

**EXECUTIVE SUMMARY on ENVIRONMENTAL MANAGEMENT PLAN &
ENVIRONMENTAL IMPACT ASSESSMENT FOR IMPROVEMENT, RE- CONSTRUCTION &
DEVELOPMENT OF NAYABAZAR-NAMCHI STATE HIGHWAY (SK-02) (LENGTH 19.7 KM)**

ENVIRONMENTAL IMPACT ASSESSMENT

Anticipated Environmental Impacts and Mitigation Measures

The road widening project activities can cause environmental impacts that are short, or long-term, and beneficial, or adverse, in nature. The overall long-term impacts will be largely beneficial in regard to the socio-economic environment and quality-of-life in the region. The key environmental issues associated with various aspects of the proposed project and impacts on various environmental components have been assessed for various stages i.e. (a) the project location, (b) design, (c) construction, and (d) operation.

Environmental Impacts Associated with Project Location, Preliminary Planning and Design

Location issues: Minor impacts on land use and local communities are expected due to acquisition of land for widening of road. The project affected people will be compensated as per the provisions of a Resettlement Plans (prepared as separate report). The widening option, have been devised so as to cause minimum destruction of structures.

Care will be taken to avoid community structures or cause damage in their relocation. There will also be a requirement to establish construction camps and related contractor's facilities, borrow pits and quarries. These will be located in environmentally sound and socially safe areas. It is expected that construction materials for the road works will be mined only from approved quarries.

Acquisition of forest land (1.03 hectare), clearing of vegetation cover and cutting of trees (3079) will cause some adverse impacts on environmental setup in the area. Loss of trees will be compensated by planting 9237 trees (1:3 ratio) as compensatory afforestation.

Environmental Impacts Due to Construction

Impacts on Topography, Soil and Vegetation: During the improvement works of the road section and because of felling of trees, hill cuttings, ground clearing; stone quarrying, and construction of structures etc. the micro-level topography may change.

Thus, the following mitigating measures shall be implemented:

- existing vegetation including shrubs and grasses along the road (except within the strip directly under embankments or cuttings) shall be properly maintained and all slopes/soil cutting areas shall be revegetated as soon as construction activities are completed,
- excavation and earthworks shall be mainly undertaken during the dry season when the risks from erosion and silt run-off are least,
- sites for quarrying, borrowing and disposal of spoils are to be confirmed according to the applicable laws and regulations in the state and the practices followed in recent/ongoing projects of international level,
- controlled and environmentally friendly quarrying techniques should be applied to minimize erosions and landslides,
- cut material shall be disposed of in suitable depressions,
- materials that will be used for surface dressing will consist of aggregates and

- gravel, and must not contain silt, and
- Internationally accepted best practice engineering approaches will be incorporated into contract documents and monitored during construction.

Impacts on Surface and Groundwater Quality, Drainage and Hydrology:

The River Rangit running parallel to the project road alignment for most of the length. Beside there are number of small streams crossing the project road. The improvement of the road may result in disruptions to the natural hydrology and water mismanagement that may lead to further problems of soil erosion, temporary pollution of Rangit River from spillage of chemicals and oil at construction sites and waste from construction camps, discharge of sediment-laden water from construction areas and uncontrolled surface water discharge over the road edge creating large-scale erosion on down-slopes. Thus the following mitigating measures shall be observed:

- natural courses of water bodies shall, as far as possible be maintained and brought back to their natural course,
- all debris and vegetation, clogging culverts shall be regularly cleared and disposal of construction debris in streams and rivers shall be avoided,
- river-bank slope stabilities shall be monitored and appropriate remedial measures applied throughout the construction period,
- if possible, construction work at bridge shall also be avoided during the rainy season,
- chemicals and oils shall be stored in secure, impermeable containers, and disposed of well away from surface waters,
- no vehicle cleaning activity shall be allowed within 300 m of water bodies/ drains,
- construction camps shall be equipped with sanitary latrines,
- lined drainage structures shall be provided,
- side drain waters must be discharged at every available stream crossing.

Air Quality

During construction, and at the micro-level only, air quality may be degraded by generation of dust (SPM) and generation of polluting gases including SO₂, NO_x and HC for short periods from vehicular movements, site clearance, earth filling and material loading and unloading. Therefore, to keep a check on these, Air quality monitoring shall be done right from the commencement of construction activity in addition to which the following actions shall be implemented:

- regular check-up and maintenance of construction equipment,
- mixing plants i.e. asphalt, concrete, and bricks, shall be operated within the permissible limits of CPCB, and be located away from settlements,
- the contractor shall submit a dust suppression and control programme to the RBD,
- vehicles delivering loose and fine materials shall be covered to reduce spills,
- controlled blasting should be carried out and only with the prior approval of the site Engineer and, if required, Roads & Bridges Deptt,
- bitumen emulsion shall be used wherever feasible, and
- bitumen heaters shall be used and the use of wood for fuel should be discouraged or prohibited.

Noise Quality:

Noise and vibration will be unavoidable but the impact will only be temporary and will only affect people living or working near piling locations. However, sound pressure levels would be monitored on twenty-four hour basis and noise levels would be carried out at

sensitive receptors and construction sites along the project roads.

Mitigation measures should include:

- (a) provision of noise barriers at sensitive locations,
- (b) construction machinery should be located away from settlements
- (c) careful planning of machinery operation and the scheduling of such operations can reduce noise levels,
- (d) controlled blasting (if any) should only be carried out with prior approval from the Engineer in charge, and
- (e) contractors should be required to fit noise shields on construction machinery and to provide earplugs to the operators of heavy machines.

Flora and Fauna

To minimise adverse impacts on flora such as trees, contract documents should specify that :

- (a) all wood building material for workers' housing should be brought from outside the project area,
- (b) workers should be supplied with non-wood fuels such as kerosene or liquefied petroleum gas for the duration of the contract,
- (c) all contract equipment and plants should be cleaned to the satisfaction of the project engineer in charge prior to their relocation to project sites;
- (d) during site clearance, care should be taken to ensure that the minimum area of vegetation area is affected and
- (e) the water sprinkling of trucks used as construction vehicles should be properly and regularly undertaken, so that dust deposition problem on vegetation are minimised.

About 7.34 km length of project road passes through forests area. However, the presence of wild animals is very rare and hence no adverse impacts are anticipated.

Environmental Effects Related to Operation

Noise and Vibration, Air Pollution, Runoff, Spoils of Hazardous Materials: Traffic volumes will, however, remain low and this should not be a significant impact. Repairs to culverts and new drainage work will eliminate/ reduce the soil erosion problems presently caused by poor cross drainage.

Land Use and Settlements: The likely impacts on land use and settlement patterns are limited. Improved access will inevitably lead to increased in and out migration, but this is likely to occur gradually and over a prolonged period. There will be time for new residential areas to be established. There may, however, be a need to control ribbon development.

Potential Environmental Enhancement/ Protection Measures

In order to improve the environment, additional measures were also proposed during construction for the following:

- (a) sanitation and housekeeping at the labour/ construction camps
- (b) provision of water supply
- (c) hygiene and provision of toilet facilities,
- (d) sewerage and waste disposal
- (e) first aid,
- (f) maintenance of buildings and facilities
- (g) identification of debris disposal sites, and
- (h) Rehabilitation of quarry and borrow pits.

Environmental Monitoring Programme

An environmental monitoring and reporting system to be adopted for present state highway improvement project in South Sikkim district under NESRIP has been developed which involves periodic checking to ensure that the environmental mitigation measures are implemented.

Additional Studies

As part of the project, additional studies which include:

- i) Public Consultations Studies,
- ii) Social Impact and Rehabilitation & Resettlement Studies,
- iii) Traffic Surveys,
- iv) Road Safety Audit, and
- v) Geotechnical Investigations and Slope Stability Analysis were carried out.

Various engineering studies have been carried out and appropriate provisions have been made for road safety and traffic management, slope protections, soil erosions etc.

ENVIRONMENTAL MANAGEMENT PLAN

Objectives of Environmental Management Plan

The main objectives of this EMP are:

- To ensure compliance with Asian Development Bank's applicable safeguard policies, and regulatory requirements of Sikkim and the Government of India;
- To formulate avoidance, mitigation and compensation measures for anticipated adverse environmental impacts during construction and maintenance and ensure that environmentally sound, sustainable and good practices are adopted;
- To stipulate monitoring and institutional requirements for ensuring safeguard compliance; and
- The project road should be environmentally sustainable.

Impacts and Mitigation Measures

Anticipated potential impacts and suggested mitigation measures specific to this project are summarised in following paragraphs. These mitigation measures will be implemented as part of this project.

Impacts

Following are anticipated potential adverse environmental impacts:

- Impacts on surrounding area due to tree cutting (3079) for the proposed widening;
- Impacts due to conversion of 1.03 hectare of forest land for non-forest purpose;
- Temporary impact on land and air environment due to locating construction camp;
- Temporary impact on land, air and water environment due to establishing and operating construction plants (Hot Mix Plant and Diesel Generator [DG] sets);
- Impact on biophysical environment due to quarry operation;
- Impacts on roadside flora and fauna;
- Impact on air quality, water quality, drainage, road users due to construction activities of project road ;

- Impact on land and water environment due to disposal of waste materials; and
- Impact on occupational health and safety due to all onsite and offsite construction works.

Mitigation Measures

Compensatory Tree Plantation

The compensatory plan is being developed in consultation with local forest department. As per compensatory afforestation, the tree plantation will be done three times of tree cutting.

Slope Protection and Bio-engineering Measures

The bio-engineering measures are suitable for slope protection in hill roads. The following items have been suggested as bio-engineering measures for slope protection in hill roads.

- Turning of slopes through rough grassing; and
- Tree plantation along the hill section (slopes) of the project road to control the soil erosion.

The above items as bio-engineering measures have been incorporated in EMP budget.

Excavated Road Side Debris and its Disposal

The provision has been made in cost estimate to use the roadway excavated materials as necessary for the construction of road, which are as follows.

- For all types of soil, such as ordinary rock, hard rock and
- Excavation from drain and foundation of other structures.

As per above description, the Contractor will use the excavated road side material for construction of road. The rest unsuitable material will be disposed suitably. Presently, the location has been identified as Khichudumra. However, other suitable locations will also be identified with due consultation with the Forest Officials.

Protection of Water Bodies

The surface water bodies in the project road require protection during construction phase of the project road. The Contractor shall not disturb/ pollute the surface water due to construction activities of the project road. The Contractor will be responsible to protect the surface water and to ensure this, monitoring of the water quality shall be carried out during construction and operation phase. However, extra payment for the same will not be given.

Re-development of Borrow Area

The items for redevelopment of borrow area such as preservation of top soil and re-application of stored top soil has been considered in proposed EMP cost. The Contractor will re-develop the borrow areas before closing of same. The estimated quantities for preservation and re-application of the top soil has been considered for redevelopment of borrow area.