substantial pace.

Environmental Impact Assessment (EIA) consists of a systematic investigation of both positive and negative impacts on the physical, biological socioeconomic environment, which would be caused or

induced due to a proposed developmental project. Its primary objective is to encourage the inclusion of environmental considerations in planning and decision making and to ultimately arrive at actions that are more environmentally compatible.

## **RESULT AND DISCUSSION**

### **1. BENEFITS OF THE PROJECT**

The Project will have multiple benefits, Adding new lanes to an existing road will reduce congestion and the traveling time between Bareilly to Sitapur will reduce substantially. The provision of By-Passes in Urban Areas adds-up further saving in the time and provide alternate routes for commuters. In additional the improved road will provide other benefits like

- Fast and safe connectivity resulting in savings in fuel, travel time and total transportation cost to the society;
- Employment opportunity to people;
- Development of local industry, agriculture and handicrafts;
- Development of tourism and pilgrimage;
- Transporting, processing and marketing of agricultural products;
- Reduction in accidents;
- Reduction in pollution;
- Opening up of opportunities for new occupations;
- Better approach to Medical & Educational services and quick transportation of perishable goods like fruits, vegetables and dairy products; and
- Improved quality of life for people and so on.

## **PROJECT DESCRIPTION**

The present study corridor is two lane existing highways near Bareilly at Km. 262+000 to Sitapur at Km. 413+200 on NH - 24 in the state of Uttar Pradesh.

Total project length is 151.2 Km. The project highways passes through important Divisional Headquarters viz. Bareilly, Shahjahanpur and Sitapur in the state of Uttar Pradesh. Besides this there are a number of villages along the highways and two small towns viz. Faridpur (Km 271), Tisua (Km. 281), Fatehganj (Km. 288), Katra (Km 294), Tilhar (Km 305), Jamba (km 335), Uecholia (Km 345), Jangbahadurganj (Km 357), Jahanikhera (Km. 363), Maigalganj (Km. 376), Chaddara (Km 387), Moholi (Km 390), Urdauli (Km.393) and Ricchahi (Km.397.00).The existing carriageway width is generally 6.8 to 7.0 m in the project stretch. There are rows of matured trees in some stretches on both the sides of the highways at a distance of about 5.5 m to 8.5 m from the centreline of the project highway which require cutting to facilitate four laning of the highways. The four laning of Faridpur town requires special attention as it is very congested area.

In all the built up areas of the highways, there is no proper drainage arrangement resulting in distressed condition of the pavement. The entire drainage system of the existing highways as well as the additional requirement consequent to four laning of highway will be studied in detail and suitable proposals for drainage will be incorporated in the design. Special feature of this stretch of the Bareilly-Sitapur section highways has fifteen important junctions.

Other important feature is congested area through which the stretch passes in appreciable length which would require special attention. All -these have been studied in detail while finalizing the alignment of the Project Highways.

The Existing highway is of 2 lane configurations and to be developing to Four- lane and there are 8 Major Bridge, 14 Minor Bridges, 4 ROB, 5 Grade Separators, 19 VUPs, 11 PUPs, 120 Nos Pipe Culverts & 70 Nos. Box Culverts are required to be constructed.



**Fig 1.0 Project Location in Uttar Pradesh**

## **ENVIRONMENTAL IMPACT ASSESSMENT OF THE PROJECT**

### **Objective of the Environmental Impact Assessment**

The rapid economic growth of any country directly relates to the improved transport network within the country. The improvement of the transport networking will enable the linkage of poorly-developed areas and partially developed areas with fully developed major and minor urban centres (e.g. Mumbai, Delhi). Such linkages are anticipated to improve the employment opportunities available to the rural poor and access to all service departments and health institutions and facilities. The whole process is supposed to act as a poverty alleviation programme. The proposed project road is to link such under-developed areas of Uttar Pradesh to the Golden Quadrilateral. The project will also help in reducing accidents and improving the safety scenario along the project road. The project Scenario is given in Table 2.0

**Table 2.0 : Project Senerio**

Sl. No	Issue	Existing	Proposed
1	Length	151.2 km	160.30 km approx.
2	Carriageway	6.8 to 7 m	18m (9 m+9m) including paved shoulder + median
3	ROW	40 to 45 m	45m in urban area and 60 m in non-urban area
4	Pavement	Flexible	Flexible
5	Intersections	16	Provision of Grade Separators/ VUP/PUP
6	Habitation	15	-
7	Level Crossing	3	-
8	ROB	1	4 (including conversion of 3 existing level crossings)
9	<b>CD Structures</b>		
9A	Major bridges	8	Additional 3 lane bridges to be constructed alongside
9B	Minor Bridges	14	All to be reconstructed
9C	Culverts(Box+Pipe)	190	All to be reconstructed
10	Bypasses	2	5 nos. 28.75 km (Total length)
11	Grade Separators	NIL	5
12	<b>Underpasses</b>		
12A	Vehicle Underpass	NIL	19
12B	Pedestrian cum cattle Underpass	NIL	11
13	Truck Lay-byes	NIL -	10
14	Bus-bays	NIL	39
15	Toll Plaza	NIL	2
16	Service Roads	NIL	7 m wide aggregating a length of 38.10 km(both sides)
17	Footpaths	NIL	2 m wide corresponding to service roads
18	Land to be acquired for widening bypasses and Engg. Enhancement	-	424.11 ha approx .

## POLICY, GUIDE LINES AND LEGAL REQUIREMENTS

There is an increasing awareness in India on the requirement of stringent laws for achieving the sustainable development objectives of Environmental management. A number of rules, regulations and notifications have been passed under the Environmental Protection Act 1986, with the help of which the Government of India regulates the environmental state of the country. One of the important notifications with respect to all developmental projects in India is the Environmental Impact Assessment (EIA) Notification of 1994, subsequently amended and updated. The clearances required for the project are given in Table 3.0

**Table : 3.0 : Environmental Clearances for Bareilly – Sitapur Project**

Clearances Required	Time frame	Status	Remarks
Preparation of BOQ for EMP items	After or during the preparation of EMP document.	Will be prepared as planned.	During DPR stage
PCB Clearance	This will be filed after the preparation of EIA report.	After November 2007, in consultation with NHAI	'Consent to establish' under air & water Act
Forestry Clearances	Will be required according to the design alignment	Forest area will be required for bypasses.	Forest clearance application needs to be submitted to the respective D.F.O.s.
Permission for tree cutting	After the initial assessment of consultant, an application in plain paper is to be submitted to the concerned DFO's	Approx. 21000 trees to be felled.	Joint survey (NHAI & Forest Department) will be required for final approval from the Forest department

During construction stage the Contractor will be required to obtain a number of permissions, consents and clearances from various bodies are given in Table 3.1

**Table 3.1 : Clearances & Approvals at Pre-Construction & Construction Stage**

Sl. No	Contractors activity for which the clearances area applicable	Statute under which clearances required	Statutory Authority
1	Hot mix plants, Crushers and Batching plants	The Air(Prevention and control) Act 1981 and the noise pollution Rules 2000	SPCB, UP
2	Storage handling and transport of Hazardous materials	Hazardous waste management handling rule and manufacture storage	Do
3	Location and layout of workers camp, equipment, storage yards.	EP act 1986 and Environmental Management Plan	Do
4	Quarries	EP Act 1986 and Environmental Management Plan	SPCB & State Mining Dept
5	Discharge from labour camp	Water (Prevention and control of Pollution) Act , 1974	SPCB,UP
6	Disposal of bituminous and scarified waste material	Hazardous Waste management Rules	SPCB,UP

## PROJECT IMPACTS AND ISSUES

Impacts of this project has been described in EIA and predicted based on Matrix Method. It is found from that the air quality, noise level and vibration, surface water quality, ground water quality, flora

and fauna, soil quality and historical and cultural resources are likely to be negatively impacted and therefore there is a need to provide mitigative measure to minimize their negative impact. However, it is heartening to note that the overall impact of four – laning the Project Highway is positive, as is evident from the Impact Assessment Matrix. The parameters which will be positively impacted are aesthetics, land and property value, land use pattern, employment, quality of life, basic amenities, trade and commerce, economy and income level by the conventional techniques and analysis. The beneficial influence of the project highway is given below:

**Table 4.0: Beneficial Influence of 4-Lane Road Project**

Project Proponent	Location	Beneficial Influence
Median	Throughout the project highway, as per the cross sections defined	Segregate up and down traffic Prevent head on collision of vehicles moving in opposite direction
Bypasses	28.75 Km at Five locations	Avoid congested area Prevent accidents
Truck Lay-byes	10 Nos provided where most of the Truck parked	Prevent vehicular congestion Provides safety parking Easy access and exit of vehicles
Intersection improvement	Major and Minor Intersections Throughout the project highway	Improved visibility Prevents congestion Reduced accidents Improve traffic circulation.
Grade Separator	At Major Intersections with the other Highway Crossing	Segregate local and through traffic Regulate smooth traffic flow Reduce traffic jam.
Underpasses	In Most of the Urban Places	Safe turning of vehicles under high RCW and safe movement of pedestrians.
Service road and footpath	With Grade Separators and Underpasses	Segregate local traffic / pedestrians from through traffic.
Bus Bays	In towns and Villages	Safety for bus passengers
Signages	All towns, villages, intersections, all curves, railway crossings, RNP, Hospitals, schools, bridges, underpasses and bus stops.	Safety of motorised and non- motorised vehicles
Striping	All along the project highway	To maintain vehicular discipline and safety
Antiglare screen	Plant Bushes on the Median	Prevent accident due to glare
Crash barriers	Where embankment height > 5m, approaches of bridges and bridges, sharp turns, canal stretch running	Prevent falling off vehicles Psychological safety.

	parallel to the project highway.	
Guard rails	Location of Service roads	To restrict pedestrian traffic and force public to use over/ underpass.

## SOCIO-ECONOMIC ENVIRONMENT

Road Construction related impacts occurred at three stages of the Project:

- Planning and Design
- Construction
- Operation

Planning and design covers the NH-24(Bareilly-Sitapur Section) road alignment finalization, details highway design, identification of construction material sources, statutory clearance, etc. that ultimately decides the impact during later phase. Most of the impacts are during pre-construction, construction and operation Phase. While some of the construction phase is temporary, some Operational phase impacts are continuing in nature.

Impacts	During Construction Phase
Impacts on agricultural land	Loss of agricultural land (major impact). Except the small urban and semi urban pockets, most of the land acquire is agricultural.
Loss of property and resources	Major impact but the magnitude /scale of this impact is low, the density of population and the ribbon development is very low.
Loss of livelihood	Loss of livelihood of the people (major impact but the magnitude /scale of this impact is low as the density of population and the ribbon developments are very low)
Impact on cultural properties	As given in Table 4.1

### *During Operational Phase*

- Positive impacts on traffic and transportation.
- Ribbon developments along the new bypass alignments.

**Table 4.1 The Impacted Cultural properties**

Item	Details	Likely Solution	Recommended Option
Impacted Cultural	Mazar (294+688), Mosque (294+850),	1. Keep the religious structure in the side and	Relocate religious structure in close

Properties	Hanuman Temple (308+200), Temple (365+100), Temple (385+600), Ambedkar Statue (387.5)	align road on its other side by changing center line. 2. Relocate religious structure in consultation with local public.	proximity, in consultation with public.
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## ANALYSIS OF ALTERNATIVES

The analysis of alternatives is one of the most important exercises that need to be carried out to find the least cost option with regards to socio-economic and environmental consequences to each alternative and the cost attributed to it.

### *Realignment & Bypasses*

The details of three bypasses which have been planned with a total length of 28.75 km are given in Table:

Sl No	Name of Bypasses	Chainage		Length (Km)
		From	To	
1	Faridpur	267+800	273+050	5.25
2	Rauza	330+800	336+340	5.54
3	JB Gang	355+870	360+700	4.83
4	Maigalganj	373+960	380+400	6.44
5	Maholi	389+220	395+910	6.69
<b>Total</b>				<b>28.75</b>

Environmentally sensitive design is the preferred approach to impact mitigation of any proposed project. The original road alignment therefore has been modified in a number of places so as to avoid unnecessary disturbance to the existing human and ecological communities. The proposed project road does not intersect or pass along any ecologically fragile areas – forest land, wetlands etc. There are also no endangered or rare species found along the proposed ROW. It passes through extensive agricultural land and a few semi-urban to urban commercial areas. The proposed realignments and bypasses have endeavored to minimize the impacts of land acquisition, human resettlement, adverse effects on adjacent water bodies, forests and plantation areas.

## ENVIRONMENTAL ENHANCEMENT MEASURES

The environmental enhancement measures are intended to provide value addition to a proposed project. These are considered in addition to the specific impact mitigation measures proposed.



Environmental enhancement therefore are measures aimed at improving the project surroundings, increasing its user-friendliness and improving the services to the local inhabitants.

In this project, the environmental enhancement measures will include:

- Bus bays
- Truck lay-byes
- Toll Plaza

The details are given in Tables 6.0 and Table 6.1 :

**Table 6.0 : Location of Pick up Bus Bays**

Sr No	Chainage	Proposed	Sr No	Chainage	Proposed
1	263+700	Bus Stand With Bus Bay	21	336+930	Bus Stand Without Bus Bay
2	266+200	Bus Stand With Bus Bay	22	341+230	Bus Stand With Bus Bay
3	274+480	Bus Stand With Bus Bay	23	343+530	Bus Stand With Bus Bay
4	278+830	Bus Stand With Bus Bay	24	347+530	Bus Stand Without Bus Bay
5	281+240	Bus Stand With Bus Bay	25	350+830	Bus Stand With Bus Bay
6	286+880	Bus Stand With Bus Bay	26	354+130	Bus Stand With Bus Bay
7	290+410	Bus Stand With Bus Bay	27	361+400	Bus Stand With Bus Bay
8	295+040	Bus Stand Without Bus Bay	28	366+350	Bus Stand Without Bus Bay
9	298+460	Bus Stand With Bus Bay	29	370+100	Bus Stand With Bus Bay
10	301+060	Bus Stand With Bus Bay	30	374+000	Bus Stand Without Bus Bay
11	305+960	Bus Stand Without Bus Bay	31	380+790	Bus Stand With Bus Bay
12	309+060	Bus Stand With Bus Bay	32	384+890	Bus Stand With Bus Bay
13	312+360	Bus Stand Without Bus Bay	33	387+990	Bus Stand With Bus Bay
14	315+010	Bus Stand With Bus Bay	34	397+450	Bus Stand Without Bus Bay
15	318+760	Bus Stand With Bus Bay	35	401+400	Bus Stand With Bus Bay
16	320+340	Bus Stand With Bus Bay	36	405+850	Bus Stand Without Bus Bay
17	323+610	Bus Stand With Bus Bay	37	409+410	Bus Stand With Bus Bay
18	325+210	Bus Stand Without Bus Bay	38	412+070	Bus Stand With Bus Bay
19	328+860	Bus Stand With Bus Bay	39	417+950	Bus Stand With Bus Bay
20	331+060	Bus Stand With Bus Bay			

**Toll Plaza:** The tentative locations of the toll plaza are at: Km 266+900 & Km 372+168

**Table 6.1 : Truck Lay byes**

S. No.	Chainage	Proposed
1	263.400	Both Sides
2	275+030	Both Sides
3	287+380	Left Sides
4	304+960	Both Sides
5	321+560	Left Sides
6	337+260	Both Sides
7	348+550	Right Sides
8	370+800	Right Sides
9	383+290	Left Sides
10	407+050	Right Sides

## MONITORING PLAN

The monitoring plan for the various performance indicators of the project in the construction and operation phases is summarised in Table 7.0

**Table 7.0 : Environmental Monitoring Plan**

Environmental Components	Project Stage	Monitoring					Approximate Cost	Institutional responsibility	
		Parameters	Location (chainage)	Frequency	Duration	Standards		Implementation	Supervision
Air	Construction Stage								
	Operation stage	SPM,RPM, SO <sub>2</sub> NO <sub>x</sub> , CO, HC Pb	*	Once every season (excl. monsoon)	Continuous 24 hours for 15 years	NAAQM	75,000	PIU	MoRT&H / NHAI
Water Quality	Construction stage	pH, BOD, COD, TDS, DO, Oil and Grease. (PB and Cr in industrial areas)	At locations where major bridges are to be constructed/replaced	Once every season	For 3 years	Water quality standards by CPCB	30000	PIU	MoRT&H/ NHAI

Environmental Components	Project Stage	Monitoring						Institutional responsibility	
	Operational stage								
Noise Levels	Construction stage	Equivalent noise levels using an integrated noise level	At locations where complaint is lodged	-	Continuou s for 3 years	Noise standards by CPCB	27,000	PIU	MoRT&H / NHAI
	Operation stage	Equivalent noise levels using an integrated noise level meter	♠	Twice an year for 15 years	Continuou s 24 hours	Noise standards by CPCB	135000	PIU	
Flora	Construction								
	Operation stage	Survival rate of trees Success of revegetation	Entire stretch	after 1 year and 1.5 years of planting	For 3 years	-	60000	PIU	MoRT&H/ NHAI

\* Faridpur, Katra and Shahjahanpur

♠ Faridpur, Katra and Shahjahanpur

### IMPACT MITIGATION AND AVOIDANCE

The philosophy behind the environmental impact mitigation measures is to reduce the impacts to an acceptable level. This can be achieved by various means such as bypassing, realigning, avoiding and by adopting to cost effective physical mitigation measures. The suggested measures are given in Table 8.0

**Tab 8.0: Environmental Mitigative Measures**

Environmental Issue/Component	Impact Description	Remedial Measure
<b>PRE-CONSTRUCTION / DESIGN PHASE</b>		
<b>Alignment</b>	Air Pollution, Noise Pollution, Accidents	Improve geometric deficiencies
Constricted sections / Settlements		Provide RCW at two locations viz 354.859 km and 392.625 km.
<b>Land</b>		
Land and property	Displacement of people and	The alignment is selected so as to minimise the land

acquisition	unemployment	acquisition and to avoid structures.
Embankment slopes	Soil erosion	On section with high filling and deep cutting slopes will be carved by stone pitching to be planted with grass etc.
Borrow areas	Soil erosion and water logging	Agriculture land will not be used as earth borrowing. Proper excavation techniques to improve safety and stability will be ensured.
<b>Water</b>		
Water sources	Loss of wells, ponds and hand pumps	All hand pumps and affected wells will be relocated. Those village ponds which are impacted, an equivalent area would be excavated / replaced.
Drainage	Flooding	Bridges and culverts have been well designed for the purpose of the flood discharge (50 year frequency for bridges and 25 year flood frequency for culverts).
<b>Flora and Fauna</b>	Threat to wildlife	There is no environmentally sensitive area where there is threat to wildlife.
Wildlife Protection		
Natural Flora	Loss of flora	The alignment is selected so as to minimise the tree cutting and to avoid environmentally sensitive areas.
Protected forest areas	Loss of trees	The alignment is selected so as to minimise the tree cutting and to avoid environmentally sensitive areas only 31,793 trees impacted in 152 kms.
Roadside plantation		Canopy trees have been preserved, as far as possible. Loss of trees to be minimum.
<b>Environmental Quality</b>		
<b>Air Quality</b>		Planting 64000 trees along the roadside lost due to construction, additional on median, trees and shrubs known to be natural sink for air pollution will be planted. Provision of RCW/ laybye, improve intersection.
<b>Noise Levels</b>		Sound barriers at places where CPCB norms exceeding the noise limits vegetation and tree plantation as effective tool to attenuate noise. Sign posting checking noise levels, RCW, Intersection improvements at 35 locations as VUP, PUP and flyover.
<b>Cultural Heritage</b>		The alignment is selected so as to minimise the land acquisition to avoid archaeological sites, religious structures and other environmentally sensitive areas. Cultural heritage sites along the alignment are surveyed. In case of archaeological sites and temples adjustment of alignment was considered. In case of six shrines, they

		may be moved with prior consultation and approval of local community.
<b>Accidents</b>		Providing median to prevent head - on collision. Providing antiglare screen where median width <5m/RCW Signages at curves and junctions, schools, colleges and hospitals, provision of guard rails where embankment / RCW height >2.5m. ROBs and bridges. Segregation of through traffic and local traffic will be carried out in congested areas to avoid accidents. Providing adequate sight distance at curves on highways by removal of all existing obstructions.
<b>CONSTRUCTION PHASE : SOIL</b>		
Soil Erosion	Flooding	On sections with high filling and deep cutting slopes will be covered by stone pitching and planting with grass etc.
Loss of topsoil	Soil erosion	Agriculture lands will not be used as earth borrowing.
		Proper excavation techniques to improve stability and safety will be ensured.
Compaction of soil	Loss of vegetation	Construction vehicles would operate on temporary access to avoid damaging the soil.
Borrowing of Earth	Soil erosion / Water logging	Material resources will be collected from licensed quarries only.
Instability of quarry	Soil erosion / water logging	Safety precautions will be ensured during the transportation of quarry material from quarriers to the construction sites.
		Only licensed quarries to be used. Stock piling of material will be properly planned so as to ensure that no traffic jam takes place on the highway.
Fuel spill and leakage	Fuel and certainty	Soakage pits along with oil and grease traps at fuel refilling ponds.
<b>Water</b>		
Water bodies	Contamination by fuel and lubricant	Where village ponds are affected, an equivalent area would be excavated / replaced.
	Storm water run-off	Drinking water would meet the Indian National Standards.
Other water sources	Ground water recharge	All hand pumps and well affected by the project will be relocated.
Drainage and run-off	Flooding due to soil erosion	In sections along water courses, earth, stone and other construction material will be properly disposed off so as not to block rivers and streams, resulting in adverse impact.

Contamination of water		Detention ponds and soakage pits will be provided at construction sites to prevent wastewater from entering into rivers and canals.
		The hot mix plant will be sited on compacted / paved surface so that the spills do not affect the aquifer.
		Vehicle maintenance and refilling will be confined to areas in construction camps designed to trap discarded lubricants and fuel.
Sanitation and waste disposal	Human health & contamination of water bodies	Contract provision will ensure that construction camps and other potential sources of secondary impacts are properly sighted and provided with drainage and wastewater facility. No additional mitigation actions related to potential hydrological impacts are warranted.
Use of water for construction	Drain on acquifier and water bodies	Distribute water collection
<b>Air</b>		
Emission from construction vehicles and machinery	Dust and air pollution are the main potential impact during road operation.	Using relatively new, well maintained equipment so that emission conforms to the CPCB norms. Avoiding prolonged vehicle and engine-powered equipment idleness. Scheduling material transport to and from site during nonpeak hours. Washing deposits of soil off transport vehicles. Asphalt mixing sites to be located more than one km from any community or residence. Provision of RCWs Improvement of intersections.
Dust and its treatment		Spraying areas of exposed soils with water or dust suppressants Covering dusty truck loads with tarpaulin and providing adequate free board to prevent spillage. Providing end boards in loaders to prevent spillage.
<b>Noise</b>		
Noise from vehicles, plants and equipment's	The sound levels might be high in certain residential / sensitive areas through which heavy vehicles traffic movement may take place.	Properly sizing and maintaining mufflers, engine intake silencers, engine enclosures, turning of idle equipment, confirming activities to day time hours. Stationary equipment to be placed as far away as possible from sensitive locations. Use hydraulic or electric models for impact tools like rock drills, pavement breakers. At times sound levels in these locations may exceed the permissible levels specified by CPCB. However, such activities be exempted being of temporary nature.
		Workers in the vicinity of excessive noise will wear ear plugs, helmets and their working time should be limited. At construction sites within 150 m of residential area

		construction would be restricted from 10 p.m. to 6 a.m.
Noise from blasting operations	Permanent / temporary shifting of threshold of hearing	Workers to wear ear plugs already covered above
<b>Flora</b>		
Loss or damage to vegetation	Soil erosion	Areas of tree plantation cleared will be replaced according to compensatory afforestation policy under the Forest Conservation Act - 1980. Tree clearing within ROW will be avoided beyond what is directly required for construction activities and or to reduce accidents.
		Giant neighbourhood trees recognised locally as important will be preserved and engineering designs modified. In slopes and other suitable places along the roadside, 64000 trees and grass will be planted.
Compaction of vegetation	Soil erosion	Construction vehicles would operate on temporary paved roads to avoid damaging and compacting vegetation.
<b>Fauna</b>		
Loss, damage or disruption to fauna	Threat to fauna	Construction workers would be asked to protect natural resources.
<b>Safety and accident risks</b>		
Accidents risks	Loss of life and disability	Provide median to prevent head on collision. Provide guard rails and anti-glare screens.
<b>Health Issues</b>		
	Low efficiency	Septic tanks and soakage pits at construction sites. Ear plugs, helmets, safety backs and dust masks as appropriate will be provided to construction labourers.
<b>Cultural Properties</b>		
<b>Damage or loss of cultural properties</b>	Disturbances in religious activity	Plan relocation of small structures coming on the way.
<b>Environmental Enhancement</b>		
Roadside landscape development		Shrubs and bushes on median. Total 50616 nos. to be planted.
Road side amenities		Laybys, Toll plaza
Road Furniture		39 Bus bays will be constructed.
<b>OPERATION PHASE</b>		

<b>Contamination from spills due to traffic and accidents</b>	Soil pollution and accidents	Accidental spills will be cleaned up according to contingency plan. Vehicle maintenance would be confined to areas with fuel / lubricants traps.
<b>Air pollution</b>	Dust and Air Pollution	Monitoring & checking of vehicular emissions of SPM, RPM, SO <sub>2</sub> , NO <sub>x</sub> , CO, Pb, HC.
<b>Noise Pollution</b>	The sound levels may be high in certain residential / sensitive areas through which heavy vehicular movement may take place.	Sign posting will be done near schools, colleges and hospitals to prevent honking of horns.
<b>Water</b>	Water pollution of streams and water bodies	Water quality monitoring will be carried out for compliance monitoring.
<b>Flora and Fauna</b>	Loss of trees green tunnels and canopies	Revegetation success will be checked in terms of trees surviving after 1 to 1.5 years in relation to total planted.
<b>Safety Measures</b>	Loss of life / property and disability	Signage at sensitive receptors viz. hospitals, schools, curves etc.

### *Socio-economic Environment*

During Construction	Mitigation Measures
Impacts on agricultural land	The agricultural area lost is an irreversible, long term negative impact of the project. At the same time, increased connectivity will mean access to better technology (tractors and other machineries), better marketing facilities etc. In comparison with the negative impact, the impact on per capita income and quality of life would be higher in terms of basic amenities, access to educational institutions etc.
Loss of property and resources	The Social impact assessment & Resettlement action plan will address all issues relating to loss of property and resources. As there is no fund shortage for NHAI projects due to Road fund created by fuel cess, the compensation & rehabilitation would be faster than other government projects.
Loss of livelihood	There will be some criteria that will help to rehabilitate people to provide training and rehabilitation under the RAP.
During Operation	More safety arrangements will be part of the project. This will further make the traffic and transportation arrangements safer and faster. Ribbon developments along the new bypass alignments

### **CONCLUSION**



The paper assesses the nature, type and magnitude of the Potential impacts likely to occur on the various relevant physical, biological and Cultural environmental components along the NH-24 (Bareilly-Sitapur Section). Most road projects today involve modifications to existing roadways, and the planning, operation, and maintenance of such projects often are opportunities for improving ecological conditions.

A growing body of information describes such practices for improving Noise, Air & water throughout the Project Highway.

*The many opportunities that arise for mitigating or reducing adverse environmental impacts in modifications and repairs to existing roads should not be overlooked. Environmental considerations should be included when plans are made to widening the Highway from 2 lane to 4 lane or modify existing roads, as well as when plans are made to build new roads.*

The Road construction related impacts occur at three stage

- Planning and Design
- Construction
- Operations and maintenance(O&M)

Planning and Design Covers the NH24 (Bareilly-Sitapur section) Road alignment finalization, detailed highway design, identification of construction material resource, statutory clearance, etc. that ultimately decides the impact during later phases. Most of the impact occurred during pre-construction, construction and O&M phases. While some of the Construction phase impacts are temporary; some Operation phase impacts are Continue in Nature.

Environmental parameters are broadly classified into three groups

- Physical Environmental
- Biological Environmental
- Human Environmental

Physical environmental includes water resources, water quality, air quality, noise and land Environmental Biological Environmental includes flora, fauna, avifauna and plantation Human Environmental includes social environmental rehabilitation, employment, agriculture and housing.

## REFERENCES

- [www.nhai.org](http://www.nhai.org)
- [http://en.wikipedia.org/wiki/Transport\\_in\\_india](http://en.wikipedia.org/wiki/Transport_in_india)