

**Government of Nepal  
Ministry of Physical Planning and Works  
Department of Roads**

**ROAD SECTOR DEVELOPMENT PROJECT  
(New Project Preparation and Supervision Services)  
(IDA GRANT NO: H339 – NEP)**

**INITIAL ENVIRONMENTAL EXAMINATION STUDY REPORT FOR  
UPGRADING OF  
MANMA TO JUMLA  
(Chainage: km 153+741 – km 238+340)**



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)

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## ACRONYMS

<b>CBOs</b>	Community Based Organizations
<b>DDC</b>	District Development Committee
<b>DDP</b>	District Development Profile
<b>DoR</b>	Department of Road
<b>EIA</b>	Environmental Impact Assessment
<b>EMAP</b>	Environmental Management Action Plan
<b>EMP</b>	Environmental Monitoring Plan
<b>EPA</b>	Environmental Protection Act
<b>EPR</b>	Environmental Protection Rules
<b>GESU</b>	Geo Environment and Social Unit
<b>GoN</b>	Government of Nepal
<b>IEE</b>	Initial Environmental Examination
<b>MOE</b>	Ministry of Environment
<b>MoPPW</b>	Ministry of Physical Planning and Works
<b>NGO</b>	Non Government Organization
<b>PAPs</b>	Project Affected Peoples
<b>PWD</b>	Public Works Directives
<b>RMP</b>	Road Master Plan
<b>SPAPs</b>	Severely Project Affected Peoples
<b>SRN</b>	Strategic Road Network
<b>ToR</b>	Terms of Reference
<b>VDC</b>	Village Development Committee
<b>amsl</b>	Above mean sea level
<b>km</b>	Kilometre
<b>m</b>	Meter

## **1. NAME AND ADDRESS OF THE INSTITUTION PREPARING THE REPORT**

### **1.1 Proponent and Address**

#### *1.1.1 Name of the Proposal*

*Initial Environmental Examination of Upgrading Manma – Jumla Road Section of Khidkijeula – Manma – Jumla under Karnali Highway (H 12) in Kalikot and Jumla Districts in Mid Western Development Region of Nepal*

### **1.2 Name of the proponent and Address:**

The Proponent is the Ministry of Physical Planning and Works (MoPPW), Department of Roads, Foreign Cooperation Division. Department of Roads is the leading agency responsible for road development, and also responsible for transforming government policies for the road sector into the provision of services by connecting places of the country with road networks.

#### **Road Sector Development Project (New Project Preparation and Supervision)**

Government of Nepal  
Department of Roads  
Kathmandu, Nepal

#### **Address of DoR for Consultation**

Geo-Environment and Social Unit (GESU)  
Department of Roads  
Babarmahal, Kathmandu, Nepal  
Telephone No. – 977-01-4262996  
Fax No. 977-01-4262996  
Email: gesunit@dor.gov.np

### **1.3 Consultants**

The consultants of the Road Sector Development Project (New Project Preparation and Supervision) are MM Group Limited Canada in JV with SAI Consulting Engineers (P) Ltd India in association ITECO Nepal (P) Ltd and Total Management Services Nepal

## **2. SUMMARY OF THE PROPOSAL**

### **2.1 Objective of the Proposal**

Upgrade Manma - Jumla Road under Karnali Highway (H12) into surface sealed bituminous standards, with formation width of 4.5 m excluding drains.

### **2.2 Relevancy**

The proposed Manma - Jumla Road is one of the six roads to be upgraded under the Road Sector Development Project additional financing. The proposed upgrading works to single lane (with adequate passing zones) seal gravel standards, will provide smoother, faster and comfortable access eliminating awesome travel journey over the fair weather road surface with an improved reliability road serviceability. As a result, the transportation of goods and services from southern districts including terai to Khalanga Jumla and to its other parts will be easier, faster and cheaper.

The proposed road upgrading requires an Initial Environmental Examination (IEE) as per WB Environmental Assessment Guidelines (for Category B projects). As per GoN, Environmental Protection Act (EPA 1997) and Environmental Protection Rules (EPR'97) 3, schedule 1(D)(6), the improvement of the standard, rehabilitation and reconstruction of feeder roads requires IEE. Thus, the IEE Study of the Proposal is a respect to mandatory requirement as per this provision. The approval of the IEE Report by the authorised agency, MoPPW is required.

### **2.3 Anticipated Impacts by the Proposed Road Upgrading**

#### *2.3.1 Impact on Land Use*

The land use along the road alignment is (i) Forest/Barren land (68%); (ii) Cultivated land (20%); (iii) Grassland (12%).

#### *2.3.2 Impact on Environment, Impact on Human Life and Impact on Population Pressure*

Environmental impacts are likely to be of beneficial as well as adverse as outlined below:

##### **a. Beneficial Impacts**

The proposed project is to benefit during constructions in a variety of ways:

- Generate employment opportunities to the local stakeholders including poor, vulnerable and socially excluded people
- Improved road access and connectivity to other parts in the country
- Increased local incomes from agriculture and off-farm activities.

In operation stage of this road section, it is however likely to result:

- increased in local land values

- skilled and semi skilled local human resources
- considerable saving's in local people's transportation costs
- considerable reduction in vehicle operation cost through fuel efficiency, lesser wear and tear of vehicles
- increased productivity of land due to due easier and better access to agriculture inputs
- open up avenues for better social services including education, public health, hygiene and sanitation
- open up avenues for the promotion of cottage industries
- stabilized slopes through bio-engineering works, causing eye catching landscape

b. Adverse Impacts

The proposed project is to cause impact adversely – in respect of physical, biological, socio-economic, cultural and religious - during road constructions in a variety of ways:

- incite and increase in slope instability and erosion due to fresh cuts
- slope instability due reckless excess materials' disposal
- abandoning quarry and borrow pit sites without proper closure once its usage no longer requires
- down stream water pollution to cause by the reckless upstream water hole use including by the contractor and their labor force and their incorrect waste disposal and spoil handlings
- requires the acquisition of some 21 ha of private land following deviation from RMDP alignment
- occupational risks to the health of labourers including the public due to pollution (dust, water pollution, poor sanitation etc)
- safety risks to road and work site accidents, especially in risk prone nature and its gravity
- labor force's vulnerability to sexually transmittable diseases, other endemic diseases
- social conflicts between labour force's and local communities
- reinstate excising infrastructure facilities including irrigation canal, water pipes etc

In operation stage of this road section, it is however likely to:



- disturb slopes especially along the road alignment by road usage, monsoon rain, etc
- incite instability by the local people's soil extraction and quarry operation on unstable slopes
- choking roadside drains, resulting litter downstream arable land with impoverished materials
- litters downstream arable land with impoverished materials by reckless excess materials disposal

### 3. DESCRIPTION OF THE PROPOSED ROAD UPGRADING

This chapter outlines a detailed description of the environmental setting in the area of proposed road upgrading, forming the basis for the impact identification, prediction and its mitigation including safeguards as well as for impact monitoring and auditing the impact of proposed road upgrading. on the bio-physical and social environment after the existing road surface sealed to bituminous conditions.

#### 3.1 Salient Features

- **Project** Upgrading of Manma - Jumla section of Khidkijeula – Manma - Jumla Road
- **Development Region** Mid-Western Development Region
- **Districts** Kalikot and Jumla
- **VDCs** Manma, Daahaa, Chhapre, Jubitha, Raanchuli, Mahadev, Raralihi, Kudaari, Tatopani, Lamra, Taalium, Mahatgaun and ChandanNath (Jumla)
- **Total Length** 84.6 km
- **Road Standard** National Highway (Karnali Highway) (H12) of DoR
- **Road Formation Width** 4.5 m excluding drainage
- **Surface Type** All weather bitumen sealed – Otta seal
- **Type of Work** Upgrading fair weather to sealed bitumen standards

The road alignment passes through 13 VDCs namely: Manma, Daahaa, Chhapre, Jubitha, Raanchuli, Mahadev, Raralihi, Kudaari, Tatopani, Lamra, Taalium, Mahatgaun and Chandananath (Jumla)The total length of road during reconnaissance visit is noted to be about 84.6 km, where it reaches bus stop in Khalanga, Jumla, which is the road terminus and district head quarter.

#### 3.2 Types of Goods to be Delivered

Proposed road upgrading work includes cuttings (earth and rock), civil works (retaining walls, breast walls, drains, cross drainages etc), correct excess materials disposal, slope protection and bio-engineering, sub – and base materials production, its overlay etc and ultimately surface sealed to bituminous conditions as its end product.

The final output of the proposed road upgrading is 84.6 km long road surface sealed bituminous conditions.

#### 3.3 Proposed Road Upgrading's Capacity

Upon proposed road upgrading works completed, the road will be 4.5 m wide excluding drains of sealed bituminous surface (with carriage way 3.5m) with lay-bys unless economic analysis favors other option of wider formation: 5 m or 5.5 m.

Currently, the motorized vehicles traffic along the Manma - Jumla Khalanga Road is 115 and 130 vehicles per day at the Manma – Nagma and the Nagma – Jumla Khalanga sections, respectively, based on the classified traffic count conducted in June 2010. These traffics mostly comprise of utility vehicles and tractors. In addition, pedestrians, porters and mules totaling 102 travels daily through the Manma – Nagma section, which, increases to 217 beyond Nagma towards Jumla Khalanga, as per the non-motorised vehicle counts conducted in June 2010.

Following the road improvement proposed, this road is expected to cater to 67 and 84 vehicles per day at the Manma – Nagma and the Nagma – Jumla Khalanga sections, respectively, at the end of the construction period (assumed to be around 2014). The 2014 traffic assessment above comprise change in the number of the heavy commercial traffic (buses and trucks) as opposed to the predominance of lighter vehicles existing on the road which results in lower traffic. This road is expected to cater to 139 and 175 vehicles per day at the Manma – Nagma and the Nagma – Jumla Khalanga sections, respectively, at the end of the design life of the road i.e. 2024, based on the traffic projection.

### 3.4 Materials to be Used

Major materials to be used in the proposed road upgrading works are presented in Table 1.

**Table 1: Summary of Estimated Quantities of Materials to be used in proposed road upgrading (Formation width 4.5m)**

Item Description	Unit	Quantity*
Earthwork Excavation	cu.m.	200,371.00
Boulder for soling, random rubble masonry, dry rubble masonry and gabion boxes.	cu.m.	32,916.00
Concrete class M10/40.	cu.m.	2,138.00
Concrete class M20/20.	cu.m.	8,335.00
Concrete class M25/20.	cu.m.	225.00
Gravel as filter material	cu.m.	3152.00
Common back fill material	cu.m.	165542.00
Reinforced concrete pipe (NP3, 90 Ø; NP2, 60 Ø)	RM	943.00
Reinforcement Steel	MT	162.00
Formwork Materials	sq.m.	5517.00
Gravel material for Sub base	cu.m.	759585.00
Bituminous Binder for Single Otta Seal	sq.m.	-
Aggregates 16-0 mm for Otta Seal	sq.m.	452,134.00

Source: Detail Design and Cost Estimate  
 Manma Jumla Road RSDP (New Project Preparation and Supervision) 2010

### 3.5 Potential Emission Resulting from Implementation of the Proposed Road Upgrading

**Solids:** Proposed road upgrading being upgrading nature, small amounts of excess materials may expect to generate, requiring its safe disposal. It is estimated that some 32,916.00 cu.m of boulder for soling, random rubble masonry, dry rubble masonry, gabion boxes etc needs to be transported from its source location to use site. Similarly construction materials including sub – and base course materials, CRRM for DBST, concrete, bitumen for pavement sealing will be required that needs safe handling and storage.

**Noise:** The current noise level along the project alignment is negligible - max. 30 dB(A). Noise source is temporary, local nature and confined due to vehicles passing by. Movement and operation of construction plant and equipments may however increase noise level during constructions. Given appropriate mitigation measure affected, the noise level can be controlled within acceptable level of 50 dB (A) for most of the machinery, except for heavy equipment and crushers. However placing restriction on the operation of heavy equipments on road stretch of settlements, markets etc during night hours will noise level significantly.

**Dust:** The dust level in the air is observed normal, except during passing of public vehicles along the road of earthen surface. Proposed road upgrading leading its surface to sealed bituminous conditions may bring dust level to a minimal.

### **3.6 Energy Used**

Proposed road upgrading works requires a substantial amount of fossil fuel e.g. kerosene, for bitumen heating. Work - and labor force at the campsite may need kerosene in absence of fire wood for cooking their meals but firewood supply system need to be managed and controlled under 'transparent and respectful manner ' by practicing 'standard agreement format' between buyers and suppliers. Contractor's fossil fuel need for their vehicles, operating machines used for road works may exert pressure on the local supplies unless a 'separate mechanism' is amicably worked out.

### **3.7 Details of the Technology**

Under proposed road upgrading, the technology to be used in road works is of mixed nature, deploying petty contractors for civil works (structural installations, drain works etc); heavy machine operations for cuttings: earth, rock cliff etc., laying sub- and base – course materials over the surface and its levelling as well as handling of pavement materials; heavy compressor for compacting overlaid pavement materials; bitumen spreader for spraying bitumen over the overlaid base course; and pneumatic compressor for binding together overlaid chips with bitumen, resulting to sealed bituminous surface. Crusher plants will also establish according to materials needs at appropriate locations suiting contractor's work schedule.

For works of labor nature, local people may be given priority if, when and where their sustained availability is assured to its employer.

### **3.8 Manpower Requirement**

Work force required for the proposed road upgrading works is estimated at 4,44,000 md (unskilled) and 1,39,000md (skilled ones). Labour deployment requiring unskilled ones may be given to local stakeholders, with preference to disadvantaged groups and women if , when and where available, and willing to.

### **3.9 Resources Required for the Implementation of the Proposal**

Total capital cost needed for the implementation of the proposed road upgrading is about Rs. 1,110,298,606.00 including VAT and contingencies.

## **4. BASELINE ENVIRONMENTAL CONDITION OF THE PROPOSED ROAD UPGRADING PROJECT AREA**

This section describes about the Physical, Biological, Socio-economic and Cultural environment of the proposed road upgrading area. The information provided here in is based on (i) primary field studies undertaken by the Consultant's Team, (ii) Public Consultation with the local stakeholders undertaken by the Consultants and (iii) Secondary data on bio-physical, social and other relevant information.

### **4.1 Physical Environment**

#### *4.1.1 Alignment*

Alignment of proposed road upgrading starts from Manma, Kalikot District Head Quarter (km 153+741) and ends at Khlanga Jumla District Head Quarter (km 238+340)

The Manma – Jumla road section of Khidkijeula – Manma - Jumla Road (84.6 km) is a part of Karnali Highway (H 12). This road section starts at km 153+741 or zero point in Manma, traverses south for a short distance and then runs over the gentle slope by the right of Tila River.

This road section descends gradually, and crosses the Biyani Khola at km 163+340 with narrow stretch after its crossings, requiring geometric improvement by back cutting. While maize crop is grown on the valley side in the Biyani settlement, combined rice and maize crops are grown on the hill – and valley – side in Ratadhaap settlement. A local grass, which is a potential root striking grass for cover on road batters including common slide, is grown conspicuously on the slopes – hill and valley – primarily for forage and thatch usage.

This road section continuously traverses and descends on gentle gradient until it begin to negotiate 3 hairpin bends starting at km 170+14 after crossing the Mahel Khola, and crosses Simla Khola at the end of stretch of 3<sup>rd</sup> hairpin bend. From the observation of huge watershed area, it can be anticipated that a huge discharge after precipitation over it during wet season is possible, with an occasional possible disruption of vehicular movements and requiring an appropriate type of crossing structure if road is to continue its services in wet season. A water mill located on the upstream is being operated with its water source, and canal originated out of this mill is again fed into downstream water mill.

After crossing Simla khola, road traverses gently along the rock cliff stretch of about 1.1 km long with narrow width, requiring back cutting in rock cliff in order to improve its geometry. As the road descends and traverses further until it reaches Pilli Bazaar at km 173+440, and continues along rock cliff with a slide on the valley side.

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*NB: These chainages were recorded according to built-up calibration within the Bolero Jeep in absence of road chainage marking, thus requiring its adjustment or confirmation.*

*The chainages reported herein are worked out Manma (km 152 +215), starting point as the 'Zero Point'*

This road section crosses two Kholas: Chaul Khola (km 174+940) and Takulla khola (km 175+140) prior to reaching Birtamode, after which it begins to descend sharply commencing with four (4) hairpin bends with 3<sup>rd</sup> hairpin bend starting at km 176+840.

After descending, this road continues to run along right of Tila River bed at km 177+440, and passes through Sherabada Bazaar (Chitkha across the river) and continues for about 700 m long of rock cliff stretch (km 181+24) before crossing Bali (Ganauni khola at km 181+540), a hill side slide (50mx20m) and log bridge over the Chhapre khola at km 184+444, where the Tila River bed is almost flat and wide.

This road begins to ascend from the river bed at km 186+440 with a stretch of 400m long rock cliff, and commences 2 hairpin bends. Hill side slope with large boulders stretches for about 3 km with an unsafe rock hanging below which road traverses. Pine forests, which occur mostly along the south of Tila River, begin to commence on the valley side of road and extends a further up.

This road passes through Jubidha Bazaar at km 189+640 and Khalna gad at km 190+240 where the Tila River bed is wide and flat, and crosses the Chhepka khola at km 192+840 prior to ascending through the hairpin bends. Pine forest occurs both on the hill – and valley – side by the road stretch of km 194+240. While rock cliff is on the hill side, rice plantation is in progress (June 2010) on the valley side.

This road crosses Idagi khola at km 195+74, slide at km 196+740, rock cliff at km 197+240 prior to crossing Chanana khola (Gutta gad) at km 195+940 in Raanchuli. Deodar forests occur on the hill side, spreading over 500 m stretch.

This road continues to traverse along the rock cliff stretch with unsafe rock hanging at km 204+404, and continues until it reaches Nagma Ghat Bazaar (km 205+240), which is some 600m downstream of Tila River and Shinja khola confluence.

After crossing the Bailey bridge over the Shinja khola located upstream Tila River and Shinja khola confluence at km 205+840, this road enters Jumla district. Unlike in Tila River valley, road in Jumla district runs along the flat terrain, not requiring any ascends and or descends as it proceeds further on natural gavel bed conditions.

While in Jumla valley, this road passes through the right of Tila River with rice crop – famous for 'red rice' (popularly known as "Jumli Dhaan") - being recently planted on the flat plains of the valley side, using a huge irrigation infrastructure originated out of Tila River, and finally ends at Khalanga bus park (km 238+340).

The road condition over this valley is fully consoling of otherwise arduous and unmemorable travelling experience over the stretch in Kalikot district.

This road section passes through a number of settlements/bazaar namely: Biyani (km 162+890), Rata Daap (km 164+340) (Karki Bazaar – a further up), Dhaad gaon, (km 166+440) Maphant (km 167+340), Pilli (km 173+440), Sherabada bazaar (km

178+440), Tagal bazaar (km 182+740), Jubidha (km 189+640), Khalnagad (km 192+240), Ranchuli (km 198+940), Nagma ghat Bazaar (km 205+240), Shantinagar (Raralihi bazaar) (km 211+240), Kudaari bazaar (km 217+740), Ranka (km 220+840), Tatopani (km 222+540), Srinagar (km 231+540), and Khalanga bus park (km 238+340).

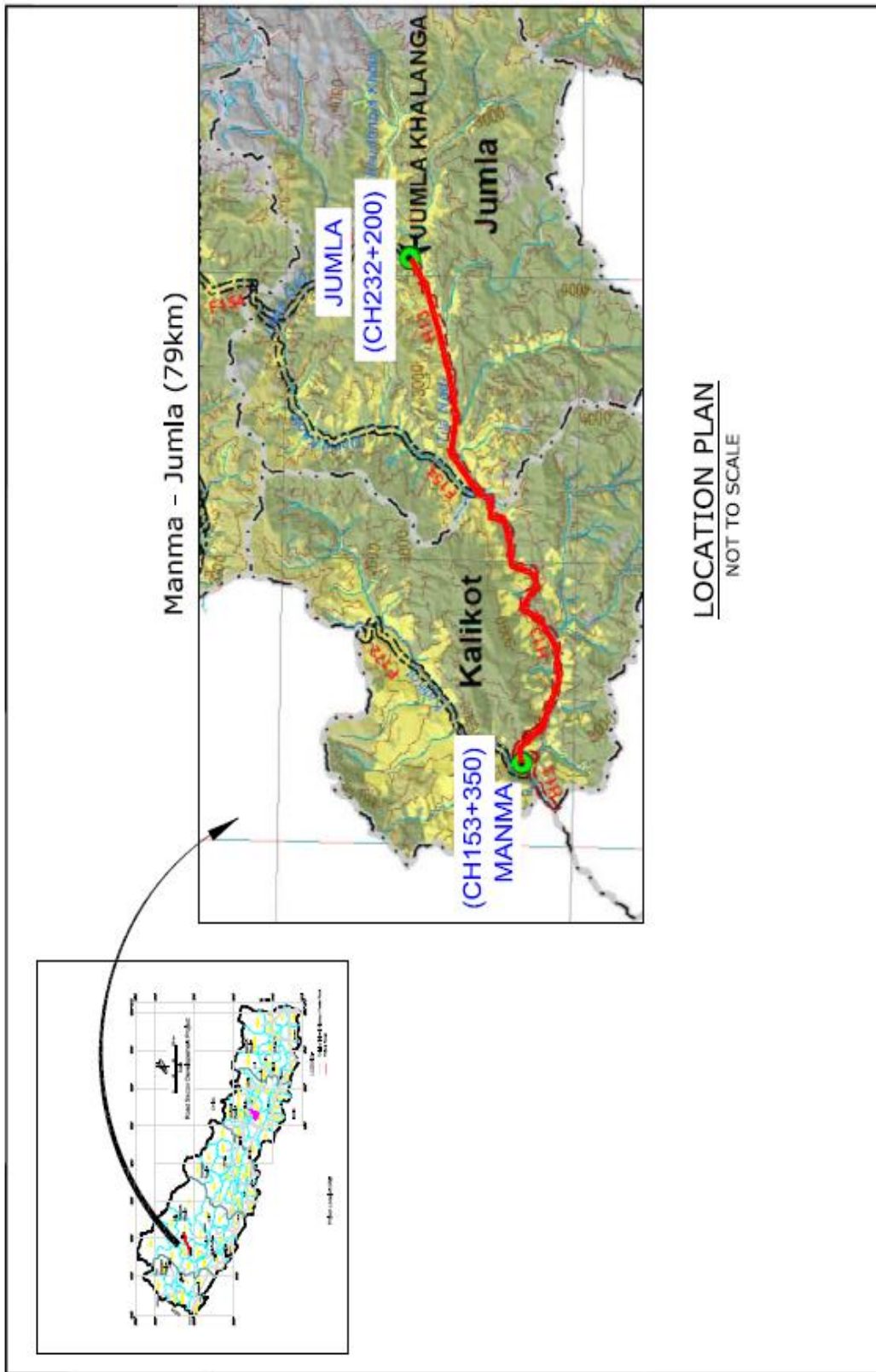
Rock cliff is the dominant stretch character of this road section. It stretches for about first 8 kilometre with number of in between breaks from the start in Manma. Stretches of rock cliff of different length are observed and presented by chainage: 200m (km 168+340), 1100 (km 170+940), 200 m (km 174+740), 200m (km 175+140), 700m (km 181+240), 400m (km 187+440), 200m (km 203+340).

As this road section predominantly spreads over the rock cliff stretches only along the Tila River valley in Kalikot district, some stretches of rock cliffs are narrow and unsafe, requiring rock cutting (km 163+340, km 171+240), including one still in unsafe and hanging conditions (km 204+040):

This road crosses public utilities at places, requiring its reinstatement and or relocation depending on the type of services, which will be affected by the proposed road upgrading works. These includes: water supplies with ½" diameter poly pipe (km 153+740, km 154+740, km 156+440, km 157+940, km 222+540 and km 159+040), hill trails (2) (km 164+040), water tank with two outlets by the formation width located outside large rock (km 1645+540), power distribution poles (3) (km 213+440), irrigation canals (km 232+790, km 233+040, km 187+340).

This road traverses 13 VDCs namely: Manma, Daahaa, Chhapre, Jubitha, Raanchuli, Mahadev in Kalikot district; Raralihi, Kudaari, Tatopani, Lamra, Taalium, Mahat gaun and Chandan nath (Khalanga) in Jumla district. The total length of road during reconnaissance visit is noted to be about 84.6 km, where it reaches bus stop in Khalanga, Jumla, which is the road terminus and district head quarter.

The location and the alignment of the road are shown in Figure 1.





#### *4.1.2 Geography, Topography and Land use*

Proposed project area is located in Kalikot and Jumla Districts in Mid Western Development Region. The topographical setting of the road alignment area is characterized by rugged hill terrain with river basin in Kalikot district but flat and wider valley in Jumla District.

##### Land Use

The land use along the road alignment is (i) Forest/Barren land (68%); (ii) Cultivated land (20%); (iii) Grassland (12%).

#### *4.1.3 Geology and Soil*

##### Geology and Soils

The road alignment belongs to the Midland Group of Lesser Himalaya of the Mid Western Nepal and consists of sedimentary to low-grade metamorphic rocks. The dominant rock types of the road alignment are slate, dolomites/limestone, quartzite/metasandstones, schist and gneisses.

#### *4.1.4 Materials Sources*

Materials sources in proposed project area are Hulma jelo (flood plains by the confluence of Tila River and Karnali River), Rakam Karnali - flood plains by the confluence of Kali khola and Karnali River, confluence upstreams of Karnali - Kalikhola and Karnali Khidkijeula khola. These are the major source of boulders, cobbles, river gravels, sand etc. Beds of Tila River in Jumla valley are another source but quantity availability seems to be very limited, with severe potential risks of over running the only paddy land in Jumla valley – the arteries of Jumla valley. Some 3km long stretch of large boulders extends on the hill side of this road (km 187 approximate).

#### *4.1.5 Hydrology*

Manma – Jumla road section crosses the number of kholas along its alignment. These include: Biyani Khola (km 163+340), Mahel Khola (km 169 approximate), Simla khola (km 172 approximate), Chaul Khola (km 174+940), Takulla khola (km 175+140), Ganauni khola (km 181+540), Chhapre khola (km 184+444) and Shinja khola (km 205+840).

#### *4.1.6 Air, Water and Noise Quality*

The air, water and noise quality within the Proposal area are practically good quality as the project area being 'pristine' compare to other road site within RSDP'a scope of works. Local people fetch their water needs from the source of springs, pipe/tap water and in some cases small streams.

#### *4.1.7 Landslides*

Three landslides are observed on the Manma Jumla Road: km 173+660, km 183 approximate (50mx20m) and km 196+740.

## 4.2 Biological Environment

### 4.2.1 Conservation Status

No protected areas including National Parks, Wildlife Reserve, Game Reserve, Wet Land etc passes through Manma Jumla road section and or is within close proximity of road. The nearest protected area – Rara National Parks located some 110 distance from Sinja and Tila confluent (km 205+840) - is in Mugu district, which harbors wildlife of hill altitudes.

### 4.2.2 Forest and Vegetation

The forest areas passing by the roads are mainly dominated with the lower mixed hardwood forest dominated with patle katus (up to 1,200 m), pine forest (chir and blue pines in the upper elevations), and emerges deodar forest on the east of Tila River as the road enter Jumla valley - beyond Nagma Ghaat (km 205+840).

Lower mixed hardwood forests are generally occurs in Kalikot district on the stretch beyond Manma on the hill slope right of Tila river and continues for some kilometers.

Pine forests (chir at the lower altitudes and blue pine at the higher altitudes), which occur mostly along the left of Tila River, begin to commence (km 190+000 onwards) on the valley side of road and extends a further up but get changed it to occur both on the hill – and valley – side by the road stretch of km 194+240.

Deodar forests occur on the hill side, spreading over 500 m stretch (km 196+000) along the left of Tila River.

Interestingly, these forests are generally found on the hill slopes left of Tila River, and if any very rarely on the hill slopes right of Tila River. Hill slopes right of Tila River in Jumla is fully devoid of any type of vegetations but its left side if densely covered with Deodar forests – apparently end of its natural distribution in the east across the trans himlayas.

Forest coverage by types and physiographic regions of Kalikot and Jumla districts is presented in Table 2.

**Table 2: Forest Coverage Type by Physiographic Region of Kalikot and Jumla (in ha)**

Forest Cover Type	Physiographic Regions	
	Hills	Mountains
Kalikot District		
Hardwoods	113	16264
Conifers	0	29384
Miscellaneous	0	53384
Shrub	1	1855
Grass Land	0	4209
Jumla District		
Hardwoods	0	12737
Conifers	0	23084

Forest Cover Type	Physiographic Regions	
	Hills	Mountains
Miscellaneous	0	70869
Shrub	0	744
Grass Land	0	6620

Source: Energy Resource and Consumption Profile of Mid-Western Development Region of Nepal WECS 1995

#### 4.2.3 Wildlife

Species of mammals are known from the residents to found in the proposed project area. These include: ghoral, thar, ban biralo (*Felis chaus*), kharayo (*Ochotona nepalensis*), ratuwa (*Muntiacus spp*), otter (*Lutra lutra*), and bwanso (*Canis lupus*)

Birds known from the local residents' occurring in the proposed project area include: dhukur (*Streptopelia senegalensis*), danphe, ban kukhura (*Gallus gallus*), monal, chyakhura (*Perdix hodgsoniae*), jureli (*Hypsipetes sp.*), teetra (*Francolinus francolinus*), kalij (*Lophura leucomelana*), koili (*Coculus canorus*)

#### 4.2.4 Non-Timber Forest Product (NTFP)

Plants of non timber use values are also known to occur in proposed project area. These include: ainselu (*Rhubus ellipticus*), ghangaru (*Pyracantha crenulata*), chutro (*Berberis aristata*), amala (*Embliba officinalis*), bikh (*Acotinum spicatum*), chutro (*Berberis asiatica*), nigalo (*Arundianria falcata*), lokta (*Daphne bholua*), babiyo (*Eulaliopsis binata*), somlata (*Ephedra gerardiana*), karu (*gentiana kuroa*), timur (*Xanthoxylum armatum*), asuro (*Adhatoda vessica*) etc

apart from these species, a number of invasive species were also known to occur inclusively Titepati (*Artemesia sp.*), kandaphool (*Lantana camara*), phule ghans (*Melochia corchorifolia*), banmara (*Eupatorium adenophorum*) etc.

#### 4.2.5 Fish and other Aquatic Animals

Tila River is the natural habitat for Himalayan trouts – fresh river fish - especially Himalayan species.

### 4.3 Socio-Economic and Cultural Environment

#### 4.3.1 Population and Demography

According to 2001 census, population by male, female and total of 7 VDCs - Manma, Daha, Pakha, Chhapre, Ranchuli, Mahadev and Jubitha - in Kalikot district touched and traversed by the proposed upgrading Manma - Jumla road section is estimated at 87639, which accounts for 27.27 % of the district population (Table 3). Gender-wise population distribution is estimated at 49.9% male and 50.1% female.

**Table 3: Population (Total/Male/Female) by VDCs in Kalikot District**

VDC	2001			2011		
	Total	Male	Female	Total	Male	Female
	Kalkot					
Manma	6092	3213	2879	7243	2820	4423

VDC	2001			2011		
	Total	Male	Female	Total	Male	Female
Kalkot						
Daha	3856	1871	1985	4584	2224	2360
Pakha	3530	1699	1831	4198	2020	2178
Chhapre	2966	1421	1545	3526	1689	1837
Ranchuli	2261	1154	1107	2688	1372	1316
Mahadev	3134	1563	1571	3726	1858	1868
Jubitha	2062	1055	1007	2452	1254	1107
<b>Total</b>	<b>23901</b>	<b>11975</b>	<b>11926</b>	<b>28417</b>	<b>13237</b>	<b>15180</b>

Source: District Development Profile of Nepal 2010/2011

Similarly population according to 2001 census by male, female and total of 6 VDCs - Raralihi, Kudari, Tatopani, Lamra, Talium and ChandanNath - in Jumla district touched and traversed by the proposed upgrading Manma - Jumla road section is estimated at 23608, which accounts for 34.22 % of the district population (Table 4). Gender-wise population distribution is estimated at 51.17% male and 48.83% female.

**Table 4: Population (Total/Male/Female) by VDCs in Jumla District**

VDC	2001			2011		
	Total	Male	Female	Total	Male	Female
Jumla						
Raralihi	2397	1247	1150	2822	1468	1354
Kudari	4208	2167	2041	4954	2551	2403
Tatopani	3529	1781	1748	4151	2097	2058
Lamra	2337	1217	1120	2751	1433	1318
Talium	4010	2044	1966	4721	2406	2314
ChandanNath	7127	3624	3503	8390	4266	4124
<b>Total</b>	<b>23608</b>	<b>12080</b>	<b>11528</b>	<b>27792</b>	<b>14221</b>	<b>13571</b>

Source: District Development Profile of Nepal 2010/2011

#### 4.3.2 Religious / Cultural and Ritual Sites

Hindu festivals and rites prevail in this region. Tatopani, Batuk Bhairav and Chdandananth Mahadev are major temples in Jumla. Large numbers of people gather to celebrate at these temples.

#### 4.3.3 Education and Health Facilities

Services of education and health facilities have relatively been better than in the past with the opening of road to publics but are still far below the standards of urban cities.

Educational institution currently functional in Kalikot and Jumla districts, providing services to its rural people is outlined in Table 5.

**Table 5: Educational Institutes Functional in Kalikot and Jumla Districts**

Institution / Nos	Teacher	Student
Kalikot		
Primary School	267	37316
Lower Secondary School	78	7971

Institution / Nos		Teacher	Student
Secondary School	36	108	4196
Higher Secondary School	10	-	1804
Campus			
Jumla			
Primary School	152	-	27054
Lower Secondary School	55	105	5950
Secondary School	34	77	2706
Higher Secondary School	8		380
Campus			

Source: *Dept of Education; District Development Profile of Nepal, ISRSC, 2004*

Health services currently available to its rural people in Jumla and Kalikot Districts is outlined in Table 6

**Table 6: Health Services Available in Jumla and Kalikot Districts**

Institution	Number
Jumla	
Government Hospital	1
Secondary Post	20
Health Post	8
Kalikot	
Government Hospital	1
Secondary Post	19
Health Post	9

Source: *Dept of Health Services; District Development Profile of Nepal, ISRSC, 2004*

#### 4.3.4 Economic Activities

As elsewhere in hill region, agriculture is the main means of their livelihood in Kalikot and Jumla Districts. Rice, maize, wheat, potato, millets etc are grown by physiographic and climatic conditions as the agricultural crops for household consumption. Its contribution is significantly lesser than need to feed ones family, which in most cases contributes less than fifty percent of their annual food grains need.

Apart from agricultural activities, rural family members have also no engagement to other income generating activities including industry as others in urban areas. While Kalikot ranks 70 in overall composite index with its poverty deprivation index 71, Jumla ranks 69 in overall composite index with its poverty deprivation index 67.

#### 4.3.5 Economic Development and Quality of Life Values

Nepal is recognized as one of the least developed country in the world, with a per capita income of some US\$241 in 2001. Thirty nine percent of country's population - 23.2 million according to 2001 census – is living below the poverty line. Accordingly, Nepal ranks 129th among 174 countries in respect of human development index – characterized by high infant mortality, low life expectancy, low adult literacy, nutrition levels etc.

An opportunity for the rural people to participate in economic development is virtually non-existent other than to those of road side markets. As a result, most of the labor forces are forced to move out of their villages to urban cities including India in search of labor works and some recently to third countries gulf nations in search of labor works and better earnings.

#### *4.3.6 Transportations*

Proposed project area is though open to public transportations, its service is often affected by rains in wet season with road stretches by the unstable slopes often buried with debris requiring regular clean ups. Manma Jumla road (84.6 km long) is the section of Khidkijeula – Manma – Jumla road connecting Manma Kalikot district head quarter with Khlanga Jumla district head quarter. This makes these two districts's road network length to some 150 km in total.

#### *4.3.7 Archaeological and Historical Values*

No sites of archaeological, historical values are known to exist on and or along the road alignment but road beyond Nagma ghat (km 205+840) in the north leads to Rara National Parks – located in Mugu at 110 km distance.

#### *4.3.8 Market Centre*

Biyani (km 162+890), Rata Daap (km 164+340), (Karki Bazaar – a further up), Dhaad gaon (km 166+440), Maphant (km 167+340), Pilli (km 173+440), Sherabada bazaar (km 178+440), Tagal bazaar (km 182+740), Jubidha (km 189+640), Khalnagad (km 192+240), Ranchuli (km 198+940), Nagma ghat Bazaar (km 205+240) are the major markets for the rural people of the project area and of those untouched by road in Kalikot District with Nagma Ghat becoming a major market inlet to rural people in Mugu and those living along the Sinja River. Karki Bazaar, Sherabada bazaar and Khalnagad are also the becoming major markets.

Shantinagar (Raralihi bazaar) (km 211+240), Kudaari bazaar (km 217+740), Ranka (km 220+840), Tatopani (km 222+540), Srinagar (km 231+540), and Khalanga bus park (km 238+340) are the major markets for the rural people of the project area and of those untouched by road in Jumla District .

These markets are their supply centers of all daily essentials. Sherabada bazaar, Tagal bazaar, Khalnagad, Nagma ghat Bazaar are the inlet markets for supplying construction materials, agricultural inputs etc to villages untouched by roads. Small grocery shops are also common in the villages along the road, where the daily essentials - pulses, salt, edible oil, kerosene, biscuits, noodles, candles, shoes etc - are available.

With the road open to public transportations, Nagma Ghat has become en route stop with meal break facility for vehicles going to and coming from Khalanga in Jumla.

## **4.4 Public Consultations**

Interim Constitution of Nepal (latest amendments) reserves its citizen of their right to information (RTI) of any development undertaking that has foreseeable environmental

implications prior to its implementation. These undertaking includes road works – new construction, upgrading etc

#### *4.4.1 Respect to GoN's Procedural Requirements*

With the approval of the ToR by MPPW on date July 22 '10, a public notice was issued and published in 'Nagrika' - a national level daily news paper (dated July 24 '10)' with 15 days time limit to all stake holders – concerned DDC and VDCs - including locals about the proposed project with a rationale for requiring IEE study, seeking their feedbacks, concerns, constructive suggestions as an exercise of IEE report preparation. Accordingly these local stakeholders were requested to present their feed back within stipulated time so that it can – in case of rational, genuine and practical – be addressed in IEE report.

As a procedural requirement, a similar copy of published public notice was also pasted and displayed in offices of concerned VDCs (Manma, Daahaa, Chhapre, Jubitha, Raanchuli, Mahadev in Kalikot district; Raralihi, Kudaari, Tatopani, Lamra, Taalium, Mahatgaun and ChandanNath in Jumla district, DDCs as well as on the office notice boards of local institutions including schools, hospitals, health posts and other concerned offices as and where applicable within each VDCs.

'Deeds of public enquiry' (Muchulkas) of pasting and displaying of these 'public notices' was collected separately from each of concerned VDCs and concerned DDC. Letter of Recommendation as to undertaking proposed road upgrading – where issued - was also collected from concerned VDCs.

Similar 'deeds of public enquiry' (Muchulkas) of pasting and displaying of these 'public notices' was also collected from local institutions including schools, hospitals, health posts and other concerned offices as and where applicable within each VDCs.

As a respect to Nepal's Interim Constitution (latest amendments) as well as to local stakeholders of their Right To Information (RTI) under approved ToR, these evidences - publication of public notice in 'Nagrika (dated July 24 '10), 'deeds of public enquiry (Muchulka)' issued by concerned VDCs (as well as their 'Letter of Recommendation') and public offices / places - are presented in Annex.

#### *4.4.2 Organizing Meeting at the Public Places*

As compliance to this RTI needs, meeting with the local stakeholders were organized primarily to making them fully aware of incoming project on their front yards, benefits they could reap from it, their obligation to making it a sustainable etc. As documentation of this meeting, minutes were established by making note of decisions made with regard to project implementation as enlisted below:

- Proposed road works will cause no disruption to exiting services during constructions but will correct it or relocate / reinstate as appropriate if any of services is disrupted.

- Project road works will cause no disruption to course of natural drainage with appropriate consideration in design works
- Can operate 'crusher plant' for producing crushed aggregates – base – and sub –course, chips, fines etc – essential for road sealing
- Can stockpile any essential materials of road construction nature
- Proposed road project will adequately taken into account of safety safeguards in design exercise especially keeping in view of accident prone spot, and established it accordingly during constructions
- Need to clean up and or controlled any conditions of environmental damaging nature sourced out of camp sites in use by contractor and or labor force during constructions
- Better if road sealing is extended beyond design formation width but up to existing services e.g. drains, vehicle parking zone etc, in built up areas of settlement market by the road side
- Need to ensure that not any of environmentally adverse nature works of burrow pits by the road side, fire wood usage (without formal deal) etc., is practiced by the contractor during constructions
- Willing to extend their hands as and when any problem is cropped up and or disruption in road works due to unforeseen reasons
- Should not adversely affect existing structures of any significances – religious, archaeological etc - during constructions of proposed road project
- Willing to extend their full hand to establishing and operating 'diversion' in order to ensuring smooth vehicle movements as well as works progress in line with its schedule



## **5. REVIEW OF ACTS, REGULATIONS AND GUIDELINES**

### **5.1 Interim Constitution of Nepal (Latest Amendments)**

Article 35 (5) of Interim Constitution of Nepal, (Second Amendment, 2007 states: "The State shall make necessary arrangements to maintain clean environment with priority to its protection"

Article 19 (2) states that the State shall not, except in the public interest, requisition, acquire, or create any encumbrance on the property of any person, without compensation provided for any property requisitioned, acquired or encumbered by the State.

### **5.2 Plans And Policies**

#### *5.2.1 Three Years Interim Plan (2007 – 2010)*

*Three Years Interim Plan (2007 – 2010)* has adopted a strategy of constructing and expanding roads linking: district headquarters, and northern and southern parts of the country. GoN's plan to 'link all district headquarters by the end of Fiscal year 2063/2064 BS' is still behind the targeted schedule, requiring Humla, Mugu, Dolpa and Manang district headquarters yet to be connected. It has also prioritized to link major commercial centres, and avoid or minimize adverse environmental impacts (NPC, 2007).

#### *5.2.2 Tenth Plan (2002 – 007)*

The Tenth Plan (2002 – 007) has recognized mandatory requirement of EIA or IEE on a priority basis.

Earlier during the period of over two decades, GoN has endorsed and implemented several sectoral policies and conservation – friendly strategy which focus on conducting environmental assessment. These include:

#### *5.2.3 National Transport Policy, 2001 (2058 B.S.)*

The National Transport Policy, 2001 (2058 B.S.) emphasizes to construct and improve the roads that provides beneficial environmental impacts (MPPW, 2001).

#### *5.2.4 Environmental Policy on the Environmental Assessment of the Road Sector, 2000*

The Environmental Policy on the Environmental Assessment of the Road Sector, 2000 provides additional opportunities to make the road project environment – friendly and sustainable (DOR, 2000).

#### *5.2.5 Forest Policy, 2000*

The Forest Policy, 2000 also emphasizes the conservation of forests, species and soil, and their sustainable use.

## 5.3 Acts And Rules

### 5.3.1 *Local Self-Governance Act, 1999*

Local Self-Governance Act, 1999 empowers the local bodies for the Conservation of soil, forest and other natural resources and implements environmental conservation activities. Sections 28, 43, 189 and 201 of the Act are of relevance and are attracted while undertaking EIA or IEE study and implementing its EMAP.

### 5.3.2 *Labor Act, 1992 (first amendment 1998) and Rule, 1994*

Labor Act, 1992 (first amendment 1998) and Rule, 1994 deals with the human labor. Clause 46 under Section 7 of this Act recognize any construction activity e.g. roads, as an industry. Clause 27 to 32 under Section 5 of this Act details for occupational health and safety requirement to be respected for labors. Child labor (below 14 years) is prohibited, and between 14 to 16 years of age should be given proper training before putting them in work. It calls for insurance and safety management of labors. It also directs to establish camp near temporary working sites with drinking water, food, sanitation and residential facilities if numbers of labors are fifty or more in construction projects. The Labor Rule, 1994 guarantees equal wage for male and female.

### 5.3.3 *Environmental Protection Act 1996 and Environmental Protection Rules 1997 (latest amendments)*

The Environment Protection Act (EPA), and the Environment Protection Rules (EPR), 1997 (Amendment 1999) requires the Proponent to prepare and receive approval for the IEE or EIA Reports of all projects/ proposals as included in Schedule 1 and Schedule 2 of EPR, 1997. Section 3 to 6 of the EPA, 1996 and Rules 3 to 11 of the EPR, 1997 contain provisions on the approval process of the IEE report. Rule 12 of the EPR oblige the Proponent to comply with matters mentioned in the report and other conditions, if any, prescribed by the approving agency, i.e. the concerned agency (Ministry of Physical Planning and Works in case of IEE for SRN, and MOEST for EIA). The Rule 13 also requires the concerned body. i.e. MPPW for this proposal, to conduct environmental monitoring. As per the environmental law, the Proponent should implement the environmental enhancement and mitigation measures as per Environmental Management Plan prepared in IEE or EIA. These legal regimes on the environment provide opportunities to integrate it in any development projects.

### 5.3.4 *Public Road Act, 1974*

Public Road Act, 1974 has been attracted by the proposed road upgrading. Section 3 of the Act empowers GON to prohibit construction of permanent structures (buildings) in the prescribed distance from the road. The DOR may acquire permanently or temporarily the land and other property adopting compensatory measures during the construction, rehabilitation and maintenance of the public road (section 14 & 15). The Act requires DOR to plant trees on both sides of the road and handover it to the local bodies (VDC or municipality) for their management (section 16). The act also empowers the DOR to operate quarries and borrow pits and other facilities during the road construction (Section 17).

### 5.3.5 *Forest Act, 1993 and the Forest Rules, 1995*

Forest Act, 1993 and the Forest Rules, 1995 are also attracted in a situation as and if the road – proposed for new construction and or upgrading - passes through the forest areas. Section 68 of the Forest Act, 1993 empowers GoN - in case of no alternative - to undertake proposed road works if it does not adversely affect the environment significantly. Forest Act however requires the Proponent to conserve the legally protected species (plants and wild animals including Champ (*Michelia champacta*), Khayer (*Acacia catechu*) and Sal (*Shorea robusta*)).

### 5.3.6 *National Parks and Wildlife Conservation Act, 1973 and the Soil and Watershed Conservation Act, 1982*

National Park, Wildlife Reserve, Conservation Area, Hunting Reserve, Wetland Area) and also declared Watershed Area, the *National Parks and Wildlife Conservation Act, 1973* attracts as and when As the proposed road pass through any declared protected areas.

### 5.3.7 *Soil and Watershed Conservation Act, 1982*

Soil and Watershed Conservation Act, 1982 and their Rules attract as and when slide or flood within road is surfaced up significantly.

### 5.3.8 *Explosive Material Act, 1961*

If construction activities require the use of explosive, in accordance with the Explosive Material Act, 1961, prior approval of the Chief District Officer (CDO) is needed to purchase explosives. Article 4 of the Act is relevant.

### 5.3.9 *Land Acquisition Act, 2034 (1977) (latest amendments)*

Land Acquisition Act, 2034 (1977) (latest amendments) empowers GoN for the acquisition of any land in the country. Land Acquisition Act 2034 (1977) and the Land Acquisition Rules 2026 (1969) are the two main legal instruments that specify procedural matters of land acquisition and compensation. Government can acquire land at any place in any quantity by giving compensation pursuant to the Act for the land acquired for any public purposes or for operation of any development project initiated by government institutions (Section 3 and 4). The powers given under these sections are very broad as government is empowered to acquire any land in the name of public works.

### 5.3.10 *Water Resources Act 1992*

Water Resources Act 1992 empowers GoN for the rational use of surface and underwater. This Act also empowers to save environment especially water, from the hazardous effects to cause by chemicals, industrial waste etc. water can only used be in such way that it does not induce soil erosion, landslide, flood etc.

### 5.3.11 *Nepal Drinking Water Corporation Act 1989*

Nepal Drinking Water Corporation Act 1989 prohibits any activities that prohibit drinking water. This Act is attracted while labor force is camp sited near the water hole, which supplies the drinking water needs of the downstream settlers.

### 5.3.12 *Aquatic Animal Protection Act 1961 (latest amendments)*

Aquatic Animal Protection Act 1961 (latest amendments) opens eye on their need to appreciate the value of wetlands and aquatic animals. Section 3 of this Act provisions punishment to any one or party introducing poisonous, noxious, or explosive materials into water source and or destroying, damaging dam, bridge, or water system with the intent of watching or killing aquatic life. Under Section of the Act, GoN is empowered to prohibit catching, killing, and harming certain kinds of aquatic animals by notification in Nepali Gazette.

## **1.1 Environmental Guidelines**

### **1.1.1 Reference Manual for Environmental and Social Aspects of Integrated Road Development, MPPW/DoR, 2003**

Reference Manual for Environmental and Social Aspects of Integrated Road Development, MPPW/DoR, 2003 has been prepared - by DOR under RMDP - to help integrate social and environmental considerations, including public involvement into road construction practices. It suggests stepwise process of addressing E&S issues alongside the technical, financial and others. The Manual is based on the experiences of Nepal, as well as incorporates the national (EPA, 1996; EPR, 1997/1999) and international 'best practices'. It suggests process of environmental and social assessment process, roles and responsibilities of stakeholders at various stages of the project, advice on impact mitigation action plans, and process for involving the public.

### **1.1.2 Environmental Management Guidelines, GESU/DoR, July, 1999**

Environmental Management Guidelines, GESU/DoR, July, 1999 has been prepared - as part of the program undertaken jointly by GON and the World Bank under the Road Maintenance and Rehabilitation Project and approved on Kartik 22, 2053 BS (1997) – to help in operational practices for all road maintenance, rehabilitation and construction activities under DOR. The Guideline outlines environmental mitigation measures to be incorporated into DOR projects, procedure for public participation, and socio-economic considerations. These measures are broken down into twelve issues including (i) Quarries; (ii) Borrow Pits; (iii) Spoil and Construction Waste Disposal; (iv) Work Camp Location and Operation; (v) Labour Camp Location and Operation; (vi) Earthwork/Slope Stabilization; (vii) Use of Bitumen; (viii) Stockpiling of Materials; (ix) Explosive, Combustible and Toxic Materials Management; (x) Setting Up and Operation of Stone Crushing Plants; (xi) Water Management; (xii) Air & Noise Pollution. this guidelines also outlines implementation methods for undertaking mitigation measures for activities

related to these issues. The Guideline suggests methods for determining how and when the public should be included in the environmental analysis.

### **1.1.3 Guideline for road Corridor and Alignment Selection**

This guideline, which provides the process and methods for environmentally sound road corridor, also articulately provide basis for environmental considerations in alignment selection.

## **1.2 Other Guidelines and Manuals**

The following guidelines were also reviewed and used as appropriate during the preparation of this report.

- Environmental and Social Framework (ESMF) 2007
- Environmental Management Guidelines for Roads and Bridges, GEU/DoR 1997
- Public Works Directives HMGN 2002
- Guide to Road Slope Protection Works DoR 2003
- Nepal Road Statistics 2006
- Policy Document of DoR on Environmental Assessment in the Strategic Road Network 2000

## **6. IMPACT OF THE IMPLEMENTATION OF THE PROPOSED ROAD UPGRADING ON THE ENVIRONMENT**

Impacts identification and its prediction have been made sticking to activities of proposed road upgrading during construction and operation stages. These include both beneficial and potential adverse impacts.

Potential impacts have been predicted in terms of their significance (low, moderate and high), extent (site specific, local and regional) and duration (short term, medium term and long term) as well as of their nature (reversible, irreversible)<sup>1</sup>.

Summary matrices of the potential impacts and the corresponding augmentation and safeguards are presented in Table 7 and Table 8.

### **6.1 Beneficial Impacts**

#### *6.1.1 Construction Stage*

The proposed road passes through various settlements in the district. The construction works will attract many rural people including locals for opportunities ranging from labour works with gaining skills to improved farm and off-farm activities, which may ultimately benefit the local economy.

#### **a. Employment and Income**

Employment is the direct benefit that rural people including locals may derive from the activities of proposed road proposed. These activities will provide an estimated 4,44,000 unskilled person-days and 1,33,000 skilled person-days. As the civil works are of labor based nature, employment opportunity is apparent especially to the local stakeholders including those people of VDCs to affect by the project. Earning associated with the road works if injected into the rural economy will directly initiate various ancillary economic activities and entrepreneur promotion. *Employment thus generated and its income is direct, high significance, local but short - long term in nature.*

#### **b Enterprise Development and Commercialization**

Commercial activities may surface up by the construction activity mostly in the form of meeting the demand of labour forces, construction crew, project team etc for daily essentials including food and tea shops, groceries, lodges and restaurants. These demands may also include local products: vegetable, live stocks etc., contributing to boost up the rural economy. Benefits may also contribute to entrepreneur promotion extending beyond construction period. *This impact is also direct, medium significance, local and short-term to medium-term in nature.*

#### **c. Skill Enhancement Opportunities**

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<sup>1</sup> - Short-term: construction duration  
- Medium-term - 3 years after the project completion  
- Long-term - > 5 years after project completion

Adapting labour intensive approach as a policy in road constructions may not only open up avenues for employment to the local stakeholders but also provide to them opportunities for gaining skills in civil works - masonry, gabion wires, and construction of dry walls, slope cutting and stabilization, bio-engineering works, roadside plantations. These skill gains may make them self reliant for working in project of similar nature at their nose or elsewhere. *The impact is both direct and indirect, medium significance, local and long-term in nature.*

**d. Vulnerable Community Development and Income Generation Plan**

People, who are without any assets and living away from the zone of construction activity, may not benefit from the road constructions as much as do to others who are living adjacent and or by the roadside but are subject to further hardships. This may instead forced them out of their ancestral house by rich neighbours without ability to benefit from the upgrading works. *The impact is indirect, high significance, local and medium- term nature.*

**e Improved Environmental Conditions of Existing Road Side Markets**

Existing road side markets may turn into rural people's common platform for brining in their agricultural products as well as buying their domestic needs including daily essentials. With these locations becoming increased used by them besides by travellers, a need for its improvement may become apparent in respect of better sanitations. *The impact is indirect, high significance, local and long term nature.*

**f Develop Existing Bus Stops into Better Transportation Infrastructures Conditions**

Existing bus stop being comparatively lightly used by the commuters, travellers etc prior to and during constructions of proposed road upgrading may become increased used by transportation once road surface become better and operational. In its view, these infrastructures may need to develop it in a way it meet all the requirements – sufficient bus bays, bus parking, drains, toilets etc - of standard transport infrastructure at key locations including district head quarters. *The impact is indirect, high significance, local and long term nature.*

**6.1.2 Operation Stage**

**a. Improved Access and Reduced Travel Costs**

Upgraded road will provide comfortable, easier, and quicker journey mostly to the local stakeholders and occasionally to outsider, requiring lesser vehicle, stoppages needs as well as reducing vehicular emissions. It will also reduce wear and tear of vehicles, requiring lesser maintenances with better fuel efficiency. This may form the ground for slashing the transportations fares including public bus.

Upgrade road may also bring local farm products into market outlets. *This is direct, high significance, regional and long term impact.*

**b. Increased Farm Production and its Sale**

Access to agricultural inputs and services is still below the needs in the fields of agro-economy such as agriculture, horticulture and livestock. Upon road upgraded, it will provide improved access to inputs: seeds, inorganic fertilizer, irrigation, agriculture extension, new crop technologies and diversification and markets. Agro-industries may be established locally based on local products supplies, enhancing local economy. *This impact is direct, of high significance, regional to trans-boundary extent and long term in nature.*

**c. Enhancement in Social Services**

With the improved access to inputs and better transport services upon completion of proposed road upgrading, other social services will also open up in the areas including education, health, communication, market, banking etc. With these services available and given its reliability assured, local stakeholders may look for and stick to locally available services rather than seeking it to elsewhere. *This impact is indirect, high significance, regional and long-term impact of the proposed Project.*

**d. Appreciation in Land Values**

Land appreciates its value higher with the road being upgraded, enabling local farmers' for higher loans offering of it as collaterals. High valued lands are safe and comfortable processing to banks and micro-finance institutions for issuing loans. *This impact will be an indirect, medium significance, local and long term in nature.*

**e. Empowering Local Women**

Proposed road upgrading will increase women's mobility; enhance their aspiration by being exposed to elite women of urban areas thereby opening opportunity for linking up association with their skill developments, which in some cases includes trainings offered to them towards their capacity build up. Participation to such trainings generates their awareness and improves knowledge level as well. Over the period, INGOs/NGOs / CBOs with a focus on women's development may become active, floating program on HIV/AIDS, safe sex, girl trafficking *The impacts are indirect, medium significance, local to regional and long-term.*

**f Opportunities for Developing Road Settlements into Market Outlets of Rural Productions**

Settlements established along the road may become ideal spot for bringing up rural productions especially farm products – previously lacking its value in absence of market. Road opening to public transportation and others upon proposed road upgraded, it will open up avenues for developing these settlements into market outlets for rural productions, and can be enhanced further with the establishment of transport infrastructure – shed house as a buy and sale centre. *This benefit is indirect, medium significance, local – regional, long- term*



## **g Improved and Reliable Transport Services at Key Points of Peripheral Settlements**

As the avenues open up for developing road settlements into market outlets for rural productions, road opening to public transportations may not be sufficient but require improved and reliable transport services including at key points of peripheral settlements. Unless it is able to fully convince the rural of its reliable and improved service, rural people may feel staking their investment causing reluctance to continuing it and pose risk to its flourishing. *This benefit is indirect, medium significance, local – regional, long- term*

## **h Opportunities for Developing Key Markets (existing) on the Road into a Potential Supply Source for the Inner Settlements**

Settlements away from the road point often need meeting their daily essentials in addition to occasional needs of other type. Supply source for these needs at best become key markets located on the road. Given improved and reliable transport services, it may open up avenues for developing these key markets into potential supply source for the inner settlements, thereby flourishing business scale. *This benefit is indirect, medium significance, local – regional, long- term*

## **6.2 Adverse Impacts**

Proposed road upgrading activities during construction and road usage during operation stage may create a number of adverse impacts on the local environment as outlined below:

### *6.2.1 Construction Stage*

#### **Physical Environment**

##### **a Slope Instability to Cause by Cuttings**

Vegetation removal as a part of earth cutting – if required - in proposed road upgrading works may expose slopes to precipitations and prompts erosion especially after the incessant rains, resulting over the period into slides. This generally depends on gradient, precipitation intensity and duration, soil type, slope cover etc. This eventually becomes a major debris source in the monsoon choking roadside drains, irrigation canals and downstream. A comprehensive mitigation measures including bio-engineering needs to be addressed and implemented accordingly. *The impact is direct, of high significance, local to regional and short – long -term in nature.*

##### **b. Incorrect excess materials disposal**

Excess materials originated by the cutting needs in proposed road upgrading works: road widening on narrow stretches, grade correction etc as a part of geometric improvement, if disposed incorrectly including at locations other than of designated one, may results in a series of adverse impacts: impairment in water bodies, slope scours, mass failures, disruption of natural drainages, arable land littered with impoverished materials thereby undermining its value etc. Water impairments in downstream river

supporting aquatic life may also become at risks of natural growth and continuity. *Impact is direct, of high significance, site-specific to regional and short – long term in nature.*

**c. Impairments in Water Resources to cause by Inadequate Drainage**

Drainage structures e.g. causeway, culverts, other cross-drainages etc installation in proposed road upgrading as its water management in inadequate quantity and at locations other than of ground condition needs, may cause impairment in the water-bodies. These include rivers, rivulets, springs, drinking water supply, irrigation schemes etc. *Impact is direct, of high significance, site-specific to regional and short – long term in nature.*

**d. Identification, operation and safe closure of Quarry and Borrow Pit**

Proposed road upgrading requires a substantial quantity of construction materials' especially boulders, cobalt, sand, pit etc for the structures installations, masonry works in civil works, sub- and base – course materials in pavement works, embankment filling etc. Quarry and borrow pits' source identified thus becomes a source of the environmental impairments: landslides, mass failures, litters valley side arable land with debris, chokes road side drains etc. unless it is correctly operated and closed once its extraction is no longer required.

*Impacts are direct, medium significance, site-specific and medium – long term in nature.*

**e. Air, Noise and Water Impairment to cause by Heavy Equipment Usage**

Heavy equipments usage in proposed road upgrading produces emissions to some extent for the time it is used in earth cuttings, pavement materials handlings surface sealing etc. Dusts also generates on the road stretch mostly by the vehicles passing by until it get sealed, and thus becomes a nuisance to roadside dwellers, travellers etc, especially during dry days. *Impact on air quality is direct, medium significance, local and short term in nature.*

Proposed road upgrading activities using heavy equipments and crusher plants run according to its work schedule also cause both noise and air impairments on the site of its activity taking place. *Impact due to air and noise is direct, of low - medium significance, local and short term in nature.*

Proposed road upgrading activities also become a cause of risk to impair local pristine water bodies. These activities includes incorrect excess materials disposal method, incorrect disposal of solid wastes generated within camp sites (contractor and laborforce), failure to safeguard the accidental spillage of lubricants, diesel, mobile within the contractor's camp, leakage of various hazardous materials etc. labour force's reckless upstream waste hole use – dish wash, cloth wash etc - also become a cause of water impairment used by the downstream settlers as well. *The impact on water pollution is direct, low - medium significance, local - regional and short term in nature.*

**f Disruption in Public Utilities, its Reinstatement and Re-location**

Proposed road upgrading may also cause disruption in the services of existing public utilities. These services includes: power supplying lines (electric poles, cables etc); water supplying lines, telephone, irrigation scheme fed to local stakeholders arable land by the road side, drainage structures (cross, side etc) established along and over the road primarily to respect natural drainage system. *The impact is direct, low significance, local and short term in nature*

**g Contractor's Awareness Need on the Consequences of Dust and Bitumen Hazards**

Proposed road upgrading may become a source of hazards related to dust and bitumen. These hazards are of serious nature especially when earth works and pavement works active on road stretch where local market, settlements etc exists and where public transport is commonly available. Concerned contractor needs to be fully aware of the consequences of these hazards including of his wrong doing during constructions, and have fully appreciated a need to over come it. *The impact is direct, low significance, local and short term in nature*

**h Accidental Risks and Road Safety Needs on Narrow Stretch as well as of Poor Sights Road Stretch**

Road stretch is not of uniformly wide all along but of narrow as well as of poor sights at some locations. These locations are prone to road accidents, and known to have to become accident spots. Road stretch with poor sights become worst as and when it is short switch backs over the slope. Proposed road upgrading needs to appreciate this issue and addressed in design as appropriate. *The impact is direct, medium - high significance, local and short term in nature*

**i Health and Safety of Labor Forces Involved in Road Works especially in Risk Prone Ones – Quarry, Rock Break Up Works, Bitumen Handlings**

Proposed road upgrading deploys a large number of labour forces for undertaking its activities of various natures. These activities amongst others include risk prone ones – quarry, rock break up works, bitumen handling, surface sealing etc. These activities are highly risk prone ones especially when it is undertaken without safety gadgets – helmet, glove, boots, goggle, ear guards with sponge muffler etc. Gravity of risks is extremely high and irreparable - death in extreme in case – loss once it has occurred. Healthiness of labor force is also equally important in view of continuing their works uninterrupted and in return supporting his family. for any reason, labor force is sick and unable to doing works, s/he is not entitled to wage, and as a result he and her/his family has to live on balance of his earnings, which in days get exhausted, prompting them into hardships. *The impact is direct, high significance, local and short term in nature*

**j Establishment, Operation and Closure of Crusher Plants**

Proposed road upgrading needs a substantial quantity of pavement materials of crushed types for sealing of road into bituminous surface. These crushed materials include aggregate of sub – and base course materials, chips, fines etc, which is

produced by putting crusher plant into operation. Crusher plant operation is a source of air and noise nuisances to local residents unless it is established well away from the settlements and affected effective safe guards during its operation. Obviously crusher plant establishment especially of its location, followed by its operation is environmentally critical and serious concerns of local stakeholders, who at time make complaints of its operation as and when it is not established at correction location, and without consultation with them. Crusher plant's safe closure is also another concern once its operation is no longer required, and thus safely closed respecting local stakeholders concern. *The impact is direct, low significance, local and short term in nature*

#### **k Stockpiling of construction materials**

Proposed road upgrading needs a substantial quantity of construction materials including rock, sand, aggregate of sub – and base course materials, chips, fines etc, requiring its proper stockpiling – free of mix ups with deleterious materials until it is used. Aggregate of sub – and base course materials essentially needs to be free of deleterious materials, which adversely affects bitumen's binding ability once it is spread over the base course. Failing to respect it, causes the road surface to fail eventually. By proper stockpiling mean, it is understood to have ensured materials stockpiled especially crushed ones free of mix up with deleterious materials – plant leaves, plastic fly over including containers, gunny bags, clay lumps etc. It also means to ensure its site location being established in order to match batching needs of pavement works schedule. *The impact is direct, medium to high significance, local and short medium term in nature*

#### **l Change in Land Use Associated with the Conversion of Arable Land into Road**

Proposed road upgrading essentially mean undertaking road works in line with the design standards set out to achieving it during constructions. Design standards amongst other, requires ensuring road once constructed be free of road accident spot, avoiding unnecessary length of high grades, good sights etc. Achieving these parameters whilst upgrading in proposed road, it may require in some physiographic conditions of proposed road alignment especially in new constructions converting arable land into road. *The impact is direct, low significance, local and short medium term in nature*

#### **m Respect Needs to Natural Drainage**

Proposed road upgrading at places crosses natural drainage along its alignment. These drainages are of various magnitudes according to its catchments areas. Failure to respect to these natural drainages with appropriate considerations, road services to its users including local stakeholders will and can not be relied upon and maintained. Respect to natural drainage includes identifying and establishing appropriate drainage structures, in adequate numbers and sited at appropriate locations. *The impact is direct, medium to high significance, local and short medium term in nature*

**n Proper Road Safety Measures in Place according to Gravity of Risks in Road Works**

Proposed road upgrading in some cases need to undertake works in unsafe section to road users especially during constructions, causing road accidents in absence of cursory warning sign being installed at site prior to ones entry. *The impact is direct, medium to high significance, local and short medium term in nature*

**o Landscape Impairment to Cause by the Unrestricted Regulations on the Contractor**

Contractor including his employee at times derails from his contractual norms, obligations etc and thus become involved in illegal activities other than of road contract and its related ones. These activities include fishing, wild life hunting / poaching, timber smuggling, materials smuggling – pavement, rock etc., which are of illegal and punishable by law, and yet they are occasionally come to public news. These illegal activities do surface up and prevailed in absence of and or inadequate restriction considerations on the contract documents. *The impact is direct, small to high significance, local and short medium term in nature*

**p Access Road Opening by the Proposed Road Upgraded Stretch**

Road opening if undertaken according to stakeholders needs – local, governmental etc., is appreciable if it is undertaken by respecting local environment amongst others. Local road opening is generally undertaken by the high way or feeder road side with local stakeholders' limited knowledge and technical capacity about respect needs to local environment as well as to existing high way or feeder road, causing it a source of impediment to its reliable serviceability. Such opening often becomes a source of fresh and recurrent slide, requiring debris clean up in wet season. *The impact is direct, small to high significance, local and short- medium term in nature*

**q Appropriate Drains Provisioned in Road Settlements**

Road settlements are spectacular site of substantial generation of liquid waste generated especially by the dish washings in food serving shops. In absence of appropriate drain in such settlements coupled by solid wastes' generation: bio – degradable and non – degradable, creates situation worst. *The impact is direct, small to medium significance, local and short in nature*

## **Biological Environment**

**a Loss of Trees – Those Obstructing Sight Distance and Those Located Within Road Width as a Part of Upgrading Works**

Proposed road upgrading although not required, may need removal of trees. The strategy is still to ensure no damage to the best possible inflicted on the forest resource, especially any trees' removal. Road situation, where the proposed upgrading is taken place, however may not be the one as is the intended strategy and get it implemented. Situation may arise where its removal is indispensable to catch up its design alignment. This is specially the case as and where tree is obstructing sight forth as well as trees standing within road width. In such cases, tree removal indispensable in view of

ensuring road safety. *The impact will be confined to the road alignment and thus is local, direct, medium – long term and of low significance.*

**b Pressure on Forest Products**

Labor force and workforce unless their energy needs for their meal cooking is met from fossil fuel, may exert pressure on the local forests of the surrounding areas. *The impact will be indirect, of Medium significance, local and short term in nature.*

**c Hunting and poaching of wildlife (flora and fauna – diversity) including by the contractor and his labor forces**

As and where the road site crosses the natural forests harbouring various species of wildlife – flora and fauna, it often becomes local people's good ground for hunting and poaching. Where the proposed road upgrading activities takes place, it again becomes contractors' and his labor forces' illegal hunting ground given they are let loose and no restriction is imposed on them during road upgrading. *The impact will be confined to the road alignment and thus is local, direct, medium – long term and of low significance.*

**d Disturbance to Wildlife Movement by the Increased Traffic Flow**

As activities of proposed road upgrading get momentum and road surface conditions are getting smoother and better quality, traffic flow may increase gradually and speeds gaining faster, which may cause wildlife population converge into clusters to seek their safety or get segregated by force, and form good ground for hunting. This in combination with drivers' temptation for fast driving including honking horn may disturb wildlife harboured in local natural forests, including their free movement and hunt for natural prey, thereby posing threat to eco-system supporting them. *The impact is indirect, small to high significance, local and short medium term in nature*

**Social, Economic and Cultural Environment**

**a Land and Building Acquisition and Compensation (where required and applicable).**

Proposed road upgrading requires its activities undertaken according to its design standards. These standards set out specific parameters and guidelines, which proposed road upgrading need to achieve during its constructions. Amongst others, these parameters also set out specific formation width including carriage way, side drains, side ways etc depending on its location - in market area: carriage way 7 m, side way 1.5 m (both sides) making formation width 10 m; formation width 5 m excluding side drains in other road stretch. Assuming 15 meter corridor of impact (COI) and 14 km long land acquisition required as a result of alignment deviation from RMDP, some 21 ha of private land is likely to be affected by the project. True picture will figure out as and when land including physical structure (as applicable) is marked and delineated on the cadastral according to design drawings and its verification on the site. *The impact is direct, small to high significance, local and short medium term in nature*

**b Increased Usage on Existing Public Utilities due to Influx of Labor - and Work force**

Labor - and work force – deployed in proposed road upgrading - requires using public utilities on the work site as their daily livings. Their need exerts pressure and competes on existing essential services available in limited capacity. These services includes telephone, water supply, solid waste management, health services, transportation, school etc, which may surpass its carrying capacity if its existing magnitude is not temporarily upgraded to suit and cater additional needs. *This impact is indirect, low significance, short-term and local in nature.*

**c Nuisance from Construction Camps**

Proposed road upgrading requires establishing a number of campsites – labor and workforce at various locations depending on contractor's work schedule and proximity of work activity to be undertaken from the labor force campsite. These labor forces may be of varying numbers but often range to any numbers but not less than 10 people in most of the cases. Campsite used by these forces becomes a source of disturbance to local people. *This impact is direct, low significance, short-term and local in nature.*

**d Alternative Fuel Needs for Campsites – contractor and labor forces for cooking their meals**

Campsites – contractor and labor forces – require energy for cooking their meals. This energy can be of two types – fire wood and fossil fuel (kerosene, LPG gas etc). Supply of fire wood can locally be arranged given forests - private, community, public etc - exist by the construction site. As and where it does not exists, energy needs however to be met from the fossil fuel – kerosene, LPG etc (alternative energy). Given its availability uncertain by unreliable supplies, cooking energy supply becomes a problem. *This impact is indirect, low significance, short-term and local in nature.*

**e Labor Forces Awareness Need on their Campsites' Sanitation and Consequences of STD – HIV/AIDS**

Labor forces health risk is commonly associated with the poor camp conditions. Use of unsafe water supply sources, poor sanitation conditions (lack of latrines, washing facilities, solid management etc) also cause the risk of endemic diseases including dysentery, diarrhoea, cholera etc. Properly unclosed borrow pits also cause the risks of spreading water-borne diseases including malaria, dengue fever etc. Contagious diseases HIV/AIDS, STDs etc may surface up conspicuously and spread over extensively as any one – local and in-migrant labor force infected with diseases – become sexually active. *Impact is indirect, high significance, local and short term in nature.*

**f Mobilization of Local People in Road Works**

Undertaking activities of proposed road upgrading requires a substantial number of manpower of various types including skilled and unskilled labor force. As and where their sustained availability is assured, and eligible and qualified, they should not be denied of a job unless any one of specifically harmful to undertaking upgrading works

activity. Offering appropriate job of proposed road upgrading activity to local people on an impartial basis may cement relationship with the local stakeholders, helping to work out any conflict surface up during constructions. *Impact is indirect, medium - high significance, local and short term in nature.*

#### **g Occupational Health and Safety, STDs**

As labor forces requires to undertake works especially in rock cutting, high slope cutting, hazardous materials handling, heavy equipment operations, bitumen works, tree felling, slope stabilization etc. they are exposed to various safety risks and health hazards if and when these works undertaken without adequate safety measures. Other potential impacts to health are respiratory, eye disease due to exposure to dust, emissions during pavement works especially in bitumen works.

Health risk is also commonly associated with the poor labour camp conditions Use of unsafe water supply sources, poor sanitation conditions (lack of latrines and washing facilities) also cause the risk of endemic diseases that includes dysentery, diarrhoea, cholera etc. *impact is direct, high significance, local and short term in nature.*

Properly unclosed borrow pits also cause the risks of spreading water-borne diseases including malaria, dengue fever.

Contagious diseases HIV/AIDS, STDs etc may surface up conspicuously and spread over extensively as any one – local and in-migrant labor force infected with diseases – become sexually active. *Impact is direct, high significance, lregional and long term in nature.*

#### **h. Pressure on Social Service Facilities**

Influx of labor force exerts pressure and competes on existing essential services including telephone, water supply, solid waste management, health services, transportation, school etc if its magnitude is not upgraded to suit and cater additional needs. *This impact is indirect, low significance, short-term and local in nature.*

#### **i Crime, Security and Conflicts due to Influx of Construction Workers**

Cash flow into the area as labor forces' wage may escalate price of essential commodities, causing market inflation during road constructions. This may also cause increased public life including alcoholism, gambling, sex life etc., and cause it as a source of conflict between local people and in-migrant as labor force. *Impact is indirect, medium significance, local, and short-term in nature.*

### **Chemical Issues / Impacts**

#### **a Safe Storage of Bitumen prior to its Usage in Road Sealing**

Bitumen, which is to be used in sealing of proposed road upgrading, is highly combustible and risky of fire hazards unless it is kept away from the fire igniting source as well as from the public. Hence its storage prior to usage in sealing works is of key



concern during road sealing works, and need to be of adequately safe in storage. *Impact is indirect, low - medium significance, local, and short-term in nature.*

**b Safe Heating, Handling and Distribution of Boiled Bitumen by the Labor force**

Bitumen is highly inflammatory and risky to its handlers, especially when the labor force carry it on for spreading over the over laid road surface with base course materials and rolled according to pavement specifications. It may cause severe burns if handlers skin get in touch with it, and is also severely toxic to naked eyes. *Impact is indirect, medium – high significance, local, and short-term in nature.*

**c Safe Storage and Usage of Fossil Fuel, Lubricants, Oil, Acids and other Chemicals used in Vehicle, Crusher Plants, Equipment etc**

Putting mechanical workshop, gas station etc into operational at contractor's camp in order to ensure upkeep of all vehicles, operating machines including heavy ones deployed in proposed road upgrading requires use of substantial quantity of lubricants, vehicles refuelling etc., to keeping it in functional Upkeep works, refuelling etc also generates some wastes and spillage. Acids used in battery recharging, other chemicals etc used at workshop are another type of workshop wastes. Fossil fuel is also required in operating crushed plant on road site where electric power supply is not available. Whilst its safe storage and usage is required and ensured, workshops wastes are potential source of environmental hazards unless it is handled correctly. *Impact is indirect, medium significance, local, and short-term in nature.*

**d Alternative Fuel Needs in Bitumen Heating**

Bitumen need heating to its specifications prior to its spread over in sealing of pavement works. For heating, it requires a substantial quantity of fossil fuel. Demand on the market according to its needs exert additional pressure on the local supplies, causing competition with its other consumers. *Impact is indirect, low significance, local, and short-term in nature.*

**6.2.2 Operation Stage**

**Physical Environment**

**a. Stabilization and Management of Unstable Slopes – Fresh and Recurrent Ones**

Upon road upgraded and put it into use by the public, slope stabilization efforts may need to continue, as and where some slopes keeps falling according to its geological formation, existing land use within its locality, precipitation in wet season etc. Whilst fresh cut slopes may get stabilized within a reasonable period, recurrent ones may continue for a long time to come requiring its periodic debris clean up if, when and where it falls in order to maintain road in its serviceable conditions. *The impact is direct, small to high significance, local and short medium term in nature*

**b Continual Respect Needs of Natural Drainage with a Focus on the Downstream Residents**

Upon road upgraded and put it into use by the public, respect shown to natural drainage during constructions, may not be fully perfect and operational. Poor up keep of existing drainage systems, debris brought down over the road etc especially after heavy precipitations may cause drainage choking, forcing surface runoff to flow along the course as it find and finally gushing down the hill. With this discharge phenomenon prevalent, it becomes at worst a source of occasional environmental threat to downstream residents as well as impairing downstream water source. This situation may need assessment of such threat, requiring correction measure. It may also require periodic clean up of choked drains as well as of debris pushed on to road. *The impact is direct, small to high significance, local and short medium term in nature*

**c. Air and Noise Impairments**

Road opening to public transportation and others following its construction completion, may cause physical impairments – air and noise – by the road side. Public transports' - especially locally operating bus - temperament of 'honking horns' regularly and more specifically at stops aiming to attract locals attention, may also cause nuisance to local people but more disturbing to 'sensitive spots' – school, hospital etc. Given such road stretch designated as 'no horn region'. *Impact is indirect, low significance, local, and short-term in nature.*

**d Road Safety**

With road surface sealed to bituminous standard, smooth and improved geometry upon proposed road upgraded, public transportations including private vehicle tempts to drive faster, causing road accidents. Such accident may be of various types ranging from minor physical injuries to fatal accidents. *Impact is indirect, low – high significance, local, and short-term in nature.*

**e Overloaded Traffic**

Public transportations especially trucks and bus, often carry loads beyond its legal and technical permits. Such carriage not only shorten its life on top of its up keeps requirement more than factory specifications with lesser return but surpass road's ability to withstand thereby shortening its life. *Impact is indirect, low – high significance, local, and short-term in nature.*

**Biological Environment**

**a. Illegal Extraction of Forest Resources - Local Mafia**

Road opening to public transportation and others following its upgrading works completion may exert indirect pressure on forests and forest resources through illegal extraction of firewood and timber. Timber mafia may surface up and become active as and when they find demand from outside. Good trafficable road conditions may motive them to take advantage of opportunity and earn money illegally. *Impact is indirect but cumulative, low to high significance, local, and medium to long-term in nature.*

**b Disturbance to Wildlife Disturbance by the Increased Traffic Flow, especially by fast Vehicular Movement**

Upon proposed road upgraded and open to public transportation and others, increased traffic flow may cause disturbance to wildlife and their movements on road stretch crossed by natural forests. This in combination with fast driving (especially during night time) and or in combination with relentless horn honking over the stretch harbouring wildlife may pose further risks to their natural succession. These may have far-reaching consequences leading to its population decimation and at worst to its extinction. Given effective regulations *Impact is indirect, low significance, local, and short-term in nature.*

**c. Meeting Fire wood for Campsite Labor force**

Some of non local labor forces who immigrated to road construction site in search of their bread earning, may opt to staying permanently rather than go back and look for another job elsewhere once they find it as their 'safe heaven'. They obviously require fire wood – an easy, reliable and affordable energy for their meal cooking – which has to meet their need as a supply source from the local forests – community, private and public. *Impact is indirect, low significance, local, and medium – long -term in nature.*

**d Hunting and poaching of wildlife**

Where the road stretch is crossed by forests harbouring wildlife including game value, it may become a good ground for the locals for hunting and poaching of wildlife of game value. The reason behind it being demand surfaced up for it following the proposed road upgraded and put it into open for public transportation. *Impact is indirect, low significance, local, and short - medium -term in nature.*

**Social, Economic and Cultural Environment**

**a. Population Pressure and Impact due to New Settlement along the Road Alignment**

Settlements, shops, food stalls' etc., emergence along the road-side soon after construction completion is common observation in Nepal. It surfaces up as the economic opportunities for the local people and to some in-migrant labor force. This leads to both appreciation in land value especially of those along and by the road side and encroachment of public land by them, causing to becoming source of social conflicts associated with road accidents – road blockage, delays etc. *Impact is indirect, low significance, local, and short-term in nature.*

**b. Social Conflicts**

Improved road accessibility and connectivity following construction completion, may trigger socially unacceptable activities including illegal drug peddling, human trafficking, sex life etc. Public life associated with alcohol, gambling etc also may cause social conflict especially among the local people and in-migrant labor force. *Impact is indirect, low significance, local, and short-term in nature.*

**Table 7: Environmental Impact Predictions with Benefit Augmentation Measures during proposed road Upgrading**

Impact	Stage	Environment	Issues	Benefit Augmentation Measures	Responsible Implementing Authority	Impact			
						Nature	Magnitude	Extent	Duration
Beneficial	Construction	Socio-economic and cultural	Employment and Income	Employ local people if and where they are available and willing to work	S C, Contractor	Direct	H	L	ST
			Enterprise Development And Commercialization	Facilitate daily essentials easily available to labor force if and where possible	S C, Contractor	Direct	M	L	ST
			Skill Enhancement Opportunities	provide opportunities for hand –on skills gain in civil works if, when and where labor force willing to	S C, Contractor	Indirect	M	L	LT
			Improved Environmental Conditions of Existing Road Side Markets	Adequately provision appropriate drainage structure; sealed surface beyond normal deign width (CW 7.5 m ; SW1.5x2 making FW 10m)	S C, Contractor	Indirect	H	L	LT
			Develop Existing Bus Stops into Better Transport Infrastructure Standards	Adequately provision appropriate drainage structure; sealed surface beyond normal deign width but extend to drains	S C, Contractor	Indirect	H	L	LT
			Vulnerable Community Development and Income Generation Plan	Provide labor works to vulnerable people if they are willing to	S C, Contractor	Indirect	H	L	ST
	Operation		Improved Access and Reduced Travel Cost	Maintain surface conditions free of defects during DLP	S C, Contractor	Direct	H	L	LT
			Increased Farm Production and its Sale	Maintain road side market outlets fully reliable	S C, Contractor	Direct	H	L	LT
			Enhancement in Social Services	Maintain good and reliable road serviceability	S C, Contractor	Indirect	H	L	LT
			Appreciation in Land Values	Commence and complete proposed upgrading at the soonest possible	S C, Contractor	Indirect	M	L	ST
			Empowering Local Women	Eradicate discrimination over women but provide common platform for developing their capability	S C, Contractor	Indirect	M	L	LT

Impact	Stage	Environmenta	Issues	Benefit Augmentation Measures	Responsible Implementing Authority	Impact			
						Nature	Magnitude	Extent	Duration
			Opportunities for Development Road Settlement into Market Outlets of Rural Productions	Maintain quality surface conditions and reliable road service	S C, Contractor	Indirect	M	L	LT
			Improved and Reliable Transport Service at Key Point of Peripheral Settlements	Maintain quality surface conditions and reliable road service	S C, Contractor	Indirect	M	L	LT
			Opportunities for Developing Key Markets (existing) on the Road into a Potential Supply Source for the Inner Settlements	Maintain quality surface conditions and reliable road service	S C, Contractor	Indirect	M	L	LT

**Table 8: Environmental Adverse Impact Predictions with Safeguards Measure Respect during proposed road Upgrading**

Impact	Stage	Environmenta	Issues	Safeguards	Responsible Implementing Authority	Impact			
						Nature	Magnitude	Extent	Duration
Adverse	Construction	Physical	Slope Instability to Cause by Cuttings	Initiate practicing environmental management plan related to this issue and respect it during constructions	S C, Contractor	Direct	H	L	ST
			Incorrect excess materials disposal	Initiate practicing environmental management plan related to this issue and respect it during constructions	S C, Contractor	Direct	H	S	ST
			Impairments in Water Resources to cause by Inadequate Drainage	Initiate practicing environmental management plan related to this issue and respect it during constructions	S C, Contractor	Direct	H	S	ST
			Identification, operation and safe closure of Quarry and Borrow Pit	Initiate practicing environmental management plan related to this issue and respect it during constructions	S C, Contractor	Direct	M	L	ST
			Air, Noise and Water Impairment to cause by Heavy Equipment Usage	Appropriate safeguards effectively affected during constructions	S C, Contractor	Direct	M	L	ST
			Disruption in Public Utilities, its Reinstatement and Re-location	Initiate practicing environmental management plan related to this issue and respect it during constructions	S C, Contractor	Direct	L	L	ST
			Contractor Awareness Need on the Consequences of Dust and Bitumen Hazards	Incorporate contractor's awareness need in capacity building prior to contract commencement	S C, Contractor	Direct	L	L	ST
			Accidental Risks and Road Safety Needs on Narrow Stretch as well as of Poor Sights Road Stretch	Place warning signs appropriate location of precaution need	S C, Contractor	Direct	H	L	ST
			Health and safety of Labor Forces Involved in Road Works especially in Risk Prone Ones-Quarry, Rock Break Up Works, Bitumen Handlings	Ensure mandatory use of safety gadgets during works at quarry, rock break. bitumen handling etc by labor force	S C, Contractor	Direct	H	L	ST

Impact	Stage	Environmenta	Issues	Safeguards	Responsible Implementing Authority	Impact			
						Nature	Magnitude	Extent	Duration
			Stockpiling of construction materials	Initiate practicing environmental management plan related to this issue and respect it during constructions	S C, Contractor	Direct	M	L	SMT
			Establishment, operation and closure of crusher plant	Initiate practicing environmental management plan related to this issue and respect it during constructions	S C, Contractor	Indirect	H	Site specific	S
			Proper safety measure in place according to 'gravity of risks'	Initiate mandatory practicing on use of safety gadgets by road builders including supervising consultants and visitors	S C, Contractor	Indirect	L-M	Site specific	S
			Change in Land Use Associated with the Conversion of Arable Land into Road	Minimize arable land need for road by meticulous design	S C, Contractor	Direct	L	L	SMT
			Respect needs to Natural Drainage	avoid from installing out fall structure above the valley side arable land	S C, Contractor	Direct	MH	L	SMT
			Prepare Road Safety Measure in Place according to Gravity of Risks in Road Works	mandatory use of safety gadgets in place by labor force	S C, Contractor	Direct	MH	L	SMT
			Landscape Impairment to Cause by the Unrestricted Regulations on the Contractor	Full restriction on the landscape impairment by the labor force	S C, Contractor	Direct	SHH	L	SMT
			Access Road Opening by the Proposed Road Upgraded Stretch	Coordinate with DDC , VDC if access road to open	PIC, SC	Direct	SH	L	SMT
			Drains Provisioned in Road Settlements (Appropriate / Adequate)	Mandatory drains provisioned / installed	Consultant – Design , Supervision	Direct	SM	L	ST
		Biological	Loss of Trees – Those Obstructing Sight Distance and Those Located Within Road Width as a Part of Upgrading Works	Remove tree(s) if and only if it obstruct sight and or located within road width	S C, Contractor	Direct	M	L	LS
			Pressure on Forest Products	Full restriction on any forest product usage by contractor / labor force	S C, Contractor	Direct	M	L	ST

Impact	Stage	Environmenta	Issues	Safeguards	Responsible Implementing Authority	Impact			
						Nature	Magnitude	Extent	Duration
			Hunting and poaching of wildlife (flora and fauna – diversity) including by the contractor and his labor forces	Full restriction on hunting and poaching of wild life by contractor / labor force	S C, Contractor	Direct	M	L	LS
			Land and Building Acquisition and Compensation (where required and applicable)	Restrict assets acquisition need to road necessity only	S C, Contractor	Direct	SH	L	ST
		Social, Economic and Cultural	Increased Usage on Existing Public Utilities due to Influx of labor and Work force.	Restrict labor force's utilities need met by contractor	S C, Contractor	Indirect	L	ST	L
			Nuisance from Construction Camps	Restrict nuisance sourced out of camps by contractor	S C, Contractor	Direct	L	ST	L
			Alternative Fuel Needs for Campsites – contractor and labor forces for cooking their meals.	Contractor to supply alternative fuel as and where fire wood not available	S C, Contractor	Indirect	L	ST	L
			Labor Forces Awareness Need on their Campsites' Sanitation and Consequences of STD-HIV/AIDS	Contractor to set labor force's sanitation need as well as consequences of unsafe sex	S C, Contractor	Indirect	H	L	ST
			Mobilization of Local People in Road Works	Set priority to local people if they are available and willing to work	S C, Contractor	Indirect	M	H	LST
			Occupational Health and Safety, STDs	Contractor to set labor force's sanitation need as well as consequences of unsafe sex	S C, Contractor	Direct	H	L	LT
			Pressure on Social Service Facilities	Contractor to set and avail easily basic amenities for labor forces	S C, Contractor	Indirect	L	ST	L
			Crime and Security and Conflicts due to Influx of Construction Workers	Contractor to set code of conduct for his labor force and their respect need	S C, Contractor	Indirect	M	L	ST
				Safe Storage of Bitumen prior to its Usage in Road Sealing	Initiate practicing environmental management plan related to this issue and respect it during constructions	S C, Contractor	Indirect	M	L
			Safe Heating, Handling and Distribution of Boiled by the Labor force	Contractor to set safety needs for bitumen handling inline with EMAP	S C, Contractor	Indirect	M	L	ST



Impact	Stage	Environmenta	Issues	Safeguards	Responsible Implementing Authority	Impact			
						Nature	Magnitude	Extent	Duration
Operation	Environmenta		Safe Storage and Usage of Fossil Fuel, lubricants, oil, Acids and other Chemicals used in Vehicle, Crusher Plants, Equipment etc.	Initiate practicing environmental management plan related to contractor's camp and workshop plan and respect it during constructions	S C, Contractor	Indirect	M	L	ST
			Alternative Fuel Needs in Bitumen heating	Contractor to arrange alternative fuel needs	S C, Contractor	Indirect	M	L	ST
	Physical		Stabilization and Management of Unstable Slopes – Fresh and Recurrent Ones	Clean up road debris to its serviceability conditions during DLP	S C, Contractor	Direct	SH	L	STM
			Continual Respect needs of natural Drainage with a Focus on the Downstream Residents	Clean up choking debris and line drain fully clean during DLP	S C, Contractor	Direct	SH	LS	SMT
			Air and Noise Impairments	Affect speed breaker on the road stretch of settlement		Indirect	LS	L	ST
			Road Safety	Installed road safety fully functional during DLP	S C, Contractor	Indirect	LH	L	ST
			Overloads Traffic	Full restriction on overloaded traffic on upgraded road	PIC	Indirect	HS	L	ST
	Biological		Illegal Extraction of Forest Resources – Local Mafia	Keep an eye on illegal forest resources extraction	DFO, Local Community	Indirect	LH	L	MLT
			Disturbance to Wildlife Disturbance by the Increased Traffic Flow, especially by fast Vehicular Movement	Full restriction on fast driving vehicle over the wildlife harboring stretch	PIC	Indirect	L	L	ST
			Meeting Fire wood for Campsite Labor force	Contractor continue to supply fire wood for labor force deployed during DLP in legally recognized deal	S C, Contractor	Indirect	L	L	LT
			Hunting and poaching of wildlife	Full restriction on the wildlife during DLP	PIC, S C	Indirect	L	L	SMT
	Social, Eco.		Population Pressure and Impact due to New Settlement along the Road Alignment	Restrict new settlement to market outlets location only	PIC	Indirect	L	L	ST
			Social Conflicts	Contract set to continue labor force's code of conduct during DLP		Indirect	L	L	ST

Impact	Stage	Environmenta	Issues	Safeguards	Responsible Implementing Authority	Impact			
						Nature	Magnitude	Extent	Duration
			Road Accidents	Restrict speed level to design with installed 'warnings signs' fully functional during DLP	S C, Contractor	Indirect	H	L	ST

## **7. ALTERNATIVE ANALYSIS**

As the scope of proposed project is to upgrade fair weather road to sealed bituminous standards of the existing alignment, issue of alternative alignment is irrelevant, not requiring 'alternative analysis'. However, proposed upgrading would entail and implemented all mitigation measures aiming to avert and or minimize adverse impacts associated with the road constructions.

### **7.1 Design**

Update exercise of Feasibility / Detailed Design Study 2010 for proposed road upgrading requires assessment and analysis of alternative design options including alternative surfacing methods – otta seal, Bituminous Surface Treatment (single / double) and other design components associated with the upgrading, paving the adequate grounds for comparative analysis. However design exercise prefers to DBST standard with formation width 4.5 m excluding drainage if economic analysis favors.

### **7.2 Construction Approach**

For this proposed road upgrading, construction approach will favor a option of a combination of mechanical and labor as it suits in view of respect need to approved road design (including construction specifications) and labor as and where available and willing to. No rigidity to any norms e.g. local labor, will favor to practice during constructions.

### **7.3 Project Site (Route)**

As the proposed upgrading is to follow the existing alignment, alternative route is irrelevant but requiring its improvement in surface condition to sealed bituminous standards with adequately drainage system and related components addressed in line with upgrading salient features. It aims to avoid and practice un-necessary vegetation removal (including trees) along the alignment unless it restricts sight on a road stretch during construction stage and its removal or clearance is the need of the site situation only.

### **7.4 Time Schedule**

As the proposed road upgrading requires its completion within the stipulated time, suitable work schedule requires matching resource (manpower, materials etc) availability, weather seasons, and type of works to be undertaken etc so that upgrading is completed within the schedule, and no significant environmental impairments is to cause by upgrading activities undertaken. Accordingly this schedule however entails and anticipates avoiding foreseeable environmental impacts.

### **7.5 Raw Materials (Resources) To Be Used**

Proposed road upgrading requires a diverse type of raw materials – natural (locally available – boulders, cobalt, earth, sand, rock etc) and market sourced (e.g. cement,

steel, bitumen, gabion etc) during road constructions. Materials of natural sources including its quantity availability are presented earlier. Materials of market sourced are generally reliable but its uncertainty is foreseen in force majeure situation.

## **7.6 Others**

### *7.6.1 No Action Option*

In the event of proposed road upgrading not undertaken, existing road conditions – road blockage in wet season, rough road surface, occasional fatalities associated with the road accidents etc – remain to continue, and thus affecting road transportation serviceability, requiring road users to suffer in respect of travel hours as well as denial of access to better social services linked up with road quality, and remain the local stakeholder in isolation from the other parts of the country.

### *7.6.2 Proposal Alternatives for Transportation*

As the proposed upgrading is set to its undertaking, issue of alternative modes of transportation – trail, ropeway, railway etc, is irrelevant, not requiring alternative modes of transportation analysis.

## **8. ENVIRONMENTAL SAFEGUARDS**

The proposed environmental safeguards (including mitigation measures) will avert, avoid, or reduce the identified adverse environmental impacts associated with the proposed road upgrading.

These safeguards need to be of preventive, curative and compensatory types depending on the nature and severity of identified adverse impacts. Measures that are proposed for of augmentation type to beneficial impacts and of minimization type to adverse impacts are outlined here under:

### **8.1 Benefit Augmentation Measures**

#### *8.1.1 Construction Phase*

##### **a Employment Opportunities to Increase Local Incomes**

Proposed road upgrading need to ensure employing local stakeholders including poor, vulnerable, socially excluded people (e.g. dalit, janajati ec) without discrimination to sex if and where they are available and willing to. As a result, project benefit will trickle down to local stakeholders, causing to improve rural economy.

##### **b Women Empowerment**

Women are exploited, dominated and excluded in their participation in capacity building opportunities including development works as well as in major decision making process though, they are the major contributor in the house keeping, agricultural activities etc. Proposed road upgrading need to overcome prevailing discrimination but instead provide them common platform for developing their capability so that they head towards the self reliant, and become exposed to 'elite' women of urban areas through the injection of capacity building e.g. organizing training on women's capacity building.

##### **c Skill enhancement**

As proposed road upgrading involves its significant share in labor based works – civil type, and significant length of road constructions across the country is in pipeline, requiring a high number of skilled and semi-skilled labor, it is appreciable if proposed upgrading is able to provide its civil works as an opportunities for skill developments for the labor force including local stakeholders on top of achieving its progress.

##### **d Developing Road Settlements into Market Outlets of Rural Productions**

Proposed road upgrading need to develop key settlements established along the road as it being the ideal point for brining out rural productions especially farm products – previously lacking its value in absence of market. As its development, proposed upgrading where possible need to develop and establish road transport infrastructure e.g. shed house, as a 'buy' and 'sale' centre of rural productions.

##### **e Improved Environmental Conditions of Existing Road Side Markets**

Existing road side markets needs to be improved into rural people's common platform by providing adequate sanitation conditions of appropriate drains as well as road

sealing works extending beyond normal design width. With these improvements, these locations will become platform for brining in rural agricultural products as well as buying domestic needs including daily essentials by the rural people. With these locations becoming in better conditions, it get increased used by them besides by travelers.

#### **f Develop Existing Bus Stops into Better Transportation Infrastructures Conditions**

Existing bus stop lightly used by the commuters, travelers etc prior to and during constructions also need to be developed into a standard Transportation Infrastructures Conditions of proposed road upgrading. These infrastructures in a way it meet all the requirements – sufficient bus bays, bus parking, drains, toilets etc - of standard transport infrastructure at key locations including district head quarters

### **8.2 Adverse Impact Safeguard Measures**

#### **8.2.1 Construction Phase**

#### **Physical Environment**

##### **a Incorrect Excess Materials Disposal**

Common experiences of incorrect and reckless excess materials disposal in road works should not surface up in proposed road upgrading and repeated as elsewhere but instead overcome and eliminated it once and for all. Correct and safe disposal methods – stick to designated location only, appropriate / adequate safeguards on disposed site in place e.g. toe wall, benching etc - need to be considered and brought into practice as a normal style of proposed road upgrading. As a procedural respect, concerned contractor need to fill in standard pro-forma – developed for this issue – and submit it to and secure approval from the Resident Engineer (including from the owner as and if required). The costs for excess materials disposal are inclusive in construction contract.

##### **b Slope Instability to Cause by Cuttings**

Fresh cut slopes with its vegetation removed in combination with design need of cuttings – earth and rock, must not let alone it to withstand by nature but requires suitable mitigation in place prior to it becoming a fresh / recurrent slide brining down huge quantity of debris. Proposed road upgrading considers its repercussion and acted upon by addressing it with appropriate mitigation measure. As a procedural respect, concerned contractor need to fill in standard pro-forma – developed for this issue – and submit it to and secure approval from the Resident Engineer (including from the owner as and if required).

The costs for stockpiling of construction materials are inclusive in construction contract

##### **c Impairment in Water Resources to Cause by Inadequate / Mis-located Drainages**

Inadequate as well as mis –located drainages e.g. causeway, culverts, other cross – drainages etc do cause impairment in downstream water bodies so also litters valleyside arable land with impoverished materials brought down by gushing discharge turning it into non-arable one, which infuriates the stakeholders and surface up to conflict. Proposed road upgrading considers it as a serious issue, requiring site –

specific suitable mitigation worked out and incorporated. As a procedural respect, concerned contractor need to fill in standard pro-forma – developed for this issue – and submit it to and secure approval from the Resident Engineer (including from the owner as and if required). The costs for drainage structures are inclusive in construction contract.

**d Identification, Operation and Safe Closure of Quarry and Borrow pit**

As quarry and borrow pit – established and operated for supplying rock, pit materials - being a potential source of the environmental impairment, its identification as a suitability for all materials requires to be verified by contractor as his responsibility, and obtain its approval prior to extracting the materials. As a procedural respect, concerned contractor need to fill in standard pro-forma – developed for this issue – and submit it to and secure approval from the Resident Engineer (including from the owner as and if required). The costs for stockpiling of construction materials are inclusive in construction contract

Quarry and borrow pit shall be located from the settlements, drinking water intakes, and shall not obstruct / disrupt natural drainage systems. Materials extraction shall not exceed depth 1.5 m at a spot but be managed in such a way that it does not alter natural river course. Any surface water ponding shall be prevented with adequate drainage. The cost for operation and closure of quarry and borrow pit are inclusive in construction contract.

**e Stockpiling of Constructions materials**

As construction materials need to be free of deleterious objects – plants, leaves, grass scrub, clay clumps, plastic etc – , as well as no mix up situation prevail on the construction site, appropriate land of sufficient area need to be identified and selected prior to it executing it as stockpiling site. As a procedural respect, concerned contractor need to fill in standard pro-forma – developed for this issue – and submit it to and secure approval from the Resident Engineer (including from the owner as and if required).

Selected land must not occupy private land or affect agricultural land without owners consent for its use. Stockpiles should be covered with tarpaulins, and for large stockpiles, it should be encircled with side barriers and covered when incidence of mix up with deleterious materials is imminent. The costs for stockpiling of construction materials are inclusive in construction contract

**f Establishment, Operation and Closure of Crusher Plant**

As crusher plant operation being a source of dust and noise nuisance, and harmful to human beings, its site location prior to putting it into operation is critical, and needs to be worked out correctly with its site well way from the human settlement. As a procedural respect, concerned contractor need to fill in standard pro-forma – developed for this issue – and submit it to and secure approval from the Resident Engineer (including from the owner as and if required). The costs for stockpiling of construction materials are inclusive in construction contract

**g Impairment in Down Steam Water Resources to Cause by Reckless Materials Disposal / Mis use of Upstream Water Hole**

Reckless materials' disposal – spoil, camp site waste etc – over the upstream water holes together with its unholy use for direct dish washings, cloth washing etc is to impair water used by the down settlers. Open toilet is another source of water impairment. Construction wastes – cement, gabion off cuts, lubricant spill, fuel spills etc is yet another source of water impairment. As a safeguard, excess materials including construction wastes need to be disposed at designate location only. Toilets, good drainages, safe water supply together with proper spillage collection and disposal system must be affected on the construction site. Contractor need to respect these provisions as his responsibility. As a procedural respect, concerned contractor need to fill in standard pro-forma – developed for this issue – and submit it to and secure approval from the Resident Engineer (including from the owner as and if required). The costs for respecting this issue are inclusive in construction contract

**h Excessive Vibration Effect to Cause by Pavement Rolling Machine**

Heavy mechanical equipment especially vibrating rolling machine used in road pavement works is cause surface vibration and rattles weak structure by he road side, risking its life. Local stakeholder is obvious to lodge complaints of its excessive use. Where such incidence encounters together with un-resolvable by local mediators, alternative pavement compression method needs to be practiced to make the work progress ahead rather than indulging in social conflict.

**i Reinstatement, Relocation of Disrupted Public Utilities**

Public utilities are to be disrupted by proposed road upgrading, requiring its reinstatement or relocation depending on the case encountered. Contractor need to ensure its services is uninterrupted with provisional service in place during constructions and corrected permanently once construction is completed. As a procedural respect, concerned contractor need to fill in standard pro-forma – developed for this issue – and submit it to and secure approval from the Resident Engineer (including from the owner as and if required). The costs for respecting this issue are inclusive in construction contract

**j Proper Safety Measures in Place according to Gravity of Risk**

Road works at time is unsafe when its nature is quarry, new opening on rock cliff, rock breaking without safety gadgets. Gravity of risk is very high and irreparable once accident is the result. Mandatory safety respect must be in place and affected by all road builders including supervising consultants, visitors during proposed road upgrading. No superiority or inferiority complexity should prevail over the construction site of risk.



## **Biological Environment**

### **a Loss of Vegetations**

Current ground conditions within existing road width along alignment of proposed road upgrading evident no need for vegetation clearance and or any trees removal. No vegetation is required during its construction but real scenario of whether or not any tree removal is required for improving sight distance and or achieving design width, become clear as ground - design verification is completed. However strategy of trees retention needs to be unless it is obstructing sight distance.

### **b Pressure on Local Forests for Supplying Fire Wood Needs**

Fire wood needs of campsite – contractor and labor force – needs to be met from forests (private, community, public) as a supply source. These needs shall not be allowed to meet any of from these sources in an illegal way but encouraged to meet by practicing legally recognized 'agreement'. As a procedural respect, concerned contractor need to make an 'agreement' with the seller (including owner as and where applicable) in a standard pro-forma – developed for this issue, and submit it to the Resident Engineer (including from the owner as and if required). The costs for respecting this issue are inclusive in construction contract

### **c Disturbance to Wild Life Population and their Habitats**

As proposed road upgrading gain its momentum and road surface become better, increased and faster traffic become nuisance to wild life population, requiring restriction regulation on ruthless driving but enforced them to respect speed limit and sensitive spot where wild animals crosses the road frequently.

### **d Threat to Bio-diversity - Wild Flora and Fauna**

With road section crossing natural forests harboring wild life become good ground for illegal hunting, contractor and his labor force may encouraged to it. As a safeguard, full restriction is required on contractor and his labor force 'not to indulge in any illegal wildlife hunting and or providing help in any way to outsider'. Failing to respect to it, culprit shall be booked with a 'warning as a chance to improving himself in first instance'. Failing to respect the first warning but indulged in another illegal hunting, culprit shall be order to leave the site at once. Concerned contractor shall be responsible for affecting these warnings against the 'culprit'.

## **Chemical Environment**

### **a Safe Storage of Bitumen prior to its Usage in Road Sealing**

Bitumen – to be used in sealing of proposed road upgrading – is highly combustible and is source of fire hazards unless it is kept away from igniting source as well as from the local people. Its storage prior to usage is of key concern and needs to adequately safe in storage. Full restriction is required on local people's unauthorized entry into to its storage site. As a procedural respect, concerned contractor need to fill in standard pro-forma – developed for this issue – and submit it to and secure approval from the

Resident Engineer (including from the owner as and if required). The costs for respecting this issue are inclusive in construction contract

**b Safe Heating, Handling and Distribution of Boiled Bitumen by the Labor force**

Bitumen being highly combustible, inflammable and risky to its handlers as and when it get in contact with his skin, handlers needs his skill and careful especially during its carry on for spreading over the surface overlaid with base course materials while undertaking road sealing works. Full restriction is required on local people's unauthorized entry into to its storage site. Appropriate safety gadgets must also be wore on by the handlers as a respected. Supervising consultant as well as any visitor must also respect it. As a procedural respect, concerned contractor need to fill in standard pro-forma – developed for this issue – and submit it to and secure approval from the Resident Engineer. The costs for respecting this issue are inclusive in construction contract.

**c Safe Storage and Usage of Fossil Fuel, Lubricants, Oil, Acids and Other Chemical Used in Heavy Equipment, Crusher Plant**

Upkeep needs of vehicles, heavy equipment as well as running of crusher plant generates a substantial quantity of oil sourced wastes – a source of environmental impairments - at the contractor's workshop, requiring its safe treatment. Contractor shall require treating oil sourced waste as his responsibility prior to abandoning workshop as a part of contract work completion..

**Social, Economic and Cultural Environment**

**a Land and Building Acquisition and Compensation (where required and applicable)**

Resettlement procedures - related to assets acquisition (private land and physical structure) need as a part of proposed road upgrading - and its implementation prior to undertaking its work, will frame up within donor's policy. Accordingly, compensation shall be made to local stakeholders for any assets acquisition, which includes compensation at replacement cost of land together with cost of crops including trees. For physical structure, compensation includes cost at prevailing price, displacement and rehabilitation cost. Full picture will surface up as RAP for proposed road upgrading come into existence.

**b Increased Usage on Existing public Utilities due to Labor – and Work – Force**

Labor – and work forces' essential services needs include water, fire wood, telephone, health services, school etc. These needs surpass the existing carrying capacity especially demand on water supply unless supplementary measure is affected. Contractor shall require affecting this supplementary as his responsibility.

**c Labor forces Awareness Needs on their Campsites' Sanitation**

Diseases: diarrhea, dysentery, cholera, typhoid etc are caused by the unsafe water. Poor sanitation at the campsite is prime reason to cause the water unsafe, requiring awareness about the full sanitations within the campsites. Contractor shall require generating awareness of his labor including repercussion of unsafe sex as his contract responsibility.

**8.2.2 Operation Phase**

**Physical Environment**

**a Stabilization and Management of Unstable Slopes – Fresh and Recurrent Ones**

Fresh cut and recurrent unstable slopes keeps on falling, requiring its debris clean up if, when and where falls in order to maintain road in its serviceability conditions. Within DLP, contractor requires to undertake this task on top of regular drain maintenance as his contract responsibility

**b Overloaded Traffic**

Unrestricted flow of overloaded traffic especially essential goods carriers from urban market outlets is to cause substantial road damages earlier than its design life, requiring road maintenances more often and earlier than design forecast. Full restriction on overloaded traffic must be in place, requiring its enforcement by the Transport Management Department and Local Traffic Police as their responsibility. Regulation must come into existence that any defaulting vehicle's 'blue book' shall be booked and suspended in first event; 'blue book renewal' withhold in second event; and 'blue book renewal' cancellation in 3rd event.

**Biological Environment**

**a Disturbance to Wildlife Movement and their Habitats**

As and where wildlife moves about, speed humps at regular intervals as well as other restriction measures including 'no horn honking', 'posting speed limits' etc needs to be affected during operation phase.

**Social, Economic and Cultural Environment**

**a Social Conflicts**

Socially unrecognized activities including illegal hard drug deals, human trafficking, sex business etc get triggered especially over the road side settlements by the better road serviceability and connectivity following construction completion, requiring 'law and order' maintain agencies' increased and broader efficiency.

### 8.3 Respect To Initial Environmental Examination

As a respect to the spirit of Initial Environmental Examination, environmental safeguards of suitable nature to overcome foreseen adverse impact needs to be affected. As its enforcement, it needs to:

#### 8.3.1 *Practicing Environmental Management Plan Pro-forma prior to Undertaking Proposed Road Upgrading*

Prior to undertaking activities of proposed road upgrading, contractor need to fill in as 'kick off' environmental management plan pro-forma on work / activity basis to begin with, submit it to Resident Engineer and secure his approval. These plans have been developed primarily to safeguards environment to the best possible, and include issues as enlisted below:

- Labor force Campsite Establishment, Management and Decommission Plan (Environment Format 01)
- Contractor's Office, Workshop Camp Establishment, Management and Decommission Plan (Environment Format 02)
- Public Utilities / Existing Services Reinstatement Plan (Environment Format 03)
- Quarry and Borrow pit Operation Plan
- (Field Identification, Extraction and Safe Closure) (Environment Format 04)
- Surplus Earth Materials Safe Disposal Plan (Environment Format 05)
- Road Support Structure Plan (Retaining Wall, Breast Wall, Toe Wall) (Environment Format 06)
- Drainage Structure Installation Plan (Environment Format 07)
- Crusher Plant Operation Plan (Site Identification, Plant Installation, Operation and Decommission) (Environment Format 08)
- Bitumen Storage, Blending and Decommission Plan (Environment Format 09)
- Embankment Structure Installation Plan (Environment Format 10)
- Materials Stock pile Plan (Environment Format 11)
- Top soil saving and its Re-use Plan (Environment Format 12)
- Road Diversion Plan (Environment Format 13)

#### 8.3.2 *Practicing and Sticking to Agreements Pro-forma related to Environmental Management Plan Pro-forma*

As a supplement to practicing any of environment management plan pro-forma enlisted above as relevant, Agreement pro-forma related to it, also needs to be 'inked up' with the concerned party, and submitted along with the plan to Resident Engineer. These agreements pro-forma have been developed primarily to safeguards interest of local stakeholders to the best possible, and include issues as enlisted below:

- Agreement related to camp site hire needs for labor forces' use
- Agreement related to supplies of fire wood needs to labor force
- Agreement related to extraction / supplies of rocks, boulder, gravel etc

- Agreement related to granting permission for excess materials disposal
- Agreement related to production / stockpile of CRRM, chips fines essential for road upgrading
- Agreement related to safe storage of bitumen
- Agreement between the Supplier and Buyer for the Sale and Purchase of Crusher Plant Materials
- Approval / Permission( by the Resident Engineer): Granted to both the Supplier and Buyer for the Sale and Purchase of Crusher Plant Materials

## **9. ENVIRONMENTAL MANAGEMENT ACTION PLAN (EMAP)**

### **9.1 Environmental Management Roles And Responsibility**

Responsibility for environmental management associated with the proposed road upgrading involves a number of roads building parties, each with specific responsibilities for particular activities. Main parties responsible for the implementation of environmental safeguards measures prior to -, during - and following - proposed road upgrading are:

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

Within the roads sector, MPPW has the overall responsibility for ensuring environmental safeguards being respected.

Department of Roads (DoR), as the main proponent, has the ultimate responsibility for the supervision of proposed road upgrading including environmental safeguards fully respected. Implementation of proposed road upgrading of Manma – Jumla Road under RSDP (New Project Preparation and Supervision) will be the responsibility of DoR Foreign Cooperation Division. Geo - Environmental and Social Unit (GESU) of DoR undertakes responsibility including environmental assessment (study) for the proposed road upgrading, provide advice related to environmental augmentation and mitigation, affecting monitoring of its study implementation in on-going proposed road upgrading.

World Bank is responsible for overseeing DoR's project design, implementation management in accordance with their grant / loan conditions including environmental safeguards adequately addressed, and respected it during proposed road upgrading works.

Design consultant will prepare final detail designs of proposed road upgrading, conduct necessary environmental study, and ensure EMAP recommendations incorporated in design. Supervising consultants will oversee entire activities of proposed road upgrading including day to day supervision of construction undertaken by the contractor, making sure environmental safeguards fully respected as a part of constructions. This will ensure full compliance of all aspects of work related to EMAP specifications by the contractor, with reporting direct to DoR Foreign Cooperation Division (including GESU as appropriate).

Construction contractor will be responsible for undertaking all road works assigned to him in accordance with contract document, including specified conditions in EMAP. Contractor will work closely with the supervising consultant in order to ensure that proposed road upgrading works are undertaken according to EMAP specified standards.

Specific responsibility of DoR, Design and Supervising Consultant (DoR's Representative) and Contactor are as outlined below:

### **DoR**

- Acquisition of all necessary private assets – land and physical structure – according to design / construction needs
- Review and approval of surveyed road alignment
- Review and approval of detailed design of proposed road upgrading
- Securing necessary permits from other line agencies of GoN including local institutions related to proposed road upgrading activities (District Forest Office, District Administration Office, District Land Survey Office, District Land Revenue Office, District Development Committees, Village Development Committee)
- Review and approval of proposed ancillary activities (workforce camps, quarry, borrow pit, crusher plants etc)
- Road maintenance, environmental monitoring and management following road handed over by the contractor

### **Project Design and Supervision Consultant (DoR's Representative)**

- Prepare final design for proposed road upgrading, its required environmental studies and EMAP design recommendations
- Survey and pegging of proposed road upgrading work according to design
- Supervise constructions undertaken by the contractor according to contract document
- Inspect and report contractor's state of works related to EMAP respect
- Audit contractor's works against the conditions set out in EMAP
- Issue corrective action against works requiring its corrections and verify if it has been respected
- Report all EMAP non-conformances to DoR for action
- Certify road works if and when contractor fully respected to EMAP and approved environmental management plan

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### **Contractor**

- Undertake constructions of road works according to approved design, with full respect to EMAP specifications as well as to approved environmental management plan
- Be available on site as and when inspections of works undertaken by the contractor including its audits
- Respect supervising consultant's instruction for correction action affected against defective works

## 9.2 Site Supervision, Monitoring And Reporting

The strict supervision of construction activities needs to be in place prior to and during proposed road upgrading in order to ensure that:

- Works are constructed in accordance with the approved designs and
- Environmental adverse impacts are fully safeguarded according to EMAP specifications

A standard system of site inspection shall be undertaken over the period of proposed road upgrading including approval and reporting as and if required

Monitoring of environmental management activity including its reporting shall also be undertaken by the concerned road builders – supervising consultants and contractors - prior to and during road upgrading as outlined in Table 9.

The Supervising Consultant together with contractor shall undertake site inspections to:

- Assist in site planning and
- Oversee constructions and state of respect to environmental safeguards

### 9.2.1 Pre-construction Phase

The Supervising Consultant and Contractor shall undertake pre-construction inspections of each section of road alignment and all ancillary sites at 'two occasions' prior to commencing any construction works.

**Pre-construction Inspection 1:** Shall involve a site review of proposed upgrading works along a stretch of 4 – 6 km of road. It will serve to:

Identify and locate by Chainage site – specific environmental issues

Identify and locate by Chainage prospective labor force campsites

Identify and locate by Chainage services that needs to be reinstated

Identify and locate by Chainage prospective excess cut / fill materials disposal

Identify and locate by Chainage sources of rock for retaining wall construction

Plan the phasing of construction along the alignment avoiding duplication of works and optimization of local resources use.

During the inspection, Supervising Consultant and Contractor shall discuss and agree upon issues enlisted as above, including the services that need to be reinstated, prospective excess cut / fill disposal sites, rock source for structural works etc. Accordingly concerned contractor shall fill in 'plan pro-forma' as a mandatory management practice applicable to 'key environmental issues' of road stretch under constructions, submit it to Resident Engineer for approval and secured his approval prior to undertaking road works foreseen to cause environmental impact.



The Supervising Consultant shall also make a record and document the type and location of all services that need to be temporarily reconnected and reinstated by the Contractor.

**Pre-construction Inspection 2:** Shall occur after the Supervising Consultant has surveyed and pegged the crest and toe of cut / fill batter, retaining wall sites, drain lines and the Contractor has pegged all excess cut / fill materials disposal sites, campsites etc.

The Supervising Consultant shall review the sites pegged by the Contractor and approve them for construction where appropriate or request the Contractor to re-peg sites.

**Follow-up Inspection** – any specific sites that require re-pegging shall be re-inspected by the Supervising Consultant and the Contractor. The Supervising Consultant shall approve these sites or instruct the Contractor to re-peg as necessary.

### 9.2.2 *Construction Phase*

The Supervising Consultant shall undertake daily, weekly, and monthly supervision and inspections of upgrading works during the period of construction and weekly inspection of related activities including campsites during its usage. For any non-respect to EMAP specifications during his supervision and inspection, Supervising Consultant shall issue letter to instructing him to correct defective within specified time, and will document and present it in Monthly Progress Report.

**Daily Supervision** – the Supervising Consultant shall supervise the following works under construction each day:

- Excavation activities
- Fill embankment construction
- Excess cut / fill materials disposal

**Weekly Inspections** - the Supervising Consultant shall undertake weekly inspections, together with the Contractor, of all the works inspected during the daily supervision as well as the following work under construction:

- Retaining and breast wall construction
- Drains construction
- Reinstatement of public utilities and services
- Quarry / burrow pits
- excess materials disposal
- stock piled materials

If any activities are not undertaken in accordance with the contract or EMAP conditions, the Supervising Consultant shall document defective works and suggest corrective

measures in the *Weekly Report*. The Supervising Consultant shall provide a copy of the *Weekly Report* to the Contractor within 2 days of the Inspection for action.

All drainage works and drain outlet areas will be inspected after each major storm event.

**Monthly Inspections** – the Supervising Consultant shall undertake a monthly inspection of all sites in use over the preceding month, as well as site activities currently in progress, at the end of each month together with the Contractor.

If any activities are not undertaken in accordance with the contract or EMAP conditions, the Supervising Consultant shall document defective works and suggest corrective measures in the *Monthly Report*. The Supervising Consultant shall provide a copy of the *Monthly Report* to the Contractor within 2 days of the Inspection for action.

### 9.2.3 Post - construction Phase

Supervising consultant shall undertake a post-construction certification inspection of each completed section of road including its rehabilitated ancillary sites. Qualified certification shall need to respect full to contract conditions including EMAP conditions. The cost for post – construction certification is included in project document of implementation phase.

### 9.2.4 Operational Phase

Environmental monitoring of upgraded road during the operation phase shall concentrate on the impact of key environmental issues identified during project design including slide and its conditions, drainage, road side structures etc.

DoR's GESU also shall undertake at most two inspections in a year. These inspections will include a visual assessment of:

- Road surface condition
- Slope conditions (cut / fill)
- Road side structures
- Drains and drain line including its state
- Damage from excess materials disposal

## 9.3 Project Level Monitoring

Supervising Consultant shall, on behalf of project, undertake its level of monitoring of road upgrading leading to sealed bituminous surface. This monitoring on type of work activities will be of three tiers nature, sticking to:

Daily Supervision - Excavation activities, Fill embankment construction and Excess cut / fill materials disposal

Weekly Inspections - Retaining and breast wall construction, Drains construction, Reinstatement of public utilities and services and Quarry / burrow pits

Monthly Inspections - Inspection of all sites in use over the preceding month, as well as site activities currently in progress, at the end of each month in conjunction with the Contractor.

#### 9.4 DoR Level Monitoring

DoR shall undertake bi-annual monitoring of upgrading works with specific focus on issues associated with road upgrading, level of contractor's respect to EMAP, site constraints etc.

#### 9.5 Monitoring And Evaluation

Ministry of Physical Planning and Works shall undertake monitoring and evaluation of ongoing works of proposed road upgrading with a focus on project implementation on the environment. As and if state of any impact is found higher than its anticipated during environmental study, MPPW shall issue necessary directives to the proponent practice and place a better safeguards so that the impact is reduced remarkably. Monitoring will focus on recording environmental state and proposing a suitable remedial action.

#### 9.6 Cost For Executing Monitoring Schedule

Responsibility for undertaking environmental monitoring of proposed road upgrading during – and post construction phase is rested on the shoulders of MPPW and GESU at the policy and proponent level. Cost to be incurred to its undertaking is provisioned in proposed project as outlined below.

Specifications	MM	Rate	Amount (Rs)
Monitoring by GESU		LS	160,000
Monitoring by MPPW		LS	90,000
TOTAL			250,000

#### 9.7 Environmental Management Action Plan (EMAP)

Environmental Management Action Plan foresees and delineates key environmental issues likely to arise with the undertaking of proposed road upgrading, and proposes practical safeguards (including mitigation) along with its implementation responsibility and monitoring schedules. EMAP also outlines its management roles and responsibilities of road builders associated with the undertaking of activities of proposed road upgrading, its supervision, monitoring and reporting (including records), audits and corrective measures, improvement proposals, and cost estimates for undertaking safeguards. The EMAP as detailed in Table 9, shall form a part of Bidding Document.

**Table 9: Environment Management Action Plan: Respect to Environment by Practicing it in Proposed Road Upgrading**

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
<b>[A] Environmental Enhancements</b>						
1. Upgrading roadsides beyond its design width through settlement areas	<ul style="list-style-type: none"> <li>• surface seal to full width (at least with SBT standards) beyond road width with drainage as road works undertaken as per design.</li> <li>• Improve health and sanitation conditions within settlement areas with adequate drainage outlets (with surface runoff catch pit installed at places along the road edge).</li> </ul>	Major settlement areas	Construction	Construction contract	Contractor	SC, DOR
2. Local Employment	<ul style="list-style-type: none"> <li>• employ local people if, and where they are available and willing to work</li> </ul>	On need basis locations of project road corridor	Construction	Construction contract	Contractor	SC, DOR
3. Skill enhancement	<ul style="list-style-type: none"> <li>• facilitate opportunities for hands –on skills gain in skill gain in civil works if, when and where labor force willing to</li> </ul>	On need basis locations of project road corridor	Construction	Construction contract	Contractor	SC, DOR
4. Road side Amenities	<ul style="list-style-type: none"> <li>• Develop bus shelters, bus bays, and truck stops as per design.</li> <li>• Install, establish and maintain road furniture (i.e. footpaths, railings, traffic signs, and speed zone signs) in working conditions as per design.</li> </ul>	On some locations of project road corridor	Construction	Construction contract	Contractor	SC, DOR
5. Improved Environmental Conditions of Existing Road Side Markets	<ul style="list-style-type: none"> <li>• Provision adequate / appropriate drainage structure; sealed surface beyond normal deign width (Carriage way 7.5 m ; Side width 1.5m x 2 making Formation width 10m)</li> </ul>	On need basis locations of project road corridor	Construction	Construction contract	Contractor	SC, DOR
6. Roadside Landscape Development	<ul style="list-style-type: none"> <li>• Carry out Bioengineering works as per detailed scheme</li> </ul>	On need basis locations of project road corridor	Construction	Construction contract	Contractor	SC, DOR
7.. Cultural Properties	<ul style="list-style-type: none"> <li>• Respect and maintain existing Cultural Properties</li> </ul>	On need basis locations of	Construction	Construction contract	Contractor	SC, DOR

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
	<ul style="list-style-type: none"> <li>Provide access roads to existing cultural properties as per design where required</li> </ul>	project road corridor				
<b>[B] Pre-Construction Stage</b>						
1. Land and Property Losses / Acquisition	<ul style="list-style-type: none"> <li>Initiate all necessary land and property acquisition formalization procedures prior to the commencement of any related work.</li> <li>Adhere to the Land Acquisition procedures according to RAP's Entitlement Framework.</li> </ul>	On need basis locations of project road corridor	Design/Pre - Construction	Project preparation cost	DOR SC	DOR DOR
2. Permits	<ul style="list-style-type: none"> <li>Obtain all necessary permits for commencement of roadwork</li> <li>Make avail permit copy to the Contractor.</li> <li>Obtain written permission from Landholders, Municipality, DDC, VDC and DoF where required under the Local Self-Governance Act, 1998 prior commencement of various activities related to construction work</li> <li>Make avail permit copies to the supervising consultant.</li> </ul>	On need basis locations of project road corridor	Pre – Construction	Project preparation cost Construction contract	PD/DOR, SC Contractor	DOR SC, DOR
3. Worksite, Survey, Pegging and Approval	<ul style="list-style-type: none"> <li>Conduct layout survey of the proposed upgrading works.</li> <li>Locate, peg out and seek approval from the Supervising Consultant for each ancillary site prior to the commencement of related activities.</li> <li>Inspect and approve, if correct all ancillary sites.</li> </ul>	Throughout Project road corridor	Pre - Construction	Construction contract  Project Cost	Contractor  SC	SC, DOR  DOR
<b>[C] Construction Stage</b>						
1. Removal of Vegetation / trees	<ul style="list-style-type: none"> <li>Mark out extent of clearing within approved worksite areas taking care to avoid religious tress – bar, pipal trees if any .</li> <li>Undertake vegetation / trees clearance only with prior approval of local stakeholders, DoF, FUG, VDC, DDC etc. as appropriate.</li> <li>Restrict clearing to the marked areas only with restriction on harvest of forest products for</li> </ul>	On need basis locations of project road corridor	Construction	Construction contract	Contractor	SC, DOR, DoF

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
	<p>personal consumption or sale.</p> <ul style="list-style-type: none"> <li>• Stockpile cleared shrub / foliage where possible within ROW as appropriate.</li> <li>• Protect and enforce restriction on cutting of remaining vegetation within the ROW and at ancillary sites.</li> <li>• Replant with same species or superior one with at least twenty five numbers against a tree removed where appropriate.</li> </ul>					
2. Quarries and Borrow Pits for Project Works	<ul style="list-style-type: none"> <li>• Locate and peg quarries and borrow pits prior to its extractions and seek approval from the supervising consultant.</li> <li>• Obtain permission/license for materials extraction from Stakeholders, Municipality, DDC or VDC as appropriate.</li> <li>• No extractions on PIECE MEAL QUARRY but limit the number to a practical one preferably one; three (3) at the most</li> <li>• Restrict extraction sites to small areas; preferably on existing quarry sites and sites without any tree cover; away from dwelling, archeological, religious or cultural sites; sites without having water logging problem in future; having lowest value production land; and sites with temporal effects</li> <li>• Full restriction on borrow pit materials extraction activity with its depth NOT EXCEEDING 1.5 M</li> <li>• Restrict all extraction activities to approved sites with operations to the hours of 07:00 – 19:00 hrs in summer season and 07:00 – 17:00hrs only.</li> <li>• Minimize extraction by re-use of surplus materials.</li> <li>• Strip and stockpile all topsoil separately as</li> </ul>	On selected river beds, quarries and borrow pits.	Design & Construction	Construction contract	Contractor and SC	SC, DOR

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
	<p>appropriate for re-use</p> <ul style="list-style-type: none"> <li>• Ensure each side drains into a sedimentation trap before runoff is discharged off the site.</li> <li>• Discourage surface water ponding through the provision of adequate drainage outlets.</li> <li>• Restore the site maintaining natural contours and vegetation.</li> <li>• START AND MAINTAIN PRACTICING ENVIRONMENTAL (ENV) PLAN FORMAT NO 04 RELATED TO THIS ISSUE – fill in, submit by the concerned contractor and secure approval from the Resident Engineer</li> <li>• STRIKE AN AGREEMENT WITH THE LOCAL INSTITUTION / PRIVATE OWNER ON STANDARD PROMAT PRIOR TO UNDERTAKING IT</li> <li>• MONITOR AND VERIFY IF APPROVED ENV PLAN FORMAT NO 04 FULLY RESPECTED</li> </ul>					
3. Excess cut / fill materials and Construction Waste Disposal	<ul style="list-style-type: none"> <li>• Re-use excess material to the extent possible as per detail design.</li> <li>• Locate disposal sites on stable ground of gentle slope avoiding i) water courses and wetlands ii) chances instability promotion iii) destruction of public and private property, vegetation and local services (Permissible sites: abandoned quarry or borrow pit which requires to restore original contour).</li> <li>• Restrict and avoid haphazard side casting but practice small spoil benches to prevent slope overloading where practicable.</li> <li>• Identify, peg and seek approval from supervising consultant for permissible fill disposal sites prior to its usage.</li> <li>• Obtain permission from local stakeholders, DDC, VDC where required as appropriate.</li> </ul>	Location of identified disposal sites.	Construction	Construction Contract	Contractor and SC	SC, DOR

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
	<ul style="list-style-type: none"> <li>• Restrict disposal at approved locations with correct placement of fill.</li> <li>• Where required, apply bio-engineering measures for vegetative cover to prevent surface erosion.</li> <li>• Ensure measures in place to prevent earthworks and stone works from impeding rivers, streams, water canals, or drainage system.</li> <li>• START AND MAINTAIN PRACTICING ENVIRONMENTAL (ENV) PLAN FORMAT NO 05 RELATED TO THIS ISSUE – fill in, submit by the concerned contractor and secure approval from the Resident Engineer</li> <li>• STRIKE AN AGREEMENT WITH THE LOCAL INSTITUTION / PRIVATE OWNER ON STANDARD PROMAT PRIOR TO UNDERTAKING IT</li> <li>• MONITOR AND VERIFY IF APPROVED ENV PLAN FORMAT NO 05 FULLY RESPECTED</li> </ul>					
4. Cut and Fill Operation	<ul style="list-style-type: none"> <li>• Survey and peg crest of cut batter and toe of earth embankment.</li> <li>• Bench the natural surface foundation of earth embankments prior to filling to enable keying.</li> <li>• Undertake and effect fill in layers no deeper than 150mm and compact before applying next layer.</li> <li>• Protect and rehabilitate cut and fill slopes including erosion prone and instable sites using conventional civil engineering structures in conjunction with bio-engineering stabilization measures as per design</li> </ul>	On need basis locations of project road corridor	Construction	Construction contract	Contractor	SC, DOR
5. Existing Unstable Hill Slopes (bare)	<ul style="list-style-type: none"> <li>• Survey and peg the extent of unstable area.</li> <li>• Apply bio-engineering and other appropriate slope protection and stabilization measures as</li> </ul>	On need basis locations of project road	Construction	Construction contract	Contractor	SC, DOR



Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
cut and fill slopes) threaten the road and surrounding land.	per detailed design to be applied to rehabilitate problem sites.	corridor				
6. Water Management (Drainage, cross-drainage, gully protection etc.)	<ul style="list-style-type: none"> <li>• Install suitably sized side drains, causeways, cross-drainage structures, bridges as per detailed design.</li> <li>• Install cascades, steps, energy dissipaters, and check dams including bio-engineering measures as per design for gully protection to avoid depth and side erosion of natural course including river beds.</li> <li>• Restrict and avoid water extracts for construction works from the standpipes and public water supplies, without prior permission of VDC.</li> <li>• Organize and effect the consensus decisions of public consultations regarding location of drainage outfalls.</li> <li>• Ensure adequate and proper care taken so as not to disrupt or contaminate the irrigation water supply or the supplies to the local public water supplies.</li> <li>• Organize and held meeting with private owner who is to be affected by the installation of cross fall out drainage prior to its construction commencement</li> <li>• Derive consensus about the type and location of cross fall out fall drainage prior to its installation</li> <li>• Restrict installation and establishment of cross fall out fall drainage according to consensus derived with the concerned</li> </ul>	On need basis locations of project road corridor	Construction	Construction contract	Contractor	SC, DOR

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
	<p>stakeholder only.</p> <ul style="list-style-type: none"> <li>• START AND MAINTAIN PRACTICING ENVIRONMENTAL (ENV) PLAN FORMAT NO 07 RELATED TO THIS ISSUE – fill in, submit by the concerned contractor and secure approval from the Resident Engineer</li> <li>• STRIKE AN AGREEMENT WITH THE LOCAL INSTITUTION / PRIVATE OWNER ON STANDARD PROMAT PRIOR TO UNDERTAKING IT</li> <li>• MONITOR AND VERIFY IF APPROVED ENV PLAN FORMAT NO 07 FULLY RESPECTED</li> </ul>					
7. Stockpiling of Construction Materials	<ul style="list-style-type: none"> <li>• Locate, peg and seek approval from the supervising consultant for the use of stockpile sites.</li> <li>• Stockpile should not be located on water courses; should not be within 50m of schools, hospitals or public standpipes; and should not affect locals and their properties.</li> <li>• Obtain written permission from landowners and local bodies for stockpiling on their land.</li> <li>• Stockpiles should be covered with tarpaulins. For large stockpiles, it should be enclosed with side barriers and also covered when not in use.</li> <li>• Provide intervening vegetated buffer to control any un-expected run-off.</li> <li>• Seed topsoil stockpiles with a cover crop where they are to be retained for more than one month.</li> <li>• Clean area properly after completion.</li> <li>• START AND MAINTAIN PRACTICING ENVIRONMENTAL (ENV) PLAN FORMAT NO 11 RELATED TO THIS ISSUE – fill in, submit by the concerned contractor and</li> </ul>	On location of identified stockpiling sites.	Construction	Construction contract	Contractor and SC	SC, DOR

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
	secure approval from the Resident Engineer • STRIKE AN AGREEMENT WITH THE LOCAL INSTITUTION / PRIVATE OWNER ON STANDARD PROMAT PRIOR TO UNDERTAKING IT • MONITOR AND VERIFY IF APPROVED ENV PLAN FORMAT NO 11 FULLY RESPECTED					
8. Top Soil Saving and Re-use	• Save practically scoopable top soil from ROW sites and re-use it on completed road formation batters approved by Supervising Consultant. • Strip and stockpile topsoil from all ancillary sites that are to be disturbed. • Keep stockpiled topsoil separate from sub-soil material. • Sow a cover crop (of quick root striking and spreading characteristics) on each batter after top soiled • START AND MAINTAIN PRACTICING ENVIRONMENTAL (ENV) PLAN FORMAT NO 12 RELATED TO THIS ISSUE – fill in, submit by the concerned contractor and secure approval from the Resident Engineer • STRIKE AN AGREEMENT WITH THE LOCAL INSTITUTION / PRIVATE OWNER ON STANDARD PROMAT PRIOR TO UNDERTAKING IT • MONITOR AND VERIFY IF APPROVED ENV PLAN FORMAT NO 12 FULLY RESPECTED	Throughout project road corridor	Construction	Construction Contract	Contractor	SC, DOR
9. Reinstatement of existing services / public utilities / cultural utilities	• Inventory all existing services / public utilities/ cultural utilities, which were, will be disturbed and or interrupted by road works. • Identify stakeholder by stakeholder / local people / end users (VDC) to be affected by road works	On location of existing public utilities/ cultural utilities / existing services disturbed and or interrupted	Construction	Construction contract	Contractor	SC, DOR

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
	<ul style="list-style-type: none"> <li>• Reach an agreement with the affected stakeholder / local people / end users (VDC), regarding services (i.e. irrigation canal, water supply lines, standpipes, drainage ditches and walking trails, chautara's etc) stating requirement of its reinstatement type – temporary and permanent - citing location of cuts / interruption and schedule of reinstatements.</li> <li>• Obtain written permission from affected landowners / local people regarding temporary disruption of services.</li> <li>• Locate and reach agreement with affected landowners and local people / end users (VDC) regarding services (i.e. irrigation canal, water supply lines, standpipes, drainage ditches and walking trails, chautara's etc) to be maintained, temporarily cut and reinstated including timing and location of cuts and reinstatements. Obtain written permission from affected landowners / local people regarding temporary disruption of services.</li> <li>• Avoid and protect all community facilities - temples, stupas, patipauwa, traditional ceremonial site, cremation site etc, which will be affected by road works</li> <li>• Provision and establish local trails at locations acceptable to the local stakeholders, end users (to satisfaction of VDC).</li> <li>• Frame up realistic work schedule aiming to minimize inconvenience to local stakeholders as well as to local cultural festivals.</li> <li>• Dismantle and relocate religious structures upon consensus developed amongst the local stakeholders by organizing local public</li> </ul>	by Project works.				

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
	<p>consultations.</p> <ul style="list-style-type: none"> <li>• START AND MAINTAIN PRACTICING ENVIRONMENTAL (ENV) PLAN FORMAT NO 03 RELATED TO THIS ISSUE – fill in, submit by the concerned contractor and secure approval from the Resident Engineer</li> <li>• STRIKE AN AGREEMENT WITH THE LOCAL INSTITUTION / PRIVATE OWNER ON STANDARD PROMAT PRIOR TO UNDERTAKING IT</li> <li>• MONITOR AND VERIFY IF APPROVED ENV PLAN FORMAT NO 03 FULLY RESPECTED</li> </ul>					
10. Bitumen safe storage and its use	<ul style="list-style-type: none"> <li>• Identify and locate site safe for bitumen storage</li> <li>• Strike an agreement with the owner if it is private land</li> <li>• Store bitumen on designated site</li> <li>• FULL RESTRICTION on bitumen STORAGE on scattered conditions along road</li> <li>• Only kerosene, diesel or gas fuel allowed using for heating and melting bitumen.</li> <li>• Clean up areas spilled with bitumen while storing its drums on designated areas.</li> <li>• FULL RESTRICTION on bituminous spills DISCHARGING into side drains.</li> <li>• Install catch pitch appropriately on bitumen storage site in order that any accidental bitumen spillage caught inside it</li> <li>• No bitumen applications or spray allowed in strong wind or rainy conditions.</li> <li>• START AND MAINTAIN PRACTICING ENVIRONMENTAL (ENV) PLAN FORMAT NO 09 RELATED TO THIS ISSUE – fill in, submit by the concerned contractor and secure approval from the Resident Engineer</li> </ul>	On designated site of Project area.	Construction	Construction contract	Contractor	SC, DOR

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
	<ul style="list-style-type: none"> <li>• STRIKE AN AGREEMENT WITH THE LOCAL INSTITUTION / PRIVATE OWNER ON STANDARD PROMAT PRIOR TO UNDERTAKING IT</li> <li>• MONITOR AND VERIFY IF APPROVED ENV PLAN FORMAT NO 09 FULLY RESPECTED</li> </ul>					
11. Blasting	<ul style="list-style-type: none"> <li>• Seek and secure approval for blasting from the SC prior to its undertaking.</li> <li>• Issue public notice to all local residents / VDC prior to blasting activity</li> <li>• Inspect and approve blasting where significant hard rock occurs.</li> <li>• Inspect blasting operation during the course of construction.</li> <li>• Restrict all blasting to the working hours 09:00 – 16:30 only.</li> <li>• Conduct controlled blasting complying rules under Explosive Act (1961).</li> </ul>	On need basis locations of blasting sites.	Construction	Construction contract	Contractor  SC	SC, DOR  DOR
12. Stone Crushing Plant / Hot mix Plant / Batching Plants	<ul style="list-style-type: none"> <li>• Identify and locate safe plant sites – crusher, hot mix, batching etc</li> <li>• Apply, seek and secure approval from SC prior to establishing and operating plants</li> <li>• Locate, peg and establish plants site well away - preferably at least 500m - from local residents, drinking water intakes, arable lands and sensitive ecosystem.</li> <li>• Identify owner of plants site - local people, Municipality, DDC or VDC as appropriate.</li> <li>• Strike an agreement with the local stakeholders - local people, Municipality, DDC or VDC as appropriate.</li> <li>• Fit and operate Stone crushing equipment / cement batching with dust control devices and operated as per Manufacturer's Specification.</li> <li>• Ensure bitumen mixing plant have in-built</li> </ul>	On designated plant location of project area.	Construction	Construction contract	Contractor	SC, DOR

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
	<p>mechanisms for the absorption of gases.</p> <ul style="list-style-type: none"> <li>• Restrict plants to the day time working hours 09:00 – 16:30 only.</li> <li>• Restore the site maintaining natural contours and vegetation after use.</li> <li>• START AND MAINTAIN PRACTICING ENVIRONMENTAL (ENV) PLAN FORMAT NO 08 RELATED TO THIS ISSUE – fill in, submit by the concerned contractor and secure approval from the Resident Engineer</li> <li>• STRIKE AN AGREEMENT WITH THE LOCAL INSTITUTION / PRIVATE OWNER ON STANDARD PROMAT PRIOR TO UNDERTAKING IT</li> <li>• MONITOR AND VERIFY IF APPROVED ENV PLAN FORMAT NO 08 FULLY RESPECTED</li> </ul>					
13. Labour force Camp Establishment, Management and Decommission	<ul style="list-style-type: none"> <li>• Identify, apply, seek and secure approval of appropriate labor force camp prior to establishing and operating</li> <li>• Locate approved site and peg appropriate labor force camp prior to establishing and operating</li> <li>• No camps allowed locating near settlements; near water supply intakes; or sites that affects locals' access to drinking water.</li> <li>• No camp allowed locating in the vicinity of landslide and flood plains.</li> <li>• Provide and maintain sustained supply of safe drinking water</li> <li>• Develop and ensure proper sewerage and waste disposal facilities at the camps.</li> <li>• No firewood meeting from illegal source – without striking an agreement with the supplier</li> <li>• No firewood using by labor force from the</li> </ul>	On locations of selected labor camps in project area.	Construction	Construction contract	Contractor	SC, DOR

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
	illegal source <ul style="list-style-type: none"> <li>• Prohibit workforce from poaching of any wildlife and cutting trees.</li> <li>• Clear and restore labor force camps to natural or stable conditions with vegetative cover.</li> <li>• Restrict labor force's working hours from 7:00 to 18:00 only.</li> <li>• START AND MAINTAIN PRACTICING ENVIRONMENTAL (ENV) PLAN FORMAT NO 01 RELATED TO THIS ISSUE – fill in, submit by the concerned contractor and secure approval from the Resident Engineer</li> <li>• STRIKE AN AGREEMENT WITH THE LOCAL INSTITUTION / PRIVATE OWNER ON STANDARD PROMAT PRIOR TO UNDERTAKING IT</li> <li>• MONITOR AND VERIFY IF APPROVED ENV PLAN FORMAT NO 01 FULLY RESPECTED</li> </ul>					
14. Contractor's Work Camp Establishment, Operation and De-commission	<ul style="list-style-type: none"> <li>• Identify, apply, seek and secure approval of appropriate contractor's work force camp prior to establishing and operating</li> <li>• Locate approved site and peg appropriate contractor work force camp prior to establishing and operating</li> <li>• No camps allowed locating near settlements; near water supply intakes; or sites that affects locals' access to drinking water.</li> <li>• No camp allowed locating in the vicinity of landslide and flood plains.</li> <li>• Provide and maintain sustained supply of safe drinking water</li> <li>• Develop and ensure proper sewerage and waste disposal facilities at the camps.</li> <li>• No firewood meeting from illegal source – without striking an agreement with the</li> </ul>	On locations selected for contractor's work camps in project area	Construction	Construction contract	Contractor	SC, DOR



Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
	<p>supplier</p> <ul style="list-style-type: none"> <li>• No firewood using by labor force from the illegal source</li> <li>• Prohibit workforce from poaching of any wildlife and cutting trees.</li> <li>• Clear and restore contractor's work force camps to natural or stable conditions with vegetative cover.</li> <li>• Remove, recover and reuse used oil, lubricants collected or removed form site.</li> <li>• Manage explosives, oil, petrol, and grease according to Provisions of this Management plan.</li> <li>• START AND MAINTAIN PRACTICING ENVIRONMENTAL (ENV) PLAN FORMAT NO 02 RELATED TO THIS ISSUE – fill in, submit by the concerned contractor and secure approval from the Resident Engineer</li> <li>• STRIKE AN AGREEMENT WITH THE LOCAL INSTITUTION / PRIVATE OWNER ON STANDARD PROMAT PRIOR TO UNDERTAKING IT</li> <li>• MONITOR AND VERIFY IF APPROVED ENV PLAN FORMAT NO 02 FULLY RESPECTED</li> </ul>					
15. Explosives, Combustibles and Toxic Materials Management	<ul style="list-style-type: none"> <li>• No hazardous materials allowed to store near surface waters.</li> <li>• Collect and re-cycle used lubricants and oils or dispose it off safely.</li> <li>• Overlay plastic sheeting under hazardous material storage area</li> <li>• Collect and retain hazardous material leaks and spills laid over the plastic sheet.</li> <li>• Capture contaminated runoff from storage areas in ditches or ponds with an oil trap at the outlet.</li> </ul>	On storage site of explosives, combustibles and toxic materials in Project area	Construction	Construction contract	Contractor	SC, DOR

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
	<ul style="list-style-type: none"> <li>• Pack contaminated and worn plastic sheeting into drums and disposed it off site.</li> <li>• Use explosives as per the prevailing GON regulations only.</li> </ul>					
16. Air Pollution	<ul style="list-style-type: none"> <li>• Install and establish stone crushing plant / Hot mix plant / Batching plant sites at least 500m from local residents, settlements and habitats</li> <li>• Fit stone crushing plant / Hot mix plant / Batching plants with dust suppression equipment.</li> <li>• Dampen and maintain on the stretch of road constructions by periodical water spray.</li> <li>• Delivery vehicles will be covered.</li> <li>• Seal mixing equipment as per existing standards.</li> <li>• ENSURE contractor's construction vehicles comply with Motor Vehicles and Transportation Management Act as amended – mandatory GREEN STICKER.</li> <li>• Install and provide temporary hoardings to minimize dust impact on locations of temples and other cultural sites as and where required.</li> <li>• Restrict traffic speed by providing speed control measures on the road stretch of the settlements, work site.</li> </ul>	On need basis locations – local residents, settlement, habitats - of Project area	Construction	Construction contract	Contractor	SC, DOR
17. Noise Pollution and Vibration Effect	<ul style="list-style-type: none"> <li>• Use plants - stone crushing plant / Hot mix plant / Batching plant - and equipment in constructions ensuring it conforms to best practices.</li> <li>• Fit and maintain vehicles and equipment with silencer prior to its use keeping noise at minimum levels.</li> <li>• Make avail and provide construction workers with appropriate ear muffs/ foam plugs.</li> <li>• Install, activate and maintain noise barriers</li> </ul>	On need basis location of Project area	Construction	Construction contract	Contractor	SC, PD/DOR

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
	<p>urban and sensitive locations i.e. schools, hospitals etc.</p> <ul style="list-style-type: none"> <li>• Carry out blasting only as a LAST RESORT after technical justification and as per Nepal Explosives Act 1961.</li> <li>• Post notice, inform and evacuate – if necessary – local residents prior to blasting.</li> <li>• Limit blasting to a rock splits only</li> <li>• Monitor cracks caused by vibration due to construction activities</li> <li>• Seek and practice alternative to minimize crack caused by vibrations.</li> <li>• Restrict and limit working hours to day hours specifically at urban and sensitive locations.</li> </ul>					
18. Safety, Accident Risks and Health	<ul style="list-style-type: none"> <li>• Install, establish and maintain adequate lighting and safety signal devices for both traffic and work safety.</li> <li>• Install and establish adequate warning signs, safety barriers, traffic calming measures for both traffic and work safety</li> <li>• Deploy flag man to control traffic for both traffic and work safety.</li> <li>• Undertake controlled blasting with cordons placed on either side; closing of road at blasting time and siren sound prior to blasting as and where required..</li> <li>• Make avail and provide protective measures including helmets, masks, boots, gloves, ear plugs and goggles for workers safety.</li> <li>• Make easily avail a readily available first aid unit including an adequate supply of dressing materials AT EVERY WORK PLACE and ANY TIME.</li> <li>• Establish and maintain health care system at construction camps including regular visits by</li> </ul>	On work place and contractor camp of Project area	Construction	Construction contract	Contractor	SC, PD/DOR

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
	<p>trained medical staff for routine check up of workers and avoidance of communicable disease.</p> <ul style="list-style-type: none"> <li>• Provide and facilitate temporary diversions of earthen stretch, with proper drainage system and periodic water spray wherever necessary.</li> <li>• Check and certify electrical equipment regularly.</li> <li>• Provide and install all road signs as per design.</li> <li>• Organize road safety education to all villagers, schools, clubs and drivers of construction vehicles.</li> </ul>					
19. Road support structure - Retaining walls and Breast Walls	<ul style="list-style-type: none"> <li>• Train and ensure MACHINE OPERATOR, deployed for foundation excavations is FULLY AWARE of the consequences of his works, especially of exceeding over design specification on the environment leading to peripheral instability as well as structure collapse at a later date</li> <li>• FULL RESTRICTIOIN on machine operator while executing foundation to a design specifications magnitude only</li> <li>• TIE UP structural ends (bottom part in the hill side and top part on the valley side)– right and left with DRY ROCKS’ so as not to allow surface run off from these ends and inciting scour</li> <li>• SMOOTHEN materials – above the structure in the hill side; below the structure on the valley side according to the case encountered – all over so as not to leave conditions conducive to erosions</li> <li>• START AND MAINTAIN PRACTICING ENVIRONMNETAL (ENV) PLAN FORMAT</li> </ul>	On need basis locations of project area	Construction	Construction contract	Contractor	SC, PD/DOR

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
	<p>NO 06 RELATED TO THIS ISSUE – fill in, submit by the concerned contractor and secure approval from the Resident Engineer</p> <ul style="list-style-type: none"> <li>• STRIKE AN AGREEMENT WITH THE LOCAL INSTITUTION / PRIVATE OWNER ON STANDARD PROMAT PRIOR TO UNDERTAKING IT</li> <li>• MONITOR AND VERIFY IF APPROVED ENV PLAN FORMAT NO 06 FULLY RESPECTED</li> </ul>					
20. Road Diversion	<ul style="list-style-type: none"> <li>• Provision and install traffic control signals – flashing boards, speed breakers, road dividers etc at appropriate locations according to a need</li> <li>• Full restriction on road side parking anywhere in the vicinity but keep it free of parking vehicles</li> <li>• Adequate water sprinkling effected over the diversion stretch – in the morning and afternoon</li> <li>• Reinstate diversion stretch to its original value once its use longer require</li> <li>• START AND MAINTAIN PRACTICING ENVIRONMENTAL (ENV) PLAN FORMAT NO 03 RELATED TO THIS ISSUE – fill in, submit by the concerned contractor and secure approval from the Resident Engineer</li> <li>• STRIKE AN AGREEMENT WITH THE LOCAL INSTITUTION / PRIVATE OWNER ON STANDARD PROMAT PRIOR TO UNDERTAKING IT</li> <li>• MONITOR AND VERIFY IF APPROVED ENV PLAN FORMAT NO 03 FULLY RESPECTED</li> </ul>	On need basis locations of project area	Construction	Construction contract	Contractor	SC, PD/DOR
21. Grievance Redressal	<ul style="list-style-type: none"> <li>• Form, activate and maintain GRIEVANCE REDRESSAL MECHANISM for each site of</li> </ul>	On need basis locations of	Construction	Contractor's cost	Contractor	SC, PD/DOR

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
Mechanism	road constructions <ul style="list-style-type: none"> <li>• Activate and maintain GRIEVANCE REDRESSAL MECHANISM in concerned project manager's office, Resident Engineers office, contractor's office for each site of road constructions</li> <li>• Inform local stakeholders of Grievance Redressal Mechanism's existence</li> <li>• Inform local stakeholders about how they can lodge grievance against contractor's fault work for his rectification</li> <li>• Undertake and correct fault works by contractor to grievance lodger's satisfaction</li> </ul>	project area				
22. Road Builders' Capacity Building	<ul style="list-style-type: none"> <li>• Organize EYE OPENING workshop with a focus on key environmental issues associated with road works (Target group: Key Level road Builders - Supervising consultants, Contract Manager / Engineer)</li> <li>• Organize TRAINING to GRASS ROOT level road builders with a focus on the implications of their works (defective) on environment (Target group – machine excavator, labor gang leader etc)</li> <li>• Organize LOCAL LEVEL workshop with a focus on familiarizing environmental issues and project benefits</li> <li>• Organize REFRESHING workshop with a focus on ascertaining key road builders feed back towards improved environmental respect (Target group - Supervising consultants, Contract Manager / Engineer)</li> </ul>	On need basis locations of project area	Construction	DoR's cost	Contractor	SC, PD/DOR
<b>[D] Operation Stage</b>						
1. Air and Noise Pollution	<ul style="list-style-type: none"> <li>• Install and enforce speed restrictions signs on the road section within dense settlements and forest area to reduce dust generation, limit</li> </ul>	Dense settlements and forest areas	Operation	Construction contract	Contractor, DOR	DOR

Environmental Issues / Component	Environmental Safeguarding Measures / Actions	Affected Location	Implementation Phase	Mitigation Cost (NRs.)	Institutional Responsibility	
					Implementation	Supervision
	vehicle speed, , and where horns will not be blown and traffic speed will be regulated. <ul style="list-style-type: none"> <li>• Establish Green barrier belt between the road and the settlements. with appropriate plantings</li> <li>• Enforce strictly vehicle emission standards.</li> <li>• Maintain road side tree plantation</li> </ul>			Engineering cost	Transportation Management Department	DOR, GESU
2. Safety Measures	<ul style="list-style-type: none"> <li>• Develop and respect Traffic Management Plan , especially for stretch of congested locations.</li> <li>• Enforce strict Traffic control measures, including speed limits.</li> <li>• Enforce strict surveillance and enforce against new encroachment and squatting within the ROW</li> <li>• Enforce school or hospital established and located within 50m of the highway with permission from the planning authorities.</li> </ul>	Throughout Road Project corridor	Operation	Engineering cost	Local Govt. Body	DOR

## 9.8 Grievance Redress Mechanism

Public dissent, especially amongst local stakeholders is obvious and common to surface up on the road stretch where its activity is undertaken, and continued without suggested environmental safeguards being correctly respected. These non-compliant safeguards at times most notably may include: rock extractions at contractors discretion without formal agreement with the land owner, locating and establishing cross / outfall drainage over the private land without its owner's consent, draining out hazardous spills over the private land, littering arable land with the impoverished materials (e.g. spoil), allowing labor force including gang leader or machine operator's undertake their works at their without knowledge of his wrong doing etc.

Local stakeholders, who are directly affected by their fault works as cited above, and wish to lodge their grievances requiring its corrections, may need to be fully aware of 'about how' and 'where they can lodge their grievances'. Inability to understand and conceive their rights by the road builders on time, and absence of 'Grievance Redressal Body' at work site of its fault works may later lead to conflict, which at worst situation may lead to a 'need for stop of road works'. For local stakeholders' convenience, this mechanism needs to be affected by establishing mandatory 'grievance register book' at the Chief District Officer's Office, Project Manager's Office, road builders' office – supervising consultants and contractor etc. The register book requires containing i) date of grievance registered ii) name / address of grievance lodger (stakeholder) iii) nature of grievance being lodged and iv) location / site of fault works requiring corrections to his satisfactions. Appropriate action may need to be affected as and if the case of registered grievance is genuine by the road builders on priority basis, and monitored if grievance is appropriately entertained.



## 10. CONCLUSION AND RECOMMENDATIONS

Completion of upgrading works for the Manma - Jumla Road section is expected to result in substantial beneficial impacts, serving a remote district in Mid Western Region of Nepal and connects it to other parts of the country. It foresees to benefit if number of measures and activities as proposed is undertaken to enhance the expected benefits associated with the road upgrading.

Local stakeholders including disadvantaged groups (poor and women) are targeted for their livelihood enhancement through jobs offers to local people if, where and when they are available and willing to, as well as through environmental awareness and training programs that will open up their eyes and enable them to benefit from the project.

Proposed road upgrading, if undertaken, will also result in the acquisition of some 21 ha of private land following deviation from RMDP alignment. Most of other identified adverse impacts are generally locally confined, and limited mainly to the period of construction, which is typically associated with the nature of construction works.

It is concluded that, with the set of proposed mitigation measures put into action, many of the identified impacts could be minimized or even set off. Once the stringent measures outlined in the Environmental Management and Action Plan are in place and respected by the Contractors, and all supervision and monitoring mechanisms are fully carried out, there is no risk and or a little residual impacts that may affect the bio-physical, social and cultural environs.

With the exception of the transformation of land into the proposed width for road formation (4.5 m) and construction width (5.5m) all the adverse impacts are reversible.

However, induced / cumulative impacts such as undesired road side settlements, encroachment or illegal logging cannot to be averted by environmental mitigation measures. Socially unrecognized activities e.g. sex business, sexually transmitted diseases, human trafficking etc., may remain as local problem in perpetuity. To address and over come these issues, it needs concerted actions of various governmental and non-governmental agencies including the local stakeholders.

Given the above conclusion, this IEE Report recommends to implement the proposed road upgrading under the condition that the safeguard measures outlined in the Environmental Management Action Plan (EMAP) are fully and effectively implemented followed by its monitoring process in action.

Given the above conclusion, this IEE Report recommends to implement the proposed road upgrading under the condition that up to 25 % payment can be withheld against any non-respect to the safeguard measures outlined in the Environmental Management Action Plan (EMAP) including quarry site closure, correct spoil disposal, reinstatement of Public Utilities etc

Proposed road upgraded if undertaken will not cross any of the thresholds set out by EPA 1997 and EPR (latest amendments) and other relevant Acts and Regulations. Thus IEE study satisfies the mandatory requirements, and is sufficient.