

Environmental and Social Due Diligence Report

Project Number: 47083-004
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INDIA: Accelerating Infrastructure Investment Facility in India – Tranche 3 Shamlaji Expressway Private Limited (Part 24 of 34)

Prepared by India Infrastructure Finance Company Limited for the India Infrastructure Finance Company Limited and the Asian Development Bank.

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ENVIRONMENT MANAGEMENT PLAN



9. ENVIRONMENTAL MANAGEMENT PLAN (EMP)

9.1. INTRODUCTION

Environmental Management Plan (EMP) is a summary of all project impacts which suggest remedial measures for the minimal impacts on the surrounding environment. EMP contains institutional strengthening through Environmental Management plan and training in addition to presenting a well-defined Environmental Monitoring Plan that will help the National Highway Authority of India (NHAI, GoI) to move toward ecologically sound widening to 6-lane of existing 4-lane highway of NH-8.

The environmental management plan is essential a contract between the project-promoting institution and the rest of society. The permission to implement a project is given by society based on set of assurances from the project promotor. These assurances broadly refer to the following aspects.

The EMP starts by identifying the required mitigative measures at their specific contexts. These contexts are to be understood by interpreting the defined impacts upon the environment. The degree of caution and comprehensiveness required to design the given mitigative measures is indicated by magnitude of impacts.

9.2. COLLABORATION IN DESIGNING MITIGATIVE MEASURES

The responsibility for designing the mitigative measures is delegated to the project promotor institution, which is the National Highway Authority of India (NHAI, GoI). It is essential to mobilize an appropriate expertise in design works to overcome or reduce the impacts. Therefore, NHAI will need to collaborate with other institution in the public and private sectors. For instances, through the Forest Department, NHAI is authorized to plan and implement afforestation programme. Similarly, mitigative measures related to the engineering solution should be included in the design of road and bridges by the design consultants.

9.3. IMPLEMENTATION OF EMP

The environmental experts/officers of various agencies are identified to implement the mitigation measures for the minimal impact on environment.

- **Environmental Experts/Officers:** The role of Environmental Experts/officers of various agencies is to ensure that all works should be carried out in accordance with the environmental management plan prepared for a specific project as per the environmental legislation (Laws, Acts, and Rules etc.) and the guidelines of funding agency. It should make a part of the Tender Document for appointment of Environmental Expert for imposition of penalty to the violators, particularly contracts.
- **Civil Work Contractor:** The environmental problems and issues usually arise out from the construction sites and workers camps are to be controlled by the civil work contractor. Such type of role of civil work contractor should be clearly defined in the Tender Document.
- **Revenue Department:** The District Collector is the head of the Revenue Department. His responsibility is to support the project through providing civil and soyam land for compensatory

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afforestation on one hand and disbursement of compensation to PAPs without delay and dispute on other.

- **Forest Department:** The Divisional Forest Officer (DFO) at Division and Conservator of Forest (CF) at Circle level are head of the Forest Department. Whatever, issues arise in relation to diversion of forest land and resources (tree felling etc.) to be supported for the developmental activities as per all the regulatory authorities.
- **Project Promoter:** The responsibilities of the project promoter are to verify the well managed practices, which can be smoothly followed and implemented under project. It also keeps in mind the accident-prone zones and environmental hazards. The interface of project promoter is extremely valuable for taking additional actions to the implementing and supervising agency for eco-friendly implementation of EMP.

9.4. ENVIRONMENT MANAGEMENT PLAN (EMP)

The Environment Management Plan (EMP) outlines the environmental management system that will be implemented during the detailed design and construction stage of the project for minimization of deleterious effects and implementation of enhancement measures. The EMP embraces environmental management issues comprising of beneficial impacts as well as long-term adverse impacts and their remedial measures.

The highway management should implement sound Environment Management Plan (EMP), which will make environment protection an essential requirement. Prediction of the potential environmental and social impact arising due to development activities are considered as the heart of EIA process. An equally essential element of this process is to develop measure to eliminate, offset or reduce adverse impacts to acceptable levels and enhance the beneficial ones during implementation and operation of the projects. The integration of the project planning is done by clearly defining the environment requirements within an Environment Management Plan (EMP). The Management Action Plan aims at controlling pollution at the source level to the maximum possible extent with the available and affordable technology followed by treatment measures before they are discharged. Specifically, the EMP lays stress on key environmental aspects and issues of the project during operation phase

by:

- Identifying potential environmental impacts;
- Recommending mitigation measures for the negative impacts;
- Identifying opportunities for enhancement measures;
- Providing an organizational framework for operating Environment Management System and other functions of the project by assigning roles and responsibilities for environmental monitoring and management;
- Formulating Environmental Action Plans (EAPs) which specify mitigation, periodic and annual monitoring activities during project implementation and operation.

9.5. ENVIRONMENT MANAGEMENT CELL: STRUCTURE AND RESPONSIBILITIES

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A separate environment management cell comprising of a team of experienced and qualified personnel reporting to a very senior level executive preferably an environmental engineer is proposed. He will be assisted by well-trained staffs comprising of environmental and safety specialists. Staff will be trained for environment control measures like air, water quality monitoring, solid waste management, noise abatement etc. Staff would also be trained to operate ESP and other pollution control equipment at optimum efficiency.

The Environment Management Cell will be responsible for managing the following activities related to environment function of proposed highway project:

Coordinate and manage the EMP implementation during pre-construction, construction and operation phase

- Appoint dedicated environment staff to manage environmental monitoring responsibilities
- Manage and coordinate environmental monitoring and control
- Coordination with other sections of the plant and government agencies in relation to environmental management activities
- Implement and monitor greenbelt protection and plantation activities
- Safety specialist will ensure safe working practices in all the sections of the plant

9.6. ENVIRONMENTAL MANAGEMENT ACTION PLAN

This section describes the Environmental Management Action Plan for the proposed project during different stages of project. The Environmental mitigation measures have been incorporated at all the stages of the project right from Designing phase to Construction and Operational Phase. All care has been taken to have minimum impact on trees and ground cover, to keep impacts on people at a minimum, to keep land acquisition at a minimum, to provide maximum safety to the Highway users and to provide mitigation measures to all expected environmental degradation during design stage itself. Further to this the Management Plan has been formulated for implementation of environmental mitigation measures to be carried out by the Concessionaire and to ensure that the provisions of the EMP are strictly followed and implemented by strengthening implementation arrangements to prevent and minimize the adverse environmental impacts during Construction phase of the project. EMP has also addressed certain environmental measures to be taken to prevent further deterioration of environment components and to improve the safety of the Highway users and roadside communities during Operational Stage of the Project.

Appropriate measures have also been identified for action during various stages of the project, viz, design and pre-construction, construction and operational phases. The measures identified for all three phases, are tabulated in **Table 9.1** which describes the nature of the potential environmental impact, the measures, which have or will be taken, the timeframe in which they are taken, the implementing agency and responsible organization.

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Table 9.1: Environmental Management Action Plan

Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
A	Pre-construction Stage			
A-1	Land and Properties Loss	<ul style="list-style-type: none"> Land acquisition will be marginal. The acquisition of land and private properties will be carried out in accordance with the RAP and entitlement framework for the project. Early identification of entitlement for compensation and planning of Resettlement and Rehabilitation Action Plan to compensate the losses. All the affected people will be compensated as per NHAI policies before commencement of Construction works. 	PIU, Revenue Department	PIU-NHAI
A-2	Preservation of Trees	<ul style="list-style-type: none"> All efforts will be made in design to save maximum trees. Compensatory Plantation to be carried out as per Forest (Conservation) Act and Forest Rules of State Government. The owners of the trees will be adequately compensated as per Resettlement and Rehabilitation Action Plan. Apart from Compensatory Plantation green belt shall be developed all along the design alignment section. 	PIU, Revenue Department	IC, PIU-NHAI
A-3	Location of crushers, hot-mix plants, WMM Plant, Concrete batching Plants etc.	<ul style="list-style-type: none"> Stone Crushers: WMM Plants and Concrete batching plants will be sited sufficiently away from settlement, agricultural operations and any commercial establishments. Such plants will be located at least 500m away from the nearest village/ settlement preferably in the predominant down-wind side. Mobile equipment can be placed within 50 m from the nearest dwelling. The Concessionaire shall submit a detailed layout plan for all such sites and approval of the Environmental Expert of Independent Consultant (IC) shall be necessary prior to their establishment. Arrangement to control dust pollution through provision of wind screens, sprinklers and dust encapsulation will have to be provided at all such sites especially for crushers. Use of buildings and equipment within the plant site as wind barriers may be considered. 	Concessionaire /Contractor	IC, PIU-NHAI

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
		<ul style="list-style-type: none"> Specifications of crushes and hot mix plants will comply with the requirements of the relevant current emission control legislations and Consent/NOC for all such plants shall be submitted to the Environmental Expert of Independent Consultant (IC). The Concessionaire shall not initiate plant operation till the required legal clearance are obtained and submitted. 		
A-4	Other construction vehicles, equipment and machinery	<ul style="list-style-type: none"> All vehicles, equipment and machinery to be procured and brought to site for construction will confirm to the relevant Bureau of India Standard (BIS) norms and the manufacture's specifications. The discharge standards promulgated under the Environment Protection Act, 1986 will be strictly adhered to. Noise limits for construction equipment such as compactors, rollers, front loaders concrete mixes, cranes (Movable), vibrators and saws will not exceed the value specification the Environment (protection) Rules, 1986. The equipment proposed to be used for bridge and culvert construction and must be checked and certified fit, especially with respect to the potential leakage of oil and grease. The inspection should verify that: <ul style="list-style-type: none"> ✓ Equipment is clean (free of mud, dirt and oil) ✓ Equipment is in good working order ✓ A drip plan is available for equipment that will be stored on site. ✓ Concessionaire has a spill kit ✓ Operator is trained on the refueling, maintenance and emergency spill. ✓ A logbook will be maintained documenting all fueling and maintenance events (date, time, location, condition of site, weather conditions, amount of fuel on maintenance event, issues). ✓ Adequate inspections will be conducted during the construction period. 	Concessionaire /Contractor	IC, PIU- NHAI
A-5	Borrow Areas	<ul style="list-style-type: none"> Finalizing borrows areas and all logistic arrangements as well as compliance to environmental requirements, as applicable, will be the sole responsibility of the Concessionaire. 	Concessionaire /Contractor	IC, PIU- NHAI

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
		<ul style="list-style-type: none"> The Concessionaire will not start borrowing earth from selected borrow area until the formal agreement is signed between the land owner and the Concessionaire and a copy is submitted to the IC and PIU. Locations finalized by the Concessionaire shall be reported to the Environmental Expert of IC and who will in turn report to PIU. In addition to testing for the quality of borrow materials by the IC, the environmental experts of the IC will be required to inspect every borrow area location prior to approval. 		
A-6	Quarry Areas	<ul style="list-style-type: none"> The quarry materials requirement of this project may be taken from the existing approved quarries along the project highways. District administration and State Pollution Control Board and shall submit a copy of the approval and the rehabilitation plan to the PIU and Environment Expert of IC. 	Concessionaire /Contractor	IC, PIU- NHAI
A-7	Arrangement for construction water	<ul style="list-style-type: none"> The Concessionaire will use ground water/surface water as a source of water for the construction after taking prior permission from the Competent Authority. The Concessionaire will provide a list of locations and type of sources from where water for construction will be used. To avoid disruption/disturbance to other water users, the Concessionaire will extract water from fixed locations and consult the Environment Expert before finalizing the locations. The Concessionaire will not be allowed to pump water from any irrigation canal and surface water bodies used by the community. The Concessionaire is required to comply with the requirements of the State Ground Water Department and seek its approval for doing so and submit copies of the permission to Environment Expert of IC & PIU. 	Concessionaire /Contractor	IC, PIU- NHAI
A-8	Site identification for disposal of unsuitable materials	<ul style="list-style-type: none"> The Concessionaire shall identify site away from the project area where unsuitable materials (debris, solid waste) generated while the construction can be safely disposed-off. Such locations shall be inspected by the Environment Expert of Independent Consultant and approved in consultation with the PIU before construction work starts. 	Concessionaire /Contractor	IC, PIU- NHAI

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
A-9	Construction camp location, design and layout	<p>Sitting of the construction camps will be as per the guidelines below:</p> <ul style="list-style-type: none"> • Locations of construction camp to be identified by the Concessionaire. Construction camp will not be proposed within 500 m from the nearest settlements to avoid conflicts and stress over the infrastructure facilities with the local community. Location for stockyards for construction materials will be identified at least 1000 m from water sources. • The waste disposal and sewage system for the camp will be designed, built and operated such that no odour is generated. • Unless otherwise arranged by the local sanitary authority, arrangements for night soils (human excreta) disposal approved by the local medical health or municipal authorities or as directed by Environmental Expert will have to be provided by the Concessionaire. 	Concessionaire /Contractor	IC, PIU-NHAI
A-10	Arrangements for temporary land	<ul style="list-style-type: none"> • The Concessionaire as per prevalent rules will carry out negotiations with the landowners for obtaining their consent for temporary use of lands for workers camp, construction sites/hot mix plants/traffic detours etc. The Environment Expert will ensure that the clearing up of the site prior to handing over to the owner (after construction or completion of the activity) is duly carried out by the Concessionaire. 	Concessionaire /Contractor	IC, PIU-NHAI
A-11	Bore-well and hand-pumps	<ul style="list-style-type: none"> • The owners of hand pumps and bore-wells will be compensated as per Resettlement Action Plan. • The bore-wells and hand pumps will be relocated as per consultation of the owners if required • Relocation of all affected bore-wells, handpumps in advance prior to start of construction • The borehole/wells beyond formation width will be retained for utilizing them as ground water recharging well with proper safety arrangements. 	PIU, Revenue Department	PIU-NHAI
A-12	Severance Problem	<ul style="list-style-type: none"> • Underpasses has been provided for crossing the highway for pedestrians, local traffic and cattle to avoid severance problem. 	Concessionaire /Contractor	IC, PIU-NHAI
B	Construction Phase			

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
B-1	Clearing & Grubbing	<ul style="list-style-type: none"> Vegetation will be removed from the construction zone before commencement of construction. All works will be carried out such that the damage or disruption to flora other than those identified for cutting is minimum. Only ground cover/shrubs that impinge directly on the permanent works or necessary temporary works will be removed with prior approval from the Environmental Expert. The Concessionaire, under any circumstances will not cut or damage trees. Trees identified under the project will be cut only after receiving permission from the State Forest Department. Vegetation only with girth of over 30 cm measured at a height of 1.0 m above the ground will be considered as trees and shall be compensated. 	Concessionaire /Contractor	IC, PIU-NHAI
B-2	Generation of debris from dismantling structures and road surface	<p>Debris generated due to the dismantling of the side of existing road for pavement rehabilitation will be suitably reused in the proposed construction, subject to the suitability of the materials and approval of the Engineer and Environment Expert as follows:</p> <ul style="list-style-type: none"> The existing base and sub-base material shall be recycled as sub-base for the haul road or access roads. The Concessionaire will suitably dispose-off unutilized debris materials at pre-designated disposal locations, subject to the approval of the Environment Expert. The Concessionaire will ensure that the surface area of such disposal pits is covered with a layer of soil. All arrangements for transportation during construction including provisions, maintenance, dismantling and clearing debris, will be planned and implemented by the Concessionaire as approved and directed by the Environment Expert. The pre-designed disposal locations will be a part of Comprehensive Solid Waste Management Plan to be prepared by the Concessionaire in consultation with the Environment Expert and Engineer of the IC. 	Concessionaire /Contractor	IC, PIU-NHAI
B-3	Disposal of other construction waste	<ul style="list-style-type: none"> The Environmental Expert will approve these disposal sites after conducting a joint inspection on the site with the Concessionaire. 	Concessionaire /Contractor	IC, PIU-NHAI

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
		<ul style="list-style-type: none"> Non-bituminous wastes may be dumped in borrow pits (preferably located in barren lands) covered with a layer of the soil No new disposal site shall be created as part of the project, except with prior approval of the Environment Expert before handling over. All waste materials will be completely disposed of and the site will be fully cleaned and certified by Environment Expert before handling over. 		
B-4	Stripping stocking and presentation of top soil	<ul style="list-style-type: none"> Stockpiles will not be surcharged, or otherwise loaded and multiple handling will be kept to a minimum to ensure that no compaction will occur. The stockpiles shall be covered with gunny bags or vegetation. It will be ensured by the Concessionaire that the topsoil will not be unnecessary trafficked either before stripping or when in stockpiles. Such stockpiled topsoil will be utilized for- <ul style="list-style-type: none"> ✓ Covering all disturbed areas including borrow areas ✓ Top dressing of the road embankment and fill slopes ✓ In the agricultural fields of farmers, acquired temporary. Residual topsoil, if there is any will be utilized for the plantation. 	Concessionaire /Contractor	IC, PIU-NHAI
B-5	Accessibility	<ul style="list-style-type: none"> The Concessionaire will provide safe and convenient passage for vehicles, pedestrians and livestock to and from roadsides and property access as connecting the project road. The Concessionaire will also ensure that the existing accesses are not blocked without providing adequate provisions and to the prior satisfaction of Environmental Expert. The Concessionaire will take care that the cross roads are constructed in such a sequence so that traffic movement on any given area does not get affected. 	Concessionaire /Contractor	IC, PIU-NHAI
B-6	Planning for Traffic diversion	<ul style="list-style-type: none"> The Concessionaire will provide specific measure for safety of pedestrians and workers at night as a part of traffic control plans. The Concessionaire will ensure that the diversion/detour is always maintained in running condition, particularly during the monsoon to avoid disruption to traffic flow. The Concessionaire will also inform local community of 	Concessionaire /Contractor	IC, PIU-NHAI

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
		changes to traffic routes, conditions and pedestrian access arrangements with assistance from IC and PIU.		
B-7	Earth from Borrow Areas for Construction	<ul style="list-style-type: none"> No borrow area will be opened without permission of the Environment Expert. The location, shape and size of the designated borrow areas will be as approved by the Environmental Expert of IC and in accordance to the IRC recommended borrow pits for road embankments. The borrowings operations will be carried out as specified in the guidelines for setting an operation of borrow areas. 	Concessionaire /Contractor	IC, PIU-NHAI
B-8	Quarry Operation	<ul style="list-style-type: none"> The Concessionaire will develop a Comprehensive Quarry Redevelopment Plan as per the Mining Rules of Uttar Pradesh and submit a copy to PIU and IC prior to opening of the quarry site. The quarry operations will be undertaken within the rules and regulations in force. 	Concessionaire /Contractor	IC, PIU-NHAI
B-9	Construction water	<ul style="list-style-type: none"> The Concessionaire will arrange adequate supply and storage of water for the whole construction period at his own costs. The Concessionaire will submit a list of sources from where water will be used for the project to IC and PIU. The Concessionaire will source the requirement of water preferentially from ground water but with prior permission from the competent authority/authorities, if required. A copy of the permission will be submitted to IC and PIU prior to initiation of construction. The Concessionaire will take all precaution to minimize the wastage of water in the construction process/operation. 	Concessionaire /Contractor	IC, PIU-NHAI
B-10	Drainage & Flood Control	<ul style="list-style-type: none"> The Concessionaire will ensure that construction materials like earth, stone are disposed-off so that it does not block the flow of water of any watercourse and cross drainage channels. The Concessionaire will take all necessary measures to prevent the blockage of water flow. In addition to the design requirements, the Concessionaire will take all required measures as directed by the Environmental Expert of IC to prevent temporary or permanent flooding of the site or any adjacent area, if any. 	Concessionaire /Contractor	IC, PIU-NHAI

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
B-11	Slope Protection and Control of Soil Erosion	<ul style="list-style-type: none"> The Concessionaire will take slope protection measures as per design, or as directed by the Environmental Expert of IC to control soil erosion and sedimentation through use of dyke's sedimentation chambers, basins, fibber mats, mulches, grasses, slope, drains and other devices. All temporary sedimentation, pollution control works, and maintenance thereof will be deemed as incident to the earth work or other items of work and as such no separate payment will be made for them. The Concessionaire will ensure the following safeguards: <ul style="list-style-type: none"> ✓ During construction activities on road embankment, the side slopes of all cut and fill area will be graded and covered with stone pitching, grass and shrub as per design specifications. ✓ Turfing works will be taken up as soon as possible, provided the season is favorable for the establishment of grass sods. Other measures of slope stabilization will include mulching, netting and seeding of batters and drains immediately on completion of earthworks. ✓ In borrow pits, the depth shall be so regulated that the sides of the excavation will have a slope not steeper than 1 vertical to 2 horizontal, from the edge of the final section of the bank. 	Concessionaire /Contractor	IC, PIU-NHAI
B-12	Water pollution from construction wastes	<ul style="list-style-type: none"> The Concessionaire will take all precautionary measures to prevent the waste-water generated during construction from entering into canals, water bodies or the irrigation system and avoid construction works close to canals or water bodies during monsoon. All waste arising from the project is to be disposed-off in the manner that is acceptable to the State Pollution Control Board or as directed by Environmental Expert. Run-off from wasted concrete may be alkaline and thus pH reduction may be needed. The Environmental Expert will certify that all liquid wastes disposed-off from the sites meet the discharge standards. 	Concessionaire /Contractor	IC, PIU-NHAI

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
B-13	Water pollution from fuel and lubricants	<ul style="list-style-type: none"> The Concessionaire will ensure that all construction vehicle parking locations, fuels/lubricants storage sites, vehicles, machinery and equipment maintenance sites are located at least 100 m away from any water body. The Concessionaire will also ensure that spillage of fuels and lubricants do not contaminate the ground. If fuel storage and refueling areas are located on agricultural land or areas supporting vegetation, the topsoil will be stripped, stockpiled and returned after cessation of such activities. All location and layout plans of such sites will be submitted by the Concessionaire prior to their establishment and will be approved by the Environment Expert and PIU. The Concessionaire will arrange for collection and disposal of oily wastes to the pre-identified disposal sites (list to be submitted to IC and PIU) and approved by the Environment Expert. All spills and collected petroleum products will be disposed off in accordance with MoEF&CC and State Pollution Control Board guidelines. 	Concessionaire /Contractor	IC, PIU-NHAI
B-14	Dust Pollution	<ul style="list-style-type: none"> The Concessionaire will take precautions viz water sprinkling etc. to reduce the level of dust generating from construction site. All the plants will be sited at least 1 km in the downwind direction from the nearest human settlement. The Concessionaire will provide necessary certificates to confirm that all crushers used in construction confirm to relevant dust emission control legislation. Crushers licensed by the State Pollution Control Committee of Board shall be used for the project. Fly ash shall be used as per IRC-SP-58 guidelines. On daily basis it will be ensured that all dumpers carrying fly ash are fully covered by tarpaulin. Water sprinkling during loading and unloading of fly ash shall be periodically. Storage of fly ash within enclosures shall be done and regular water sprinkling will be ensured over the stack. 	Concessionaire /Contractor	IC, PIU-NHAI

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
B-15	Emission from construction vehicles, equipment & machineries	<ul style="list-style-type: none"> The Concessionaire will ensure that all vehicles, equipment and machineries used for construction are regularly maintained and confirm the pollution emission levels comply with the relevant requirements of State Pollution Control Committee. The Concessionaire will submit PUC certificates for all vehicles /equipment/machinery used for the project and maintain a record of the same during the contract period. Monitoring results will also be submitted to IC and PIU as per monitoring plan. 	Concessionaire /Contractor	IC, PIU-NHAI
B-16	Noise from vehicles, equipment and machineries	<ul style="list-style-type: none"> The Concessionaire will confirm the following: <ul style="list-style-type: none"> ✓ Servicing of all construction vehicles and machinery will be done for exhaust silencers and will be checked and if found defective will be replaced. ✓ All construction sites within 150 m of the nearest habitation, noisy construction work such as crushing; concrete mixing will be stopped during the night time between 10.00 pm to 6.00 am. ✓ No noisy construction activities will be permitted around educational institutions/health centers (silence zones) up to 100 m from the sensitive receptors. ✓ Monitoring shall be carried out at the construction sites as per the monitoring schedule and results will be submitted to IC and PIU. ✓ Environmental Expert will be required to inspect regularly to ensure the compliance of EMP. 	Concessionaire /Contractor	IC, PIU-NHAI
B-17	Personal Safety measures for labour	<ul style="list-style-type: none"> The Concessionaire will provide: <ul style="list-style-type: none"> ✓ Protective footwear and protective goggles to all workers employed on asphalt materials, cement, concrete etc. ✓ Protective goggles and clothing to workers engaged in store breaking activities. ✓ Earplugs to workers exposed to loud noise, and workers working in crushing, compaction, or concrete mixing operation. ✓ Adequate safety measures for workers during handling of materials at site. 	Concessionaire /Contractor	IC, PIU-NHAI

Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
		<ul style="list-style-type: none"> The Concessionaire will comply with all the precautions as required for ensuring the safety of the workmen as per the International Labour Organization (ILO). The Concessionaire will also ensure that no paint containing lead or lead products is used except in the form of paste or readymade paint. They will provide facemasks for use to the workers when paint is applied in the form of spray or a surface having lead paint is rubbed and scraped. The Concessionaire will mark 'no smoking' in high risk areas and enforce noncompliance of use of PPE with zero tolerance. These will be reflected in the construction Safety Plan to be prepared by the Concessionaire during mobilization and will be approved by IC and PIU. 		
B-18	Traffic & Road Safety	<ul style="list-style-type: none"> The Concessionaire will take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades, including signs, markings, flags, lights and flagmen as proposed in the Traffic Control Plan/Drawings and as required by the Environmental Expert of IC for the information and protection of traffic approaching or passing through the section of any existing cross roads. The Concessionaire will ensure that all signs, barricades, pavement markings are provided as per the MoRTH specifications or as directed by the Engineer., a Traffic Management Plan will be devised and implemented to the satisfaction of the Concessionaire's vehicle drivers must be strictly controlled particularly when plying on local/village roads. 	Concessionaire /Contractor	IC, PIU-NHAI
B-19	Risk from electrical equipments	<ul style="list-style-type: none"> The Concessionaire will take all required precautions to prevent danger from electrical equipment and ensure that- <ul style="list-style-type: none"> ✓ No material will be stacked or placed as to cause danger or inconvenience to any person or the public. ✓ All necessary fencing and lights is provided to protect the public in construction zones. All machines to be used in the construction will confirm to the relevant Indian Standards (IS) codes, are free from patent defect, are kept in good working order, regularly inspected and properly maintained as per IS provision and to the satisfaction of the Environment Expert. 	Concessionaire /Contractor	IC, PIU-NHAI

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Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
B-20	First aid	<p>The Concessionaire will arrange for-</p> <ul style="list-style-type: none"> An available first aid unit including adequate supply of sterilized dressing materials and appliances as per the factories Rules in every work zone. Availability of suitable transport always to take injured or sick person(s) to the nearest hospital. Equipment and trained nursing staff at construction camp. 	Concessionaire /Contractor	IC, PIU-NHAI
B-21	Informatory Signs and Hoardings	<ul style="list-style-type: none"> The Concessionaire will provide, erect and maintain informatory/safety signs, hoardings written in English and local language, wherever required or as suggested by the Environment Expert of IC. 	Concessionaire /Contractor	IC, PIU-NHAI
B-22	Road side Plantation Strategy	<ul style="list-style-type: none"> The Concessionaire will carry out the plantation as per the Green Belt Development Plan prepared for the project as per IRC-SP: 21: 2009. 5 times the number of trees to be felled would be planted, in the form of strip and block plantations depending on the availability of land. Plans for compensatory plantation will be drawn up in consultation with the State Forest Department. Minimum 75 percent survival rate of the saplings will be acceptable otherwise the contractor will replace all casualties at his own cost to ensure this survival percentage. The contractor will maintain the plantation till they handover the project site The Environment Expert of IC will inspect regularly the survival rate of the plants and compliances with regards to tree plantation guidelines. 	Concessionaire /Contractor	IC, PIU-NHAI
B-23	Accommodation for labour camps	<ul style="list-style-type: none"> The Concessionaire will follow all relevant provisions of the Factories Act, 1948 and the Building and the other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 for construction and maintenance of labor camp. The location, layout and basic facility provision of each labour camp will be submitted to IC and PIU prior to their construction. The construction will commence only after written approval of the Environment Expert. The Concessionaire will maintain necessary living 	Concessionaire /Contractor	IC, PIU-NHAI

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ENVIRONMENT MANAGEMENT PLAN

Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
		accommodation and ancillary facilities in functional and hygienic manner and as approved by the IC.		
B-24	Water Demand and supply	<ul style="list-style-type: none"> The Concessionaire will provide potable water facilities within the precincts of every work-place in an accessible place. The Concessionaire will also guarantee the following: <ul style="list-style-type: none"> ✓ Supply of sufficient quantity of potable water (as per IS) in every workplace/labour camp at suitable and easily accessible places and regular maintenance of such facilities. ✓ If any water storage tank is provided, the bottom of the tank will be kept at least 1 m above from the surrounding ground level. ✓ If water is drawn from any existing well, which is within 30 m proximity of any toilet, drain or other source of pollution, the well will be disinfected before water is used for drinking. ✓ A reliable pump will be fitted to each covered well. The trap door will be kept locked and opened only for cleaning or inspection, which will be done at least once in a month. ✓ Environmental Expert will be required to inspect the labour camp once in a week to ensure the compliance of the EMP. 	Concessionaire /Contractor	IC, PIU-NHAI
B-25	Sanitation and Sewage system	<p>The Concessionaire will ensure that-</p> <ul style="list-style-type: none"> The sewage system for the camp will be designed, built and operated in such a fashion that it should not pollute the ground water or nearby surface water. Separate toilets/bathrooms, will be arranged for men and women Adequate water supply is to be provided in all toilets and urinals All toilets in workplaces are with dry-earth system (receptacles) which are to be cleaned and kept in a strict sanitary condition Night soil (human excreta) is to be disposed by putting layer of it at the bottom of a permanent tank prepared for the purpose and covered with 15cm, layer of waste or refuse and then covered with a layer of earth for a fortnight. 	Concessionaire /Contractor	IC, PIU-NHAI

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ENVIRONMENT MANAGEMENT PLAN

Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
B-26	Waste disposal	<ul style="list-style-type: none"> The Concessionaire will provide segregated garbage bins in the camps and ensure that these are regularly emptied and disposed-off in a hygienic manner as per the Comprehensive Solid Waste Management Plan approved by the Environmental Expert of IC. Unless otherwise arranged by local municipal authority, arrangements for disposal of night soils (human excreta) suitably approved by the local municipal authority or as directed by Environment Expert, will be arranged by the Concessionaire. 	Concessionaire /Contractor	IC, PIU-NHAI
B-27	Pollution Monitoring	<ul style="list-style-type: none"> The periodic monitoring of the ambient air quality, noise level, water (both ground and surface water) quality, soil pollution/contamination in the selected locations as suggested in environmental monitoring plan will be the responsibility of Concessionaire. PIU will appoint MOEF/SPCB approved pollution monitoring agency/ laboratory for this purpose. 	Concessionaire /Contractor	IC, PIU-NHAI
C	Operation Phase			
C-1	Monitoring Operation Performance	<ul style="list-style-type: none"> The PIU will monitor the operational performance of the various mitigation/enhancement measures carried out as a part of the project. The indicators selected for monitoring include the survival rate of trees; utility of enhancement provision for relocated utilities, hand pumps and other relocated structures if any; status of rehabilitation of borrow areas; and noise barriers, which are proposed at different locations. 	Concessionaire /Contractor	IC, PIU-NHAI
C-2	Maintenance of Drainage	<ul style="list-style-type: none"> PIU will ensure that all drains (side drains, cross drains etc.) are periodically cleared especially before monsoon season to facilitate the quick passage of rainwater and avoid flooding. PIU will ensure that all the sediment and oil and grease traps set up at the water bodies are cleared once in every three months. 	Concessionaire /Contractor	IC, PIU-NHAI
C-3	Pollution Monitoring	<ul style="list-style-type: none"> The periodic monitoring of the ambient air quality, noise level, water (both ground and surface water) quality, soil pollution/contamination in the selected locations as suggested in environmental monitoring plan will be the responsibility of Concessionaire. 	Concessionaire /Contractor, Pollution Monitoring Agency	IC, PIU-NHAI

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ENVIRONMENT MANAGEMENT PLAN

Sl. No.	Environment Issues & Impacts	Mitigation Measures	Planning and Execution	Supervision
C-4	Monitoring of survival rate of plantation in the PROW	<ul style="list-style-type: none"> Every year there will be monitoring for the survival rate of plantation in the PROW for the first five years before on set of monsoons. A minimum survival of 85% will be maintained. Any loss will be made up by fresh plantation. 	Concessionaire /Contractor	IC, PIU-NHAI
C-5	Changes in Land-use pattern	<ul style="list-style-type: none"> NHAI/PIU shall take initiative and act as facilitator to prepare an action plan for balanced regional development in consultation with local development authority and State Government to control the ribbon development along the project road. A land use regulation control need to be adopted. A land use – zoning map may be developed, under which up to a distance from the PROW of the alignment no development will be allowed. Necessary hoardings will be erected indicating the availability of PROW and legal charges for encroachment of PROW. Budgetary provisions are to be made to control the ribbon development along project road. Safety of public and road users shall be maintained through traffic control and management throughout the operation period. Trauma centers for treatment of accident victims should be established at regular intervals and operated to the full satisfaction of PIU. 	Concessionaire /Contractor	IC, PIU-NHAI
C-6	Corporate Social Responsibility (CSR)	<p>As part of CSR, the following provisions are suggested:</p> <ul style="list-style-type: none"> Undertaking regular road safety, HIV/AIDs, health awareness campaigns Assistance to improve skills for income generation to community people Development of schools, health cares, dispensaries or public facilities Workshops/Training to farmers to impart the knowledge to use modern methods and tools for farming To ensure that the contractors provides all necessary amenities and facilities for the workers at construction camps/work sites and no employment of child labour is practiced at site 	NHAI	NHAI

9.7. ORGANIZATIONAL DETAILS

Table 9.2: Environmental Management Action Plan

Designation	Designated Persons
Vice President	Mr Sanjay Shrivastava
Project Manager	Mr Jitendra Chaturvedi
Dy. Manager (QA/QC)	Mr. Ravi Kant Pandey
Dy. Manager (Structure)	Mr. Jitendra Behra.
Asst. Manager (Structure)	Mr. Sant Vir Singh
Sr. Engineer (Highway)	Mr. Hargovind Singh
Assistant Engineer (Highway)	Mr. Hemant Tiwari
Sr. Engineer (Structure)	Mr. Amit kumar Aman
Sr. Engineer (Structure)	Mr. Sandeep kumar
Lab Technician	Mr. Aditya Bajpai.
Computer Operator	-
Office Assistant	-
Safety Officer	Mr. Vineet Mishra
Account Manager	Mr. Kishor Dhakad
HR Manager	Mr. Sumeet Sharma.
Sr. Engineer (Planning & Billing)	Mr. Shashi Kumar

Table 9.3: Organization Chart

Employment	Required	Deployed
Project Head	1	1
Project Manager (Highway)	1	0
Project Manager (Bridge)	1	0
Dy. Project Manager (Highway)	1	1
Dy. Project Manager (Bridge)	1	1
Sr. Engineer (Highway)	5	5
Sr. Engineer (Bridge)	3	3
Supervisors/Jr. Engineer (Highway)	10	10
Supervisors/Jr. Engineer (Bridge)	10	4
Survey Engineer (Highway & Bridge)	5	2
Survey Assistants (Highway & Bridge)	20	10
Safety Engineer (Highway & Bridge)	3	0
Manager QA/QC.	1	1
Sr. Material Engineer	2	0
Sr. Lab Technician	10	2
Lab Technicians	10	3
Sr. Manager Planning & Billing.	1	0
Asst. Manager Planning & Billing.	3	0
Store Manager & Staff	15	2
Purchase Manager	2	0

Employment	Required	Deployed
Accounts Manager & Staff	3	1
HR Manager & Staff	5	1
Liason Head & Land Acquisition & Staff	3	1
DGM (Plant & Machinery)	1	0
Plant Managers	5	0
Plant Operators & Staff	40	10
Mechanical Staff	25	5
Auto CAD Operator	3	0
Computer Operators	2	0
Support Staff	50	6
Total	242	69

9.8. CONCLUSION

Afforestation should commence with the start of the project. The entire available land should be covered with trees under the afforestation programme. If the land is not sufficient on the project routes, separate proposal for afforestation should be planned for the plantation of tree away the project site, where land is available to recover greenery loss. Green belt development plan is formulated as part of road up-gradation project. As part of greenbelt development, plantation should be made in entire open space on the both side of the road and central verge to enhance floral cover and scenic beauty as well as sink of air pollution and act as noise barrier. Plantation may be carried out around the water bodies or along river front.

The loss of forest due to felling of trees in the process of widening shall be compensated as a part of afforestation programme. It is proposed to develop greenbelt around the perimeter of various project appurtenances, selected locations such as along water reservoir periphery, bus stops, truck lay bye, along the sensitive receptors near institutions, hospital etc. The plantation will act as sound barriers also.