

Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads

Upgrading of Narayanghat-Mugling Road

(Chainage : Km 2+425-Km 35+677)

EXECUTIVE SUMMARY OF THE ENVIRONMENTAL ASSESSMENT REPORT

March 2013

MMM Group Ltd. (Canada)
in JV with
SAI Consulting Engineers (P) Ltd. (India)
in association with
ITECO Nepal (P) Ltd. (Nepal) &
Total Management Services (Nepal)

Abbreviations

ADB	Asian Development Bank
AIDS	Acquired Immune Deficiency Syndrome
APs	Affected Peoples
B/C	Benefit/Cost
BFC	Barandabhar Forest Corridor
BOQ	Bill of Quantities
CBO	Community Based Organization
CBS	Central Bureau of Statistics
CDO	Chief District Officer
CFC	Compensation Fixation Committee
CFUG	Community Forest User Group
CGI	Corrugated Iron
Ch.	Chainage (km)
CMS	Consolidated Management Service Nepal (P) Ltd.
DADO	District Agriculture Dev Office
dB (A)	Decibel (A)
DDC	District Development Committee
DFO	District Forest Office
DoR	Department of Roads
DWSC	Department of Watershed and Soil Conservation
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Act
EPR	Environmental Protection Regulation
FGD	Focus Group Discussion
FRCU	Foreign Cooperation Unit, DoR
FS	Feasibility Study
FY	Fiscal Year
GDP	Gross Domestic Product
GESU	Geo-Environmental and Social Unit
GI	Galvanized Iron
GIS	Geographical Information System
GNP	Gross National Product
GoN	Government of Nepal
GRC	Grievance Redress Committee
HIV	Human Immunodeficiency Virus

I/NGO	International/Non-Governmental Organization
IEE	Initial Environmental Examination
LFB	Local Forum of Beneficiaries
MoEST	Ministry of Environment, Science and Technology
MoF	Ministry of Forest
MoPPW	Ministry of Physical Planning and Works
Msl	Mean Sea Level
mt	Metric Ton
NPC	National Planning Commission
NTFP	Non Timber Forest Product
PAF	Project Affected Family
PAP	Project Affected Person
RAP	Resettlement Action Plan
RCC	Reinforced Cement Concrete
RM	Running Meter
RMDP	Road Maintenance and Development Project
RoW	Right of Way
RRA	Rapid Rural Appraisal
SIA	Social Impact Assessment
SLC	School Leaving Certificate (Class 10)
SRN	Strategic Road Network
STD	Sexually Transmitted Disease
SWRP	Sector Wide Road Programme
ToR	Terms of Reference
VDC	Village Development Committee
TSP	Total Suspended Particulates
vpd	Vehicles per day
WB	The World Bank

BACKGROUND AND INTRODUCTION

1. Enhancing trade competitiveness is one of six priorities of the Government of Nepal's development plan. For this, the Government of Nepal (GoN) has requested the World Bank to provide IDA financing, to support Nepal in addressing its commitments to enhancing regional trade including along the Kathmandu-Kolkata Corridor. The GoN's 2010 Trade Integration Strategy (NTIS) seeks to enable inclusive growth in Nepal through enhancing the competitiveness of Nepal's exports and reducing the cost of trade.
2. The priorities of this strategy include: (i) reducing the time and cost of trade-related transactions through efforts at simplification, harmonization, and automation; (ii) building the capacity of domestic trade-related institutions including for sanitary and phytosanitary inspections, trade negotiations, trade facilitation and logistics, and monitoring and regulating trade-related sectors; and, (iii) enhancing the Government's ability to coordinate trade-related institutions and development partners.
3. Towards meeting the priorities identified in the NTIS, the World Bank is currently implementing the Nepal Regional Trade Non-Lending Technical Assistance Program (NLTA) designed to enhance the government's capacity to implement the NTIS by providing technical assistance to the key trade-related institutions to: (a) develop plans for trade facilitation and logistics; (b) put in place an effective monitoring system; (c) undertake key sector studies and receive just-in-time expertise (as needed) and; (d) draft capacity development plans (including for HR development, change management and coordination).
4. To take forward the actions/activities identified by the NLTA, *the Nepal-India Trade and Transport Facilitation Project (NITTFP)* is being designed. The main objective of the proposed project is to facilitate efficient transit and transport of goods traded between Nepal and India.

Objectives of the NITTFP

5. The proposed development objective is to facilitate efficient transit and transport of goods traded between Nepal and India. This will be done by removing key trade-related infrastructure constraints within Nepal, and by alleviating soft barriers to trade between Nepal and India. The expected outcome as a result of project interventions is a reduction of transport time and logistics costs for Nepal's international trade.
6. The estimated total project cost is US\$101 million. IDA would finance US\$99 million, and the IFC will provide US\$2 million in support from its South Asia Regional Trade and Integration Program (SARTIP). The projected costs allotted to sub-components may change when all feasibility studies are finalized.

Project Components

7. The project will have three components. The proposed activities under each of these components have been briefly described below.

Component 1: Modernize transport and transit arrangements between Nepal and India:

The project seeks to improve the efficiency of the systems used to manage and control the movement of Nepal's and India's international trade by providing technical assistance to introduce a modern and effective transit regime between the two countries including assistance to:

- (a) Nepal to propose evidence-based amendments to the Transit Treaty and Rail Services Agreement in order to expedite the movement of third-country trade passing through the two countries;
- (b) Nepal and Indian Customs to simplify and harmonize customs and border management procedures, processes and systems, especially to provide for electronic interchange of transit data; and,
- (c) the road transport regulatory authority in Nepal to strengthen and modernize the regulation of international trucking services including axle load control and road safety from a transport management perspective.

Component 2: Strengthen Trade-Related Institutional Capacity in Nepal:

(a) Trade Portal and Single Window System Development:

The project will finance the design, development and implementation of two closely interrelated information and communications technology (ICT) systems and related business process improvements to improve transparency and integrity, lower trade transaction costs, improve inter-agency coordination and reduce the time taken to clear goods. These systems will also assist Nepal to comply with current and future WTO requirements (GATT Article X) dealing with publication of trade rules and transparency. The Nepal Trade Information Portal (NTIP) will provide a single user-friendly website where comprehensive and up to date information on all tariff and non-tariff measures (including all relevant rules, regulations, procedures and fee schedules) applied at the time of import, export or transit is readily accessible to traders. The Nepal Single Window System (NSW) will allow traders to submit and have processed all required import, export and transit documentation electronically via a single gateway instead of submitting essentially the same information numerous times to different government entities. A significant amount of preparatory work for the component has already been undertaken under the Bank-managed NLTA program including an assessment of the legal and regulatory framework, preparation of options for the most effective governance and operational models, preparation of the technical and functional architecture for the NSW, preliminary work on business process simplification, change management and communication as well as capacity building for officials and the trading community. Lessons from successful Trade Portal and National Single Window systems elsewhere in the world (such as Lao PDR for the Trade Portal and Singapore, Philippines, and Indonesia for the Single Window) have been incorporated into the project design.

- (b) **Institutional strengthening for Interagency Coordination including financing of Project Coordination Office (PCO):** Coordinating the multiple trade-related agencies in any country is a complex resource-intensive task, and Nepal currently does not have sufficient capacity to manage this task and ensure active and sustainable cooperation between multiple stakeholders. As such, the focus of this sub-component will be on strengthening Nepal's National Trade and Transport Facilitation Committee and the capacity of the Ministry of Commerce and Supplies (MoCS) to coordinate the trade-related agencies. Since the PCO is established within MoCS, its capacity will be strengthened to coordinate the implementation of the different activities and components of the project. Technical advisors will be hired for every sub-project, as well as skills for procurement, financial management, environmental and social safeguards, and monitoring and evaluation (M&E).

Component 3: Improve Select Trade-Related Infrastructure

- a) **Expand and upgrade the Narayanghat-Mugling road section and implement measures for improvement of entire Birgunj-Kathmandu Corridor:** Upgrade and expand 33km of the Narayanghat-Mugling road section to Asian Highway Standard and address road safety, axle load control and biodiversity conservation issues along the trade corridor. This section experiences the heaviest traffic load carrying 90 percent of Nepal's international trade traffic (about 6000 vehicles per day). Since the improvement of border post infrastructure is expected to increase traffic along the entire Corridor from Birgunj to Kathmandu, the Project will also finance studies for the upgradation and expansion of other segments along the Corridor including the Birgunj-Hetauda section. Studies to be financed include those for environmental and social safeguards (including biodiversity management) as well as feasibility and design studies for the upgradation and maintenance of bridges along the corridor, and for the upgradation and expansion of the Birgunj-Hetauda road section.
- b) **Build a Container Freight Station (CFS) in Kathmandu.** To facilitate the loading and distribution of goods in the Kathmandu Valley, a CFS will be built in the Kathmandu Valley. The CFS will contain a parking lot and warehousing facility. Government will acquire the required land. Five possible sites were reviewed, with the optimal one being the site in Chobar formerly used for a cement factory and is now no longer operational. This site is owned by Government with access to the Inner Ring Road and Outer Ring Road.
- c) **Improve the infrastructure at Birgunj and Bhairahawa ICDs.** Improvements are needed at these two key ICDs to facilitate further trade and to improve the efficiency of current trade. At the Birgunj ICD, the existing warehouse shed covers only about half the length of a train shipment. During the rainy season, the remaining goods are exposed to the elements and perishables goods would rot or suffer damage. There is also insufficient space for the loading and unloading of existing and anticipated future goods trade, which prolongs the queue/idle time and clearance time. Disabling of a set of unused tracks would create additional space for loading and unloading of Nepal's international goods trade which would also speed up these processes. The new extra space is especially needed for edible oils. At the Bhairawa ICD, heavy rains and usage have caused severe damage to the surface of the ICD infrastructure including the access road and parking lot. Resurfacing with better materials is needed to restore the ICD to a useable state. A maintenance plan will also be prepared to prevent such damage in the future.
- d) **Pilot Multi-Functional Joint Analysis Laboratory** (including for Customs and SPS testing including food, plant, and animal quarantine): i) Provide capacity and change management support to agencies and stakeholders involved in the SPS testing and certification process to agree to simplify and harmonize their procedures within Nepal, and to draft a work plan towards upgrading standards and mutual recognition of certifications between Nepal and India. If co-located multi-functional laboratories are deemed necessary to facilitate the clearance process, a work plan with the input and agreement of stakeholders will be drafted which will include a governance plan, HRD plan, and operational procedures. The agencies and stakeholders involved in this initiative/working group include the Ministry of Commerce and Supplies, Department of Customs, Department of Agriculture, Department of Livestock Services, Department of Food Technology and Quality Control, and the Chamber of Commerce. (ii) Finance the provision of equipment, IT systems and connectivity, technical assistance, staffing and human resources capacity development, and change management support to pilot one or two new multi-functional, multi-agency, joint analysis laboratories at locations to be determined by stakeholders.

Narayanghat-Mugling Road Section

8. Infrastructural development, particularly faster movement and transportation of goods in a country like Nepal, is a guiding factor for economic development. Proper transportation of goods requires a comprehensive transport system and increasing road traffic requires better riding quality of roads and uninterrupted movement. Hence, it becomes necessary to develop and upgrade roads.

9. As part of the Component 3 under the proposed NITTFP, a 33km long road section between Narayanghat and Mugling, carrying a substantial percentage of Nepal's international trade has been proposed for upgrading. The Project would support upgrading of this road to a two-lane Asian Highway Standard from an existing intermediate carriageway and finance associated costs including road safety, axle load control and environmental management measures. The proposed works would provide smoother, faster and comfortable access by eliminating traffic jams/congestion that frequently occurs on this road section.

Environmental Assessment Study

10. The proposed upgrading work was earlier being considered for inclusion under 'Additional Financing' of the Road Sector Development Project (RSDP). In line with the scope of the engineering works, the proposition for road upgrading required an Initial Environmental Examination (IEE) as per Govt. of Nepal's Environmental Protection Act (EPA 1997) and Environmental Protection Rules (EPR'97) 3, Schedule 1(D)(6) that deals with the improvement, rehabilitation and reconstruction of a Highway. Thus, an IEE was conducted and a report was prepared in April 2008 in line with the mandatory requirements set forth in the said regulations. Subsequently, the IEE report was also approved by the authorised agency, Ministry of Planning and Physical Works.

11. The Govt. of Nepal has now decided to include the proposed upgrading works for Narayanghat-Mugling Road under NITTFP. The IEE undertaken by the Department of Roads through its consultants in April 2008 has been revised/updated and improved in the last one year to meet the requirements of Bank's operational policies.

12. The main objective of this exercise was to fill the gaps identified in the IEE report and contribute towards avoidance, minimization and mitigation of the likely adverse impacts through mainstreaming the study findings into the various stages of the project cycle. The revised version of IEE (this report) is now titled the 'Environmental Assessment Report' in line with operational policy requirements set forth in Bank's OP 4.01.

13. Based on comments and suggestions provided by the World Bank since the inclusion of the road under NITTFP, specific assessment was carried out, with a particular focus on bio-physical aspects. The revision of the report also targeted strengthening of the baseline information, carrying out analysis of alternatives, renewed consultations with key stakeholders and reinforcement of the Environment Management Plan with specific additional measures to deal with biodiversity issues.

14. More specifically, the environmental assessment study has sought to:

- Strengthen baseline information by including secondary and primary (including field surveys) information, particularly on the biodiversity aspects
- Identify areas/stretches of concern and presence of endangered species of flora, fauna and aquatic life, if any
- Identify the major issues that may arise as a result of the proposed works on bio-physical environment of the project area
- Provide information to the decision-makers about the environmental implications/ impacts of the proposed project and its associated cost for mitigation.

- Recommend practical and site specific environmental management and mitigation measures as may be necessary and include these in the Environmental Management Plan for the project

Methodology

15. Questionnaire and formats were developed for survey and necessary data collection. Data/information on natural/biological, physical and social parameters was generated through field surveys and literature review. Primary data and information was generated through field observations and surveys, questionnaire, focus group discussion, consultation with key stakeholders and from professional judgment. Stakeholders consulted with in the data collection included officials from Departments of Roads, Department of Forest, Department of National Parks and Wildlife Conservation, Range Officers, Non-Government Organizations, Community Forest Users, local people and their representatives, Road Users including truck and bus operators, and fishermen along the project route. GPS was used for to take reference. The field work also involved jungle treks and quadrature survey. The quadrature method was used for generating the information about the density of floral species within the specific area. The quadrature survey was done in the Barandabhar Forest Corridor. The quadrates were taken of 30x50 m along the area of forest at four different locations.

16. Secondary information was collected through published and unpublished reports and maps one important source being the 'Barandabhar Management Plan' prepared by the Department of Forest, Govt. of Nepal. Also secondary data were collated from reports/information of DoR.

Description of the Road

Table 1: Key Features of the Road

Name of Road	Narayanghat – Mugling Road
Geographical Location	Central Development Region
Zone	Narayani Zone
District	Chitwan
Altitude of the lowest point	200m
Altitude of the highest point	265m
Climate	Sub-tropical
Total Road Length	36 km
Road Length in the Project	33.2 km
Class of Road	National Highway - H05

Figure 1: Salient Features of the Narayanghat-Mugling Road

- Important Link (designated as H-05) of Strategic Highway Network of Nepal
- Connects Narayanghat located at east-west Mahendra Highway (H-01) to Mugling located at east-west Prithvi Highway (H-04)
- Section included in the current project: Aaptari (Bharatpur bypass junction, km 2+400) to Mugling (km 35+677), total length 33.277 km
- Part of Asian Highway AH-42 (297 in Nepal from Kodari to Birgunj) as categorized by UN ESCAP (IGA Nov 18, 2003). AH42 is a route of the Asian Highway Network, running 3,754 km from AH5 in Lanzhou, China to AH1 in Barhi, India. It passes along Kodari, Kathmandu, Narayangarh, Pathlayia and Birganj.
- Traffic volume: AADT 5968
- Aligned along river valley along left bank of Trishuli river.
- Lesser Himalaya and Siwalik geological belts encountered.
- Crosses a number of cross drains: tributaries at eastern bank of Trishuli river.
- 18 existing medium bridges across the cross drains along the road link.

17. The Narayanghat-Mugling road follows the left bank of the Trishuli river and does not involve steep gradients. For this reason, the road has been the preferred route to and from Kathmandu, specifically for trade traffic moving from/towards Biratnagar, Birgunj and Siddhrathnagar. The road lies in Chitwan district of Central Development region of Nepal.

18. The road starts at Narayanghat (km. 0+000) but the proposed section under the project would start at Aaptari (km 2+425), the junction where the bypass road to Bharatpur meets. The road ends at Mugling (km 35+677) in Chitwan district, where the road meets the east-west Prithvi Highway. The total length of the road under the project is therefore 33.2 km.

19. The road follows the left bank of the Trishuli River from Ramnagar (km 5+500) up to Mugling (km 35+677). The project road has bridge crossings over 18 tributaries of Trishuli River.

Need for Upgrading the Narayanghat-Mugling Road

20. The Narayanghat-Mugling road is an important link between the commercial transit points of the country with India through which commodities to the capital city and others part of country are supplied. It also helps to facilitate the trade between India and Nepal and is a part of the key trade transit corridor with India.

21. The proposed upgrading works are needed on account of the following reasons:

- Currently, the existing intermediate lane width of 5.5 m often faces traffic congestion.

- Road width is affected by landslips frequently experienced during monsoons which further reduce the width for traffic flow.
 - There are no alternative efficient road links connecting traffic from east-west Mahendra Highway to capital city of Kathmandu.
 - Road link is a traffic bottleneck in the core road network of Nepal as there are no efficient alternative north-south links.
 - The Narayanghat-Mugling road would remain a vital link till the completion of the proposed fast track and/or Kathmandu-Hetauda tunnel way, both of which are not likely to be completed in the next at least 10 to 15 years.
22. The widening/expansion and upgrading of the Narayanghat-Mugling road is therefore necessary to cater to the growing traffic and meet the requirements of trade and transport between India and Nepal.

Proposed Interventions

The following engineering interventions have been proposed for the Narayanghat-Mugling road:

- Widening of the road was found feasible with 11 m carriageway width from km 2 to km 16 and 9 m carriageway width has been proposed from km 16 to km 36
- Widening at mountainous section from km 16 to km 36 is mostly towards valley side to avoid hazardous and unstable conditions on the hill side
- Pavement strengthening is proposed for entire carriageway width in view of the increased traffic volume and projected cumulative axle load.

Proposed Improvement

23. The basic proposition is to upgrade the road to a two-lane Asian Highway Standard. The width of road is intended to be expanded to 11m upto km 16 km and then upto 9 mts. till the end of the road at Mugling.

Table 2: Proposed Cross-Section

Proposed Cross Section	
Right of Way	30 m
Formation	11.0 m from km 2+425 to km 16+000 9.0 m from km 16+000 to km 35+677
Carriageway	7.0 m
Shoulder	2.0 m Paved both sides from km 16 1.0 m Paved both sides from km 16 to km 35+677

REVIEW OF RELEVANT ACTS, REGULATIONS AND GUIDELINES

24. The Environmental Assessment Report has been prepared based on the policy and principles of the DoR's sector-wide Environmental and Social Management Framework (ESMF) which is in harmony with the Acts of Government of Nepal (GoN) and World Bank Policy on Environmental Assessment (OP 4.01) to ensure the integration of protection/conservation of environment in the process of development. The environmental study for Narayanghat-Mugling road is guided by the various requirements and provisions of the GoN and World Bank applicable acts and regulations. It is the responsibility of the various Project Implementing Entities to ensure that proposed activities are consistent with the regulatory/legal framework, whether national or local. Additionally, it is also to be ensured that activities are consistent with World Bank's operational policies and guidelines.

Table 3: List of GoN Acts and Regulations, and International Policies applicable to the project

Act/Regulation
Environmental Protection Act, 2053 BS (1997 AD)
Environmental Protection Rule, 2054 BS (1997, amendment, 1999 AD)
Forest Act, 2049 BS (1993 AD)
Forest Rules, 2051 BS (1995 AD)
Forest Policy, 2000
The Labor Act, 2048 BS (1992 AD)
National Park and Wildlife Conservation Act, 2029 BS (1973 AD)
Local Self Governance Act, 2055 BS (1999 AD)
Land Acquisition Act, 2034 BS (1977 AD) and Land Acquisition Rules, 2026 BS (1969 AD)
National Environmental Impact Assessment Guidelines, 1993 (2050 BS)
The National Transport Policy, 2001 (2058)
Three Years Interim Plan, 2007/08 to 2009/10
The Interim Constitution of Nepal, 2063 (2007 AD).
Convention on Biological Diversity, 1992
International Legal Instruments Plant Protection: Agreement for the South East Asia and the Pacific (as amended), 1956, Convention on International Trade in Endangered Species of Wild Fauna and Flora, (CITES), 1973.

25. The study also used the relevant guidelines: Environmental Management Guidelines, GESU/DoR, July, 1999 and the Reference Manual for Environmental and Social Aspects of Integrated Road Development, 2003 (2060 BS)

26. The following operational policies of the World Bank are relevant in context of this Project from an environmental viewpoint: Environmental Assessment (OP 4.01); Natural Habitat (OP 4.04); Forest Policy (OP 4.36) and Cultural Property (OP 4.11)

BASELINE ENVIRONMENTAL CONDITIONS

27. As a precursor for the prediction of potential environmental impacts likely to arise, the EAS established the base line environmental status which includes a thorough appreciation of the physical, natural and socio-cultural environment along the project roads and within the project influence area. The baseline conditions which covers

- Physical Environment – Geomorphology and Topography, Geology including the distribution of rock and soil types along the road alignment; landslides and slope stability; source of construction materials, land use, climate and rainfall, hydrology and drainage

system including details of the 18 major river crossing and bridges; existing traffic, and air and noise quality;

- Biological environment including vegetation, aquatic life and forest, taking into consideration existing anthropogenic disturbances occurring along the stretch; flora and fauna in the corridor and particularly in the Barandabhar Protected Forest - the a 29 km long forest patch, extending from Mahabharata range in the north to Chitwan National Park to the south. The Barandabhar forest covers an area of 87.9 sq. km and bisects the Chitwan District in east and west Chitwan. Specific stretches falling within the gazetted Barandabhar Forest Corridor are recognized as valuable for wildlife connectivity;
- Sociocultural Environment considers the population and demography, ethnic group distribution, settlement and housing, occupation and livelihoods, agriculture and human resources, literacy and education, food security and other key indicators of human welfare, land type and holding size, food production, markets, industries, income and expenditure, gender, religion, service and utilities, settlements and other relevant features along the road.

28. An understanding the baseline environmental parameters/characteristics is necessary for the decision making from an environmental point of view about the design, implementation and operational issues of the project.

29. For this study, the direct area of influence that has been considered is the Right of Way (30 mts.) along with the sources of raw materials (sand, water, aggregate, earth), haul roads and debris disposal areas. The indirect area of project influence includes natural, social features and land uses located within one kilometre from the Right of Way edge.

ASSESSMENT OF IMPACTS AND POSSIBLE MANAGEMENT MEASURES

30. The identification and prediction of impacts gives due consideration to the proposed actions/activities during construction and operation stages of the Project. Both beneficial and potential adverse impacts were analysed/assessed and summarized in the table below.

Table 4: Summary of Potential Impacts and Possible Management Measures

Stage	Impacts Description and Management Measures
Likely positive Impacts at Construction Stage	
Employment and Income generation	Project has a potential for creating 200000 person/day unskilled and 100000 skilled labour opportunities at the local level.
Enterprise Development and Commercialization	Enterprises will contribute to the local rural economy and may help reduce rural poverty in the main market centres are Narayanghat, Ramnagar, Jugeedi, Dasdhunga, Gunmune, and Mugling.
Skill Enhancement	Employment opportunities to the local poor people will also engender transfer of skills and technical know-how while working in construction works. It will enable them to get jobs in similar activities in other projects.
Development of Services	Local people will have the opportunity to develop their educational and health facilities and the road project may also indirectly contribute/support to uplift social service sector including health and education facilities through increase in income
Utilization of Open Space	The project could utilize the open space that would be available along the road corridor for vehicle stop, toilet facilities, tree plantation, and recreation.
Likely positive Impacts at Operation Stage	
Improved Access to the people and commodities	Improved access from the road widening to will facilitate movement and transport of people and commodities from other parts of the country as well as from India to the capital city of Kathmandu. New market areas and settlements will develop, urbanization and industrialization will be possible, and all this will lead to the regional development of the

	area.
Asian Highway	The proposed upgrading works will make the existing Highway into Asian Highway standard. It will assist to create trade and transit corridor between India and China. This will immensely enhance the economic benefits for Nepal.
Promotion of Industries in the area	The upgrading of road can enhance industries in these areas due to wider and smooth-road.
Rise of Land Values	Land values are expected to increase
Empower women	Through provision of better access to schools, health centres, and markets. The road will enable better access to development training institutes, offices and various administrative line agencies located in the district headquarters. Easy access will encourage more women development focused NGOs/ CBOs, to come and operate in the Project Area, resulting in increased awareness programmes on HIV/AIDS, safe sex, girl and boy trafficking.
Decline in Soil Loss	Applying slope protection measures extensively mainly through civil engineering structures and bio-engineering methods will render results in declined soil loss
Management of Biological Resources	Limiting tree felling and undertaking compensatory afforestation; introducing various plant species for slope stabilization will also contribute to improving both road safety and the green cover. It will help to increase forest product, soil conservation and habitat of wildlife. To facilitate wildlife movement, special measures will be provided such as signboard, under passes, drain cover etc.
Benefit augmentation measures	Project related beneficial impacts could be augmented by involving the local people during the construction and operation of this road project.
The project activities during construction and in the operation of the road may create a number of adverse impacts on the local environment. A summary of the adverse impacts and proposed mitigation measures are provided below:	
Adverse Impacts at Construction	
Change in Land use	Construction may impact cultivated land, forest/scrub land and built up area along the road. The impact will be permanent, irreversible, direct, medium, local and for long term Mitigation Measures: Compensation will be given for affected private properties. Plantation of trees will be done on all available areas and roadside slopes to increase greenery in the area.
Impacts due to Slope Instability	Soil erosion will mainly occur during the construction period due to excavation, cutting and removal vegetation cover. About 12 locations that are landslide prone areas are identified along the road alignment. Deep and steep slope excavation may cause instability of slope and cause landslide. Few flooding related problems can be seen along road alignment where natural drainage crosses the road. During construction period some landslide will be active due to slope cutting. Mitigation Measures: Avoiding back cutting in vertical rocky area and fragile locations. Include river training works, gully protection works in design. Recommend adoption of bio-engineering techniques such as grass seeding, turfing, grass plantation, brush layering, tree/shrub plantation, bamboo plantation, and dry stone rip rap. Provide additional civil engineering structures for slope protection, flood protection, drainage management at key identified locations.
Impacts due to Spoil Disposal	Unmanaged disposal of spoil may cause (i) blockage of natural drainage systems, (ii) loss of organic fertile top soil and farmlands, crops and forest, (ii) water logging with potential impacts on public health and safety and scenic beauty. Mitigation Measures: Ensure safe disposal and management with minimum environmental damages; use surplus spoils to (i) fill eroded gullies, close quarries and borrow pits, and depressed areas (ii) for reclaiming the degraded land in near vicinity in consultation with local communities. Provide disposal site with proper drainage, vegetation cover and adequate protection; and

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	compact and trim the slope of disposed spoils using bioengineering measures. Strictly prohibit site casting /Spoil disposal in dense forest area and in critical locations.
Impacts on Water Resources by Inadequate Drainage	Potential blocking of river crossing and natural drainage from road construction especially during the construction of embankments, shoulders, re-construction/repairing of culverts etc. This could create temporary inundation of areas closer to the above locations during rainy season. Mitigation Measures: provide adequate numbers of drainage structures in order to have minimum interference with natural drainage pattern of the area; channelize surface water discharge from side drains; do not block or divert water away from natural watercourse.
Impacts due to Quarrying Materials and Borrow Pit Operation	Extracting the large amounts of construction materials from inappropriate sites or in excessive amounts can seriously damage the local environment eg if quarrying is done high slope and fragile areas, excess amounts from river or box cutting of agriculture land. This will eventually affect the livelihood of local people. Mitigation Measures: Quarry and borrow operation plan will be prepared and approved by Environmental Engineer; avoid quarry/borrow operation in unstable sites, erosion prone area, forest area, settlements, and fertile farm land; rehabilitate quarry sites with appropriate civil engineering structures and bioengineering measures
Impacts from Air, Noise and Water Pollution	Construction activities will likely cause dust and noise pollution from earth works excavation, quarry operations, crushers, asphalt plants; from equipment operation and exposure of soil. Vehicle and machinery emit smoke and fine particles which will increase the local air pollution significantly during the construction stage causing inconvenience to local people residing closer to the proposed road or quarries etc. Burning of fossil fuel would emit sulfur oxides (SOx), nitrogen oxide (NOx), Carbon dioxide (CO2) and particulates. Asphalt plants would also create problems of ash disposal and thermal pollution. Combustion of fossil fuels release greenhouse gases in. Potential contamination of top soil from chemical spills and work camp generated waste could pollute nearby water sources affecting aquatic fauna and local source of water supply Mitigation Measures: Use of masks by the workers operating in the areas of high dust generation; avoid disposal of excavated materials in the water bodies; use of ear muffs, helmet to lessen noise pollution during rock breaking and quarrying; cover dry material or make it wet during transportation.
Camp Sites and Storage Depots	Camp siting may cause encroachment of agriculture land and alteration of drainage, solid waste and waste water problems Mitigation Measures: Use local labor to avoid camp sites; rent local house instead of camp to house laborers; site camp away from productive lands areas; pay compensation for using private farm or lands for storage or camp.
Construction Equipment and Vehicles	The Machine Intensive Road Construction Approach will negative impacts in air, noise pollution due to emission of smoke, increase in vibration due to vehicular movement.. Mitigation Measures: Provide safety gadgets to labourers during construction work. The equipment/vehicles deployed for construction activities would have to be regularly maintained. All the vehicles deployed for material movement would be spill proof to the extent possible.
Impact on community infrastructure	Construction material storage site pose adverse impact during construction stage. Erosion from stockpiled material will cause water pollution, land value degradation, loss of agricultural productivity, and nuisance. Landscape degradation from indiscriminate dumping of spoil, poorly designed quarrying operations and mismanagement of waster in roadsides may create scars in the landscape. Spillage of bitumen could affect soil productivity, water pollution and cause adverse impacts on human health Mitigation measures: Discourage indiscriminate dumping of spoil, rehabilitate local landscape, plant local species along the roadside. In handling bitumen workers will use appropriate safety gear, avoid storing bitumen near water bodies, avoid heating using firewood, and avoid bitumen related

	work during rainy condition. Similar caution would be adopted in handling fossil fuel, lubricants, acids and other chemicals.
Impact on Vegetation and Forest Resources; Wildlife Habitat and Movements	Road passes through forest areas at various stretches. Over the 30 year operation, the road has created some ecological impacts, habitat fragmentation and affecting free movement of wildlife in forest landscape. Upgrading of the road will slightly result in acerbating this effect due to widening of the formation width. The proposed road passes through 9 community forests and Government forest. From the community forest and government forest, total 261 numbers of various species and 3.97 Ha. Mitigation Measures: To avoid future induced impacts from fragmentation, certain management measures to restore the free movement of wild animals to the possible extent and avoid accidents with heavy traffic that is using this road mainly between Km 3+550 and 7+600, where some wildlife crossing/ movement area was found. Measure will include provision of underpasses, traffic calming measures, watering holes in the BFC core area, support habitat improvement in the BFC core area; awareness programs for workers on habitat protections; provision of drain covers; provision of illustrated signboards to educate road users in the corridor, restricting labourer access to sensitive areas, developing biodiversity management plans. Limit site clearance for construction to the least/minimum width. Unless absolutely necessary avoid tree or vegetation cutting. Undertake Afforestation program in open space in forest area. Manage construction activities near forest area to ensure least disturbance to the wildlife and birds. Discourage workers collecting fuel wood from forest or Poaching/harassing of birds or animals. Coordinate project with DFO/CFUG to control the activities like poaching by enforcing acts and regulations strictly. With regards to aquatic life, during construction in critical sections on the valley side which directly fall into the river, use critical care to avoid improper construction practices that may affect the aquatic life of Trishuli river
Impact on forest resources due to Source of Energy/Fuel	Illegally collecting firewood for cooking and heating purpose, and for construction Mitigation Measures: Restrict use of woodfuel; provide kerosene for heating bitumen incorporating recommendation in contractor agreement on such provision
Socio-economic effects Eg. Impacts due to Traffic	Traffic diversion could lead to congestion increasing the travel time of local people. Traffic congestions will occur during the construction period especially near townships and buildup areas due to increment in number of vehicles brought for construction activities. Generally traffic jam will be significant during morning and afternoon rush hours. Proper prior planning to accommodate peak traffic flow with construction will help address this issue.
Impacts on Community Infrastructure	Few temporary structures (encroachment of the RoW used to build temporary boutiques retail centers, fences, & front walls etc.) of the road side may need to be shifted. These houses will be compensated under land acquisition act; other affected structures include a number of drinking water sources, chautaries and temples. Few water drinking pipes to be removed as part of widening Any damages during construction of road are subject to immediate repair under the responsibility of the Contractor.
Impact on health of workers and local people living along the road corridor. Occupational Health and Safety, STDs	Engineering activities such as rock cutting, hazardous material handling, machinery operation, bitumen etc could make laborers prone to accidents. Other health concerns will include poor conditions at labor camps, respiratory and eye diseases, influx of workers and potential issues with sexually transmitted diseases Mitigation Measures: The workers shall be provided and made mandatory the use of helmets, safety belts, masks, gloves and boot depending on nature of work; provide clean drinking water at sites and camp; pit toilets at sites and camp; first aid facilities at sites and camp with training to use them; provide group accidental insurance for workers. Awareness generation to local people and workers on HIV/AIDS and other communicable diseases. Pressure on social services,

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	potential conflicts due to influx of construction workers, impairment of existing environmental conditions due to influx of labor would be addressed to reduce/prevent socio-economic effects
Adverse Impacts at Operation Stage	
Landslide and slope failure	As the road alignment area is geologically weak area, landslide could occur in three identified locations potentially blocking the road each year and require for the rehabilitation and maintenance. This may cause damage to road. Mitigation Measures: Maintain slope protection measures and drainage works; Minor landslide and mass wasting will be immediately cleared and slope restored with appropriate technology (bioengineering); adopt soil conservation activities in the right of way and vulnerable areas beyond the road alignment; organize environmental awareness programs for local communities as means to control quarrying in road side hill slopes, grazing cattle on unstable areas
Impacts on Water Resources caused by Poor Drainage	During operation phase, sediments could block drain and culverts, improper disposal of debris or disposing garbage into side drain will create overflow of drains and alter surface runoff paths causing soil erosion and health hazards. This will also induce siltation in nearby stream which can trigger floods as well as affect aquatic flora and fauna Mitigation Measures: Close the side drains especially near towns and maintain regularly to avoid blockage of water; maintain smooth discharge across culverts and cross drainages to avoid water logging; avoid discharging roadside drain water into farmland or environmentally sensitive locations; and regular cleaning of roadside channels to avoid drain blockages
Impact Due to Air, Noise, Water and Soil Pollution	As the road is Asian Highway category and the vehicular movement is expected to be very high, which may cause nuisance to wildlife, and local resident especially in Aptatari to Jugedi area which is considered more sensitive to wildlife. Increased domestic waste from settlements and related livelihoods activities may impact and degrade water quality. Mitigation Measures: Include plantation of trees on both sides of the road as far as possible to provide noise attenuation; speed limit of maximum 40 km/hr in forest area mainly from 2+425 to 8+500 section, awareness program for drivers to drive below design speed to avoid collisions; minimal or no use of horn; erect signs at wildlife crossing areas. To control vehicle speed, joint efforts with DoR, DFO, CFUG, Traffic Police to enforce speed limit
Impact on Sanitation of the Area	Increased traffic volume will also generate problems with solid and liquid waste management with potential adverse impact on wildlife if consumed. Mitigation Measures: Proposed actions will include banning plastic bags in the area, restrict haphazard throwing of garbage by the travellers, notice boards to generate awareness about littering to pollute the area, providing public toilet facilities to be constructed every 10 KM at vehicle stops, etc
Impacts on forest resources	Undesired cumulative and induced impacts may include accelerated logging, illegal extraction of timber and other forest products, incidental forest fires, and the introduction of invasive species (weeds) Mitigation Measures: Engage support of DFO/CFUG and VDCs/DDC and local community in controlling illegal harvesting of forest resources, community awareness on preserving specific forest products, promote cultivation of rare species, NTFPs, promote replacement of firewood by non-forest energy sources such as biogas, subsidized kerosene, gas.
Impacts on Social, Economic and Cultural Environment	The proposed road passes through forest area, small settlements and therefore widening and improving of the surface conditions induces high vehicular speed could increase the risk of increased of road accidents, impacts on wildlife. Influx of laborers and impact due to new settlement along the road, could increase pressure on welfare resources creating social conflicts Mitigation Measures: Include delineators, safety signs in design etc. along the road; provide place illustrated sign boards at accident-prone spots and bus bays. Speed limit, No horn, warning signboard in forest, animal crossing area.

STAKEHOLDER CONSULTATIONS

31. The consultation process and disclosure of information about the project was primarily aimed to share information about the following:

- a) Relevant details of the project scope and schedule
- b) Potential impacts and degrees of likely project impact
- c) Details of the entitlements and the eligibility for R&R benefits
- d) Implementation Schedule with a timetable for the delivery of entitlements
- e) Detailed explanation of the grievance process and other support in arbitration
- f) Special consideration and assistance of all vulnerable groups and
- g) Various environmental management measures to avoid/minimise issues, including those pertaining to health and safety

32. The project consulted both primary and secondary stakeholders during the environmental and social assessment. These consultations/meetings with key stakeholders included the local communities and persons likely to be affected by the project. These meetings were conducted at Ramnagar Bazar, Juredi, Debitar, Dasdhunga, Simaltal, Santibazar and Mugling located along the existing road.

33. Main Messages from the consultations centered around

- a) **Involvement of local people in project design finalization: Employment opportunity for local people Fair and timely compensation rate: Special consideration was sought for the vulnerable households** affected by the project - either by changing the technical design or through supplementary compensation.
- b) **Regular monitoring of the project** during implementation by the project authority to ensure the technical quality of work and environmental conservation (particularly to prevent/minimise landslides).
- c) **Provision of a separate unit** in the project to listen to the suggestions and grievances of the local people.

34. **Stakeholder Consultation at the National Level At the national level:** In order to seek feedback from key stakeholders including government and non-governmental agencies engaged in planning and design of infrastructure projects, a national level consultation workshop was organized on December 20, 2012 as part of the project preparation process on the preliminary draft Environment and Social Safeguard reports. The consultation forum offered an opportunity to bring together key stakeholders to deliberate and identify means (and specific measures) through which responsible development of linear infrastructure can be promoted by securing habitat integrity and promoting social benefits, particularly in the context of the Barandabhar Forest Corridor through which a small portion of the Narayanghat-Mugling road traverses. The outcomes/suggestions from this workshop are reflected, as appropriate, in the over-all sub-project design.

ANALYSIS OF ALTERNATIVES

35. The environmental assessment examined and systematically compared feasible alternatives for the proposed project to help avoid or minimize impacts that would be inevitable. Analysis of alternatives compared options in terms of their potential environmental, social impacts, capital costs, suitability under

local conditions, including institutional, training and monitoring requirements. Analysis looked at 'with and without' project scenarios, alternative alignments, options under formation width (FW), construction approach, time schedule and materials to be used.

36. The final choice in terms of decision to proceed with widening the road, the engineering design, alignment, formation width, construction schedule, choice and source of building materials have therefore been derived following a comparison of possible feasible options.

ENVIRONMENT MANAGEMENT PLAN

37. Based on the environmental impacts predicted, an environmental management plan, has been prepared for the proposed project and would be incorporated in the bidding/contract documents. The Environmental Management Plan (EMP) consists of the set of mitigation, monitoring and institutional measures to be taken during pre-construction, construction and operation stages of the project to eliminate/reduce adverse environmental impacts. The plan also includes the actions, needed for the implementation of these measures and designates responsibility for implementing the action as well as an indication of what stage in the project cycle. The EMP has been prepared as per the requirements of World Bank OP 4.01- Annex C.

38. The main aim of the Environmental Management Plan is to ensure that the various adverse impacts associated with the project are properly mitigated. The **objectives** of the EMP are outlined below:

39. **At the design stage**, the Management Plan will envisage minimum impact on the natural environment, maximum safety to the highway user and road side communities, incorporating environmental safeguards and defining mitigation measures that effectively reduce the expected environmental degradation to an acceptable level.

40. **At the construction phase**, the Management Plan will outline implementable, economically feasible mitigation measures to be carried out by the contractor to prevent negative impacts; and make provisions that ensure that the requirements of the EMP are strictly followed and implemented through strengthened implementation arrangements.

41. Operation Stage will focus on preventing deterioration of environment components of air, water, soil, noise etc; and improving the safety of the highway users and road side communities.

42. The application and implementation of the EMP therefore, will:

- Support the integration of environmental aspects into the decision making process of all stages related to planning, design, execution, operation and maintenance of sub-project in question, by identifying, avoiding and/or minimizing adverse environmental impacts early-on in the project cycle;
- Enhance the positive/sustainable environmental and social outcomes through improved/sensitive planning, design and implementation of various activities;
- Minimize environmental degradation resulting from direct or indirect effects of the project, to the extent possible;
- Protect human health;
- Minimize impacts on social and cultural environment; and
- Support the achievement of compliance with applicable laws and regulations of Nepal as well as with the requirements of relevant Bank policies on environment aspects.

Environmental Management and Mitigation Measures

43. At the preconstruction stage, the proponent will ensure an encumbrance free corridor of impact is ready prior to hand over for construction to start by the contractor. Preconstruction activities will also include joint verification of the EMP by the Environment Specialist of the Construction Supervision Consultant and Contractor; identification and selection of material sources (quarry and borrow material, water, sand etc), applying for and obtaining all necessary clearances, and planning traffic rerouting management including arrangements for temporary land, if required.

44. **During construction**, which is the most critical stage to avoid environmental impacts key considerations such as good engineering practices such as roadside drainage, provision of cross drainage structures, etc would be carefully adhered to by the contractor. The assigned Construction Supervision Consultant of the client will assist the contractor monitoring and guiding the contractor in adopting good environmental and engineering practices, arranging compensatory plantation through Department of Forest and providing on the job training in line with issues/needs.

45. **During the operational phase**, DoR will be monitoring of environmental conditions and of operational performance of the various mitigation/enhancement measures carried out.

46. In addition to several provisions, in the EMP which will help in avoiding and minimising damages to the wilderness area, the following specific measures have been identified to manage and mitigate adverse impacts resulting from the proposed project. These measures include: underpass for wildlife crossing at two crossings (Km 3+550 and 7+600); traffic calming measures in the 300 mts. stretch around Km 7+600 to minimize chances of accidents, particularly during night time; prohibiting night time construction work in wildlife sensitive stretches; prohibiting constructing camp/office/plant locations in forest areas; workers awareness program/s and warning signages for road users in wildlife sensitive zone, providing water holes for wildlife to minimize movement across the road for finding water; Afforestation/compensatory program, specifically targeted to improve wilderness/vegetation in the core area of BFC and Community Forests; Specific Monitoring / auditing arrangements involving wildlife expert and the Department of Forest; and ove-tailing with other Forestry and Biodiversity management programmes under implementation in BFC.

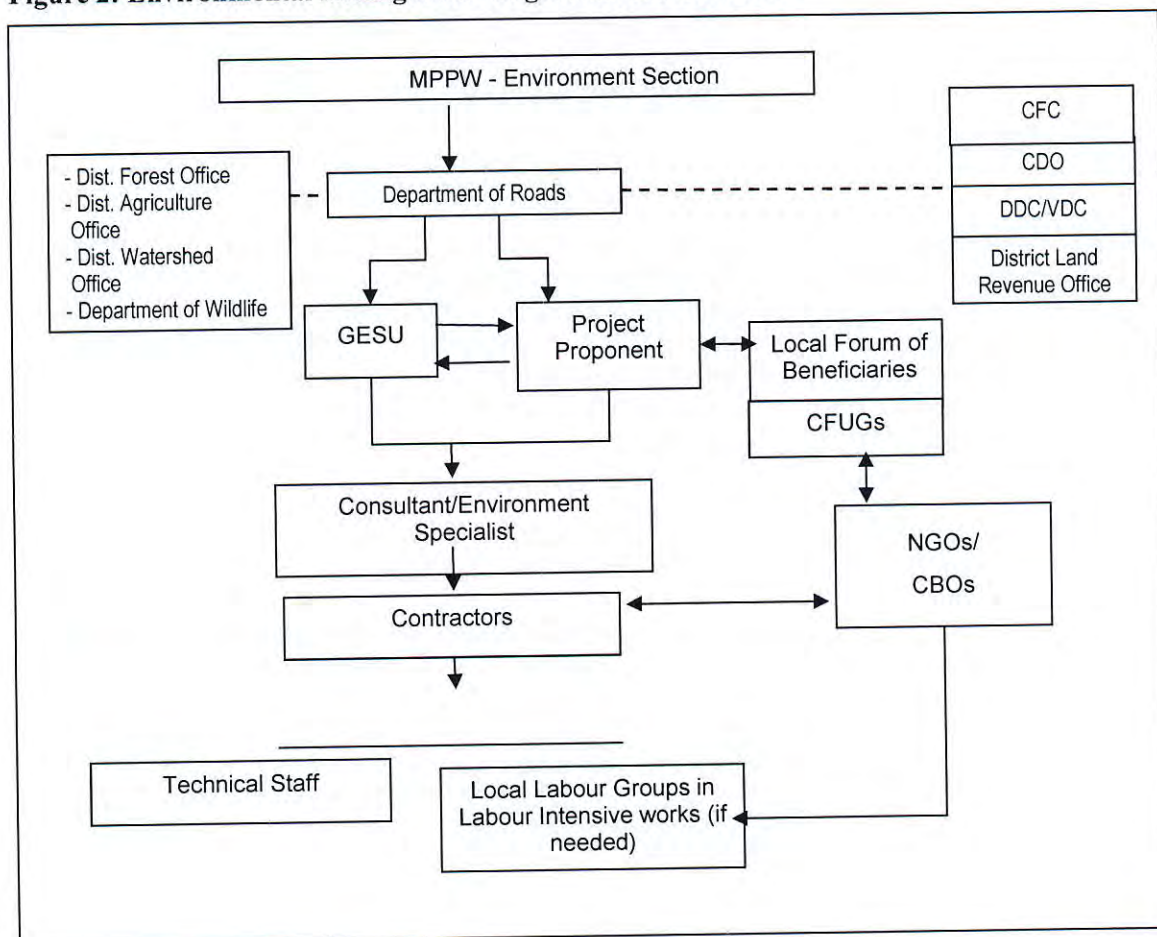
INSTITUTIONAL ARRANGEMENTS

47. As the project authority, DOR will retain overall responsibility for the management procedures as outlined in the EMP. Main parties responsible for the implementation of environmental safeguards measures prior to -, during - and following - proposed road upgrading are:

- MoPPW
- DoR (including GESU)
- World Bank
- Project Design and Supervision Consultant
- Contractor – construction / bio-engineering works

48. In most cases DoR the proponent and as the principal responsible agency for monitoring, direct involvement of the Geo-Environment and Social Unit (GESU) of the Department is foreseen.

Figure 2: Environmental Management Organisational Structure



49. Other institutions directly involved are the forestry and agriculture agencies, at district level. Next to the DFO, the CFUGs play an important role in the protection of flora and fauna. DDC and VDCs will be more involved as local level authorities. Road security and enforcement of traffic regulations comes under the mandate of the TrafficPolice under the Ministry of Home Affair. NGOs/CBOs are indirectly involved in carrying out awareness generation and social development programs. The construction supervision and monitoring will be entrusted to a Supervision Consultant by establishing environmental unit in the project. In Environmental unit minimum an Environmental Specialist shall be deployed for assisting the Proponent to ensure proper construction practices and implementation of the management options and mitigation measures proposed in the Environmental Management Action plan. Environmental Specialist will be required whole project period for close monitoring.

50. The Grievance Redress Mechanism will follow the provisions made under the Resettlement Action Plan for the project. At project level a grievance redress mechanism will be established allow project affected persons (PAPs) to appeal any disagreeable decisions, practices and activities arising compensation for assets, and technical and general project-related disputes.

BUDGETARY ESTIMATES

The following table summarizes the budgetary provisions

Table 4: Total Cost Estimates for Enhancement and Mitigation Measures and Monitoring

Environmental Protection Measures and Monitoring costs	Estimated Budget (NRs.)
Benefits Augmentation Measures ¹	300,000.00
Adverse Impacts Mitigation Measures ²	17,973,000.00
Cost of Environmental Monitoring ³	4,140,000

¹ Will include environmental awareness, biodiversity awareness and management training

² Will include amongst others underpass provision for wildlife crossing, bioengineering and wetland construction

³ Monitoring costs will cover compliance monitoring, impacts monitoring at construction stage and operation stage monitoring. The monitoring schedule and responsibility framework developed for the project identifies the phase of the project at which specific monitoring will be done, the method of monitoring and the responsible party