Government of Nepal
Ministry of Federal Affairs and Local Development
Singha Durbar, Kathmandu, Nepal

Rural Reconstruction and Rehabilitation Sector Development Program
(RRRSDP-2)

Department of Local Infrastructure Development and Agricultural Roads
(DoLIDAR), Shreemahal, Pulchowk, Lalitpur

INITIAL ENVIRONMENTAL EXAMINATION STUDY REPORT FOR

UPGRADING OF
Nayapul-Pawati-Dadakharka Road

Proponent

District Development Committee
Charikot, Dolakha

Executive Summary

Proponent

District Development Committee (DDC) of Dolakha district is proponent of this project which is endorsed by Rural Reconstruction and Rehabilitation Sector Development Program, Phase-2 (RRRSDP-2) follow up of RRRSDP-1. This road development Project is implemented by Department of Local Inffastructure Development and Agricultural Roads (DoLIDAR) under Ministry of Federal Affairs and Local Development.

Project Description

The proposed Nayapul-Pawati-Dadakharka Road is located in Dolakha District, Central Development Region, Janakpur Zone. The length of road is 19 km distance having width of 3m (including 5 m carriage way width and 1.5 m shoulder on either side). The planned RoW of the road is 10 m on either side from the centre line of the road. The starting point of the road is from 1367amsl at Nayapul Tamakoshi and ends at 1275 amsl Pokhari Vetpu VDC of Dolakha1041amsl. The road alignment passes through the scattered forest land and rural settlement and cross the ghyang Khola road does not cross any major river.

Significance of the Proposal

The ameliorated road in the project site will enhance the socio-economic situation and bring constructive change in the other sectors. The road will provide easy access to the places and other resources that makestransport of goods and servicescheap, safe and fast from rural areas to urban centers. IEE study of road is conducted to fulfill the statutory requirementsstated in Schedule 1, Rule 3 of Environment Protection Rules (EPR 1997). For the further implementation of the project the IEE report have to be approved from the Ministry of Federal Affairs and Local Development (MoFALD).

Objectives

The prime aim of the IEE study is to segregate and envision the plausible impacts of the project on environment component (Physical, Chemical, Biological, Socio-economic and cultural environment of the project area). Moreover the study will guide the proponent with detail mitigation measure including beneficial impact of project.

Methodology

Accordance to the Rule 7 (1) of Environment Protection Rule, 1997 of the GoN (Second Amendment 2007) and prescribe methodology of ToR, the IEE Report is prepared. Different materials collected during the study period were reviewed. For the future use, the zone of influence of the project is demarcated in the Study. IEE Study team made the field survey, collected necessary information and conducted focal group discussion and public consultation with local people and concerned stakeholders.15 days Public Notice was published in Abhiyana national daily newspaper on 1st of Ashwin 2071.

Existing Environmental Condition

The proposed project site is located in mid-hill of the country at an altitude of 1367 to 1275 amsl. Physiographically, theproject site is placed in between Siwalik Hills Zone and Mahabharata lekh.The project site has moderately warm summer months while the winter is cool. The total mean annual precipitation of the area is 2037mm and annual average temperature is 21.3 oC. The road alignment comprises of 53% of cultivated land, 14% of forest, and 23 % bush land, 4% of Waterbody, 3% of grass and remaining 2% of barren/bush land.

The major tree species identified in the project area are Sal *(Shorea Robusta)*, Chilaune (*Schima wallichii*), Salla (*Pinus roxburghii*), Parijot (*Nyctanthes arbo-tristis*), Pipal (*Pericampylus glaucus*), Katus (*Litsea monopetala*), Uttis (*Alnus nepalensis*), Bamboo (*Bambusa vulgare*), Bar (*Ficus benghalensis*), Mango, Mauwa (*Engelhardia spicata*), Lakuri, Guava (*Psidium guajava*), Dudelo

(*Euphorbia hirta*) and Lapsi(*Choerospondias axillaris*). The ethno-botanical plants observed are*Timor* (*Zanthoxylum armatum*), Pipal (*Pericampylus glaucus*), bar(*Ficus benghalensis*), amala(*Ohyllanthus emblica*)(Field Survey, 2014). The wild animalspresent in the project area were squirrels (Faunambulus sps), Dumsi (Hystrix, brachyuran), Chituwa (Panthera pardus), Phaura (Vulpes, bengaleasis), Monkey (Macaca, mulatta), Sarus (Grus, nigricollis). Common herpeto fauna species include Bufo melanostictus, frogs (calotes vensicolor), Snakes (green snakes). The common bird species observed in the project site are sparrows, Kalij (Caphura leucomelanos) Kafal pakyo, kag, Parrot and flying fox.

Total population of project affected VDCs are 39,383 in 10,252 numbers of household in which 46% are male and 54%. 21.1% of district population lives in the project affected VDCs. The average HH size of the VDCs is represented by 3.97 persons per HH. The average literacy rate of the project VDCs is 62.37%. Majority of Ethinic groups belongs to Chhetree (i.e. about 41%). Most of the Chhetree community is found in the Bhimeshwor Municipality.Similarly, Newar Community is second most densely populated in the project VDC followed by Tamang, Brahman, Kami, Damai/Dholi, Sarki, Sanyasi/Dashami. Whereas other cast such as Rai, Gurung, Koiri/Khushwaha, Dhanku, Kathbaniya, Hajam/Thakur, Sunuwar, Haluwai, Jirel and Sherpa found in the project affected VDC. Nepali is the most spoken language in the project VDC (i.e. 75% of population mother tonge). Similarly, 15% of population speaks tamang language and remaining peoples speaks newar and Sherpa launguage.Major source of water in the project VDCs are spring water that is supplied from Tap/pipe line (79%). Other sources of water used by people are spout water, uncovered well/kuwa, River/stream and covered well/kuwa. 23% of household don't have toilet facilities whereas rest used flush toilet (44%) and ordinary toilet (33%).

Beneficial Impacts from Project Implementation

The project brings lots of opportunities to the local people with its construction and operation phase. Employment opportunity for local people is an immediate beneficial impact from the project. About 200 md skilled and 400 md unskilled laborswill be deployed in different activities of project. The poor vulnerable and socially excluded peoples will be given priority in project related job through the contractors. Other advantages during this phase are increased enterprise development opportunities in the area, opportunities to improve technical skills and knowhow by participating in construction related works of the project.

The road construction will enhance accessibility that will make transportation cheaper and easier. This will also increase the productivity of land due to easier and cheaper availability agriculture inputs and improves income and food security of local people, further enhance establishment of agro-industries based on local products as raw material. With the smooth access and better transportation facilities, improvement in socio-economic development including education, health, communication, market and banking. Ultimately, it leads to improve the quality of life of people. The operation of road will also contribute to increase in land values that will be beneficial to local landholders. The implementation of the proposal will enhance a number of visitors and tourist activities and promote a tourism business.

Adverse Impacts of Implementation of the Proposal

Construction of road will bring large flux of construction workers that will impact on existing services/facilities of the place such as telephone, water supply, health and medicine and transportation. During construction period, work personnel will be exposed to different health risk factors which can cause respiration problem and eye disease due to pavement work. Similarly, health hazard will be caused through activities such rock cutting, slope cutting, handling of hazardous material, machinery movement, bitumen works, side casting, tree felling, slope stabilization etc.

Six cut slope failures were observed in road alignment. All failures are occurred after opening of the road track. This area is very sensitive while maintaining RoW. The high instabilities are found between the chainage 3+537 to 5+743 and 12+010.

Removal of vegetation and cutting of new hill will expose new surface area for erosion. Spoil disposal from the excavation will drain to water resource and result in water pollution, land value degradation and loss of agricultural crop. Bitumen and chemicals which is to be used in 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 insecurity.

About 124 numbers of trees have to be cleared prior to the road construction. The tree species that are to be removed for the road construction are follows Sal (30), Chilaune (8), Pine (30), Parijot (2), Peeple (5), Kutmero (6), Mango (1), Uttis (20), Bamboo (1), Bar (2), Mauwa (11), Lakuri (2), Guava (1), Dudelo (2) and Lapsi (1).However some of the trees can adjust while maintaining RoW.The RoW encroachment create a negative consequences such as the blockage of road due to construction of houses and shops, delay in private and public transport, increment in accidents, hindrances for maintenance of work, haphazard garbage disposal, poor sanitation that may result in undesired landscape aesthetics, and reduction of the overall road capacity.

Adverse Impact Mitigation Measures

The IEE report has lay down different mitigations measures to counteract environmental impacts and to make the project environmentally friendly. With the implementation of project, the affected people will be given due attention and compensation as per the level of impact through contractors. Other constructions that shall be focused are site clearing, slope cutting, quarrying, spoil disposal and other construction activities to protect environmental integrity of the project area.

After the construction phase, different instabilities raised along the alignment will be regularly maintained. To prevent water logging on the road site or nearby cultivation land, drainage and proper discharge facilities will be maintained. Similarly, proper adequate measures will be taken to preserve wildlife and forest resources, and maintain social integrity of the area.

Environmental Management Plan

Environmental Management Plan (EMP) is proposed in the report considering to issues identified, possible effects and impacts, measures for their mitigation, monitoring method and schedule. Similarly, agencies responsible toper form those environmental mitigation measures and monitoring have been incorporated. Different monitoring indicators to crosscheck level of impact on physical, biological, socio-economic and cultural environment have also been prescribed in the report. The approximate cost for implementation of EMP is estimated at around NRs. 43,41,480/-.

Conclusion

Majority of identified environmental adverse impacts are local and limited mainly to the period of construction. The study foresees that the projects have minimal impacts on physical, biological, socio-economic and cultural environment of the project area. The identified adverse impacts can be minimized, compensated, or even ignored. The implementation of proposed Nayapul-Pawati-Dadakharka Road is will bring large set of beneficial impacts such as employment generation, wage income, increase in local economy and enhancement of technical skills etc.

The proposed project site does not fall under environmentally sensitive area. It is anticipated that with the set of proposed mitigation measures, most of the impacts can be minimized or mitigated. Similarly, the proposed road construction work will not overcome any standard prescribe by EPA, 1996 and EPR, 1997 (with amendments,) and other relevant Acts and Rules. Based on this IEE study, this project is recommended for implementation with incorporation of the measures suggested in the EMP.

कार्यकारी सारांश

आयोजना प्रस्तावक

यस नयापुल-पवटी-डाँडाखर्क (१९ कि मि) सडकको प्रस्तावक दोलखा जिल्ला विकास समिति रहेको छ । यसमा पुनर्निर्माण तथा पुनः स्थापना क्षेत्र विकास कार्यक्रम दोस्रो चरण अर्न्तगत प्रस्ताविक उक्त सडकको कार्यन्वयनको जिम्मेवारी स्थानीय पूर्वाधार विकास र कृषि सडक विभाग(DoLIDAR), नेपाल सरकार, संघिय मामिला तथा स्थानीय विकास मन्त्रालय अन्तर्गत रहि दोलखा जिल्ला विकास समितिको रहने छ ।

आयोजना विवरण

प्रस्तावित नयापुल-पवटी-डाँडाखर्क सडक आयोजना मध्यमा अञ्चल विकास क्षेत्र जनकपूर अञ्चल दोलखा जिल्लाको भीमेश्वर नगरपालिका, फसकु, पवटी, घ्याङ सुकाठोकर र भेङ्पु गाविस सम्म सम्पन्न गर्ने योजना रहेको छ । उक्त सडकको लम्बाई १९ किलो मिटर हुने छ भने चौडाई ५ मिटर रहने छ । प्रस्तावित सडक मामिण वस्ती हुदै पहाडी जंगल भाग भई जाने छ र साथै घ्याङखोला पनि काटने छ ।

प्रस्तावको सान्दर्भिकता

प्रस्तावित आयोजनाले स्थानीय समुदायको आर्थिक तथा सामाजिक अवस्थामा सुधार ल्याउने छ । छिटो, छरितो, सुरक्षित यात्रा र सर-सामाग्री अर्थात ढुवानी सेवा उपभोग गर्न सकिने भएकोले यस प्रस्ताव कार्यन्वयनको सान्दर्भिकता देखिएको छ । वातावरण संरक्षण नियमावली २०५७ अनुसूची १ अनुसार प्रस्तावित सडकको निर्माण तथा सुधारको लागि प्रारम्भिक वातावरणीय परिक्षण अध्ययन प्रतिवेदन नेपाल सरकार स्थानीय विकास मन्त्रालय मार्फत स्विकृत लिनु पर्ने भएकोले प्रारम्भिक वातावरणीय परिक्षण अध्ययन गरिनु पर्ने अनिवार्य कानुनी प्रावधान रहेको छ ।

उद्देश्य

यस प्रारम्भिक वातावरणीय परिक्षणको मूख्य उद्देश्य प्रस्तावित आयोजनाको कार्यान्वयनबाट आयोजना क्षेत्रको भौतिक, रसायनिक, जैविक, सामाजिक, आर्थिक, साँस्कृतिक वातावरणमा पर्न सक्ने सकारात्मक तथा नकरात्मक प्रभावहरुको अध्ययन गरी सकारात्मक प्रभावहरुको बढोत्तरी तथा नकरात्मक प्रभावहरुलाई न्यूनीकरण गर्ने उपायहरु पहिल्याउनु हो ।

कार्यविधि

यो अध्ययन प्रतिवेदन वातावरण संरक्षण नियमावली २०५७ दोस्रो ससोधनको प्रावधान अनुसार तथा यसै प्रस्तावको कार्यसूची (Terms of Reference) मा उल्लेख गरिए अनुसार तयार पारिएको हो । यसका लागि सान्दर्भिक ग्रन्थहरुको पुनरावलोकन तथा आयोजना प्रभावित क्षेत्रको निर्धारण गर्ने कार्य गरियो । अध्ययन टोली द्वारा सामूहिक रुपमा २०७१ साल असोज महिनामा स्थलतरा सर्वेक्षण गर्ने, आवश्यक सूचनाहरु संकलन गर्ने र स्थानीय समुदाय र सरोकारवालाहरु सँग समूहगत छलफल, परामर्श गर्ने कार्य गरियो । स्थलगत अध्ययन अर्थात सरोकारवालाहरूको जानकारीको लागि राष्ट्रिय दैनिक अभियानमा मिति २०७१ साल असोज १ गते सार्वजनिक सूचना प्रकाशित गरियो ।

विद्यमान वातावरणीय अवस्था

प्रस्तावित सडक मार्ग नेपालको मध्य भौगर्भिक क्षेत्रमा १३६७ देखि १२७५ मिटरको उचाइमा पर्दछ उक्त क्षेत्रको जलवायु उष्ण तथा समशितोष्ण अर्थात वर्षामा न्यानो र जाडोमा चिसो रहेको छ । अयोजना क्षेत्रको

वार्षिक सरदर मनसुन २०३७ मि.मि. रहेको छ भने वार्षिक सरदर तापक्रम २१.३ डिग्री सेन्टीग्रेड रहेको छ । उक्त क्षेत्रको भू-उपयोग कृषि क्षेत्र (५३%), वन क्षेत्र (१४%) र अन्य (२३%) रहेको छ ।
आयोजना क्षेत्रमा पाइने मुख्य रुख प्रजातीहरूमा साल, चिलाउने, सल्ला, पारिजात, पिपल, कुटमेरो,आप, उतिस, बास, वर, मौवा, लाकुरी, अम्बा, दुधिलो र लप्सीरहेको छ। यस परियोजना क्षेत्रमा पाइने स्तन धारी जनवारहरूमा न्याउरी मुसा, दुम्सी, चितुवा,बादर, फ्याउरो साथै चराचुरङ्गीहरुमा सूगा कालिज, काफलपाक्यो, र काग देखिने गर्दछन् ।

आयोजना प्रभावित गाविसको कुल जनसंख्या ३३३८३ रहेको छ भने घर धुरी संख्या १०२५२ छ जसमा ४६ प्रतिशत पुरुष ५४ प्रतिशत महिला छन् । आयोजना गाविसमा जिल्लाको २१.१ प्रतिशत जनसख्या वसोवास गर्छन् । प्रत्येक घरधुरीमा परिवार संख्या ३.९७ रहेको छ भने सरदर साक्षर दर ६२.३७ प्रतिशत रहेको छ । प्रमुख जातिमा क्षेत्री र नेवार छन भने बाँकी तामाङ्ग, बाह्मण, कामी, दमाई, सार्की, सन्यासी, राई, गुरुङ, मजाम, सुनुवार, जिरेल र शेर्पा रहेका छन् । ७५ प्रतिशत जनसंख्याले नेपाली भाषा बोल्छन भने १५ प्रतिशतले तामाङ्ग र अन्यले नेवार तथा शेर्पा भाषा प्रयोग गर्छन् । ७९ प्रतिशत घर धुरीमा खानेपानी पाइपको जडान गरेको पाइन्छ भने बाँकीले कुवा खोला र मुलको पानी प्रयोग गर्छन् । २३ प्रतिशत घरधुरीको शौचालयको व्यवस्था छैन भने बाँकी ४४ प्रतिशतले आधुनिक शौचालय र ३३ प्रतिशतले सामान्य शौचालयको व्यवस्था गरेको पाइन्छ ।

आयोजना निर्माणबाट पर्ने सकारात्मक प्रभावहरु:
आयोजनाबाट तत्कालै हुने लाभमा स्थानीय जनसमुदायमा रोजगारीको श्रृजना गर्दछ । आयोजना सञ्चालनको लागि प्रतिदिन २०० जना दक्ष र ४०० जना अदक्ष श्रमशक्तिको आवश्यकता पर्दछ । आयोजनासग सम्बन्धित कामका निर्माण व्यवसायी मार्फत् गरीब तथा पिछडीएका स्थानीय जनताले प्राथमिकता पाउनेछन् । यस कारणमा हुने अन्य लाभहरुमा उद्यमसिलताको विकास र आयोजना निर्माण कार्यमा सहभागी भई स्थानीय क्षमता बृद्धि हुने अवसर पनि पर्दछ ।

सडक निर्माणबाट आवत जावत गर्न सहज हुने छ । यस कार्यले कृषि सामाग्रीको सुलभ आपूर्ति, कृषिमा व्यवसायीकरण र कृषिको उत्पादकत्वमा वृद्धि भई स्थानीय समुदायको आर्थिक तथा सामाजिक अवस्था सुधार आउने छ । पँहुच तथा यातायातको अवसर संगै शिक्षा, स्वास्थ, संचार, बजार, बैंकिङ्ग तथा अन्य आर्थिक र सामाजीक क्षेत्रहरुको विकास हुनेछ । सडकको सञ्चालनले स्थानीय जमीनको मूल्य वृद्धि भई स्थानीय जनतालाई लाभ पुर्‍याउनेछ ।

आयोजना कार्यान्वयनबाट पर्न सक्ने नकारात्मक प्रभावहरु:
निर्माण कार्यक्रममा संलग्न श्रमिकका कारण स्थानीय स्तरमा उपभोग गरिएकों सेवा सुविधाहरू जस्तै खाने पानी, स्वास्थ्य, यातायात र सार्वजनीक सञ्चारहरूमा चाप बढ्न सक्छ । निर्माण गतिविधिहरूका कारण श्रमिकहरू तथा स्थानीय समुदायमा विभिन्न प्रकारको रोग तथा स्वास्थ्यमा समस्या देखा पर्न सक्दछन् ।
आयोजना निर्माणको क्रममा भिरहरु काट्दा, निर्माण सामाग्री निकाल्दा, खन्दा निस्कीएको माटो तथा ग्रेगर निकाल्दा, खानी सञ्चालन गर्दा त्यस क्षेत्रको भिरालो ठाउँहरुमा असर पर्न गई पहिरो तथा भू-क्षय हुने सम्भावना रहन्छ । तसर्थ, फोहर तथा खन्दा निस्कीएको माटो, ग्रेगरको उचित व्यवस्थापन हुन सकेन भने यसले जल प्रदुषण, वन जङ्गल विनास, कृषि उत्पादनमा ह्रास गराउनका साथै रासायनीक सामाग्रीहरुको प्रयोग उचित भण्डारणको अभावमा चुहावट भएर वा खसेर मानविय क्षती तथा वातावरणीय जोखिम निम्त्याउन सक्दछ ।

वार्षिक सरदर मनसुन २०३७ मि.मि. रहेको छ भने वार्षिक सरदर तापक्रम २१.३ डिग्री सेन्ट्रीग्रेड रहेको छ । यस क्षेत्रको भू-उपयोग कृषि क्षेत्र (५३%), वन क्षेत्र (१४%) र अन्य (२३%) रहेको छ ।
आयोजना क्षेत्रमा पाइने मुख्य रुख प्रजातीहरूमा सिल, चिलाउने, सल्ला, पारिजात, पिपल, कुटमेरो,आप, उतिस, बास,ेवर, मौवा, लाकुरी, अम्बा, दुधिलो र लप्सीरहेको छ। यस परियोजना क्षेत्रमा पाइने स्तन धारी जनवारहरूमा न्याउरी मुसा, दुम्सी, चितुवा,बादर, प्याउरो साथै चराचुरङ्गीहरुमा सूगा कालिज, काफलपाक्यो, र काग देखिने गर्दछन् ।

आयोजना प्रभावित गाविसको कुल जनसंख्या ३३३८३ रहेको छ भने घर धुरी संख्या १०२५२ छ जसमा ४६ प्रतिशत पुरुष ५४ प्रतिशत महिला छन् । आयोजना गाविसमा जिल्लाको २१.१ प्रतिशत जनसंख्या बसोबास गर्छन् । प्रत्येक घरधुरीमा परिवार संख्या ३.९७ रहेको छ भने सरदर साक्षर दर ६२.३७ प्रतिशत रहेको छ । प्रमुख जातिमा क्षेत्री र नेवार छन भने बाँकी तामाङ्ग, बाह्मण, कामी, दमाई, सार्की, सन्यासी, राई, गुरुङ, हजाम, सुनुवार, जिरेल र शेर्पा रहेका छन् । ७५ प्रतिशत जनसंख्याले नेपाली भाषा बोल्छन भने १५ प्रतिशतले तामाङ्ग र अन्यले नेवार तथा शेर्पा भाषा प्रयोग गर्छन् । ७९ प्रतिशत घर धुरीमा खानेपानी पाइपको जडान रहेको पाइन्छ भने बाँकीले कुवा खोला र मुलको पानी प्रयोग गर्छन् । २३ प्रतिशत घरधुरीको शौचालयको व्यवस्था छैन भने बाँकी ४४ प्रतिशतले आधुनिक शौचालय र ३३ प्रतिशतले सामान्य शौचालयको व्यवस्था गरेको पाइन्छ ।

आयोजना निर्माणबाट पर्ने सकारात्मक प्रभावहरु:
आयोजनाबाट तत्कालै हुने लाभमा स्थानीय जनसमुदायमा रोजगारीको सृजना गर्दछ । आयोजना सञ्चालनको लागि प्रतिदिन २०० जना दक्ष र ४०० जना अदक्ष श्रमशक्तिको आवश्यकता पर्दछ । आयोजनासंग सम्बन्धित कामका निर्माण व्यवसायी मार्फत् गरीब तथा पिछडीएका स्थानीय जनताले प्राथमिकता पाउनेछन् । यस कारणमा हुने अन्य लाभहरुमा उद्यमसिलताको विकास र आयोजना निर्माण कार्यमा सहभागी भई स्थानीय क्षमता बृद्धि हुने अवसर पनि पर्दछ ।

सडक निर्माणबाट आवत जावत गर्न सहज हुने छ । यस कार्यले कृषि सामाग्रीको सुलभ आपूर्ति, कृषिमा व्यवसायीकरण र कृषिको उत्पादकत्वमा वृद्धि भई स्थानीय समुदायको आर्थिक तथा सामाजिक अवस्था सुधार आउने छ । पँहुच तथा यातायातको अवसर संगै शिक्षा, स्वास्थ, संचार, बजार, बैंकीङ्ग तथा अन्य आर्थीक र सामाजीक क्षेत्रहरुको बिकास हुनेछ । सडकको सञ्चालनले स्थानीय जमीनको मूल्य वृद्धि भई स्थानीय जनतालाई लाभ पुर्याउनेछ ।

आयोजना कार्यान्वयनबाट पर्न सक्ने नकारात्मक प्रभावहरु:
निर्माण कार्यक्रममा संलग्न श्रमिकका कारण स्थानीय स्तरमा उपभोग गरिएको सेवा सुविधाहरू जस्तै खाने पानी, स्वास्थ्य, यातायात र सार्वजनीक सञ्चारहरूमा चाप बढ्न सक्छ । निर्माण गतिविधिहरूका कारण श्रमिकहरू तथा स्थानीय समुदायमा विभिन्न प्रकारको रोग तथा स्वास्थ्यमा समस्या देखा पर्न सक्दछन् ।
आयोजना निर्माणको क्रममा भिरहरु काट्दा, निर्माण सामाग्री निकाल्दा, खन्दा निस्कीएको माटो तथा ग्रेगर निकाल्दा, खानी सञ्चालन गर्दा त्यस क्षेत्रको भिरालो ठाउँहरुमा असर पर्न गई पहिरो तथा भू-क्षय हुने सम्भावना रहन्छ । तसर्थ, फोहर तथा खन्दा निस्कीएको माटो, ग्रेगरको उचित व्यवस्थापन हुन सकेन भने यसले जल प्रदुषण, वन जङ्गल विनास, कृषि उत्पादनमा ह्रास गराउनका साथै रासायनीक सामाग्रीहरुको प्रयोग र उचित भण्डारणको अभावमा चुहावट भएर वा खसेर मानविय क्षती तथा वातावरणीय जोखिम निम्त्याउन सक्दछ ।

सडक निर्माण गर्दा करीब १३१ वटा रुखहरु काट्नुपर्ने हुन्छ । सडकको निर्माण सँगै बजार बस्तीको अव्यवस्तीत विस्तार हुने सम्भावना र सडक क्षेत्र मिच्ने प्रविधिले सडक दुर्घटना बढनुका साथै अन्य वातावरणीय, सामाजिक अर्थात सांस्कृतिक पक्षहरू समेत प्रभाव पादछ ।

नकारात्मक प्रभाव न्यूनिकरणका उपायहरु:

यस आयोजनालाई वातावरण मैत्री बनाउनका लागि सकारात्मक प्रभावहरुलाई बढावा गर्ने तथा नकारात्मक प्रभावहरुलाई नियन्त्रण या न्यूनिकरण गर्ने थुप्रै उपायहरु यस प्रतिवेदनमा प्रस्तावित गरिएको छ । योजना निर्माण कार्यको कममा कसैको व्यक्तिगत सम्पत्तीमा क्षति हुने देखिएमा निर्माण कार्य अघिनै उक्त व्यक्तिसग त्यसको लिखित सहमती लिईनेछ । आयोजनाले प्रभावित जनतालाई निर्माण कार्यमा रोजगारीमा तथा सिपमूलक तालिममा प्राथमिकता दिनेछ । आयोजना निर्माणको कममा जग्गा फडानी गर्दा, जमिन काट्दा, खानी सञ्चालन गर्दा, खन्दा निस्किएको माटो, ग्रेगर थुपार्दा, तथा अन्य संवेदनशील कार्य गर्दा त्यस क्षेत्रको वातावरणलाई सुरक्षीत राख्न विशेष ध्यान दिईनेछ ।

उक्त आयोजना कार्यान्वयन हुँदा उत्पन्न हुने अस्थिरता, सडक किनाराको नालाबाट बग्ने अनियन्त्रीत पानी, सवारी साधनको वृद्धिले बढ्न सक्ने धुलो तथा ध्वनी प्रदुषण त्यसै गरी सडकको निर्माणसँगै वन सम्पदा तथा वन्य जन्तुमा पर्ने चापलाई मध्य नजर राख्दै त्यस क्षेत्रको वातावरणलाई सुरक्षित राख्न विशेष ध्यान दिइने छ ।

वातावरणीय व्यवस्थापन योजना

यस प्रतिवेदनमा वातावरणीय व्यवस्थापन योजना अर्न्तगत आयोजनाबाट पर्ने सम्भावीत असरहरु, असरहरुको प्रभाव, न्यूनिकरण विधि, अनुगमन विधि तथा कार्यतालीका प्रस्तावीत गरिएको छ । यसका साथै न्यूनिकरणका उपायहरुको तथा अनुगमन कार्यको कार्यान्वयन गर्ने जिम्मेवार निकायहरुको पनि पहिचान गरिएको छ । अनुगमनका लागि आवश्यक भौतिक, जैविक, सामाजिक, आर्थिक तथा सांस्कृतिक वातावरणीय अनुगमन सूचकहरुको पनि पहिचान गरिएको छ । वातावरणीय व्यवस्थापन योजना कार्यान्वयन गर्न करिब रु ३६१४८०/-खर्च हुने अनुमान गरिएको छ ।

निष्कर्ष

पहिचान गरिएका प्रायः वातावरणीय प्रभावहरु थोरै क्षेत्रमा तथा मूख्य गरी निर्माण कार्यको समयमा सिमित हुने पाईएको छ । प्रस्तावित न्यूनिकरण विधिहरुको पालना गरिएमा पहिचान गरिएका वातावरणीय प्रभावहरुको न्यूनिकरण वा नियन्त्रण गर्न सकिन्छ । वातावरणीय व्यवस्थापन योजना अर्न्तगत उल्लेख गरिएका उपायहरुको कार्यान्वयन गरिएमा यस आयोजनाको कार्यान्वयनले आयोजना क्षेत्रको भौतिक, जैविक, सामाजिक, आर्थिक तथा सांस्कृतिक वातावरणमा उल्लेखनीय नकारात्मक प्रभाव नपर्ने देखिन्छ । प्रस्तावित सडक आयोजनाले रोजगारीको सृजना साथै स्थानीय समुदायको आम्दानी वृद्धि गराई स्थानीय अर्थतन्त्रको [illegible] टेवा पुऱ्याउने छ । यस प्रारम्भीक वातावरणीय अध्ययनको आधारमा यस प्रतिवेदनमा उल्लेख गरिएको वातावरणीय व्यवस्थापन योजनालाई पूर्ण रुपमा लागू गरी प्रस्तावित आयोजना कार्यान्वयन गर्न सिफारीस गरिन्छ ।

ACRONYMS/ABBREVIATION

AIDS	Acquired Immune Deficiency Syndrome
BT	Blacktop
CBO	Community Based Organization
CBS	Central Bureau of Statistics
CF	Compensation Fixation Committee
CFUG	Community Forest User Group
CoI	Corridor of Impact
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
dB (A)	Decibel (A)
DDC	District Development Committee
DFO	District Forest Office
DoLIDAR	Department of Local Infrastructure Development and Agricultural Road
DoR	Department of Roads
DTICC	District Transport Infrastructure Coordination Committee
DIZ	Direct Impact Zone
IZ	Indirect Impact Zone
LRCC	Local Road Coordination Committee
LRUC	Local Road User Committee
RBG	Road Building Groups
EMP	Environment Management Plan
EPA	Environment Protection Act
EPR	Environment Protection Rules
ER	Earthern
ERMC	Environment and Resource Management Centre
ESMF	Environmental and Social Management Framework
FGD	Focus Group Discussion
GIS	Geographical Information System
GR	Gravelled
GON	Government of Nepal
HIV	Human Immunodeficiency Virus
II	Indirect Impact Zone
MBT	Main Boundary Thrust
MCT	Main Central Thrust
MFT	Main Frontal Thrust
MoPPW	Ministry of Physical Planning and Works
Amsl	Above mean Sea Level
MoFALD	Ministry of Federal Affairs and Local Development
MoSTE	Ministry of Science Technology and Environment
NTFP	Non Timber Forest Product
PCU	Project Coordination Unit
RoW	Right of Way
RRA	Rapid Rural Appraisal
RRRSDP	Rural Reconstruction and Rehabilitation Sector Development Program
SRN	Strategic Road Network
ToR	Terms of Reference
VDC	Village Development Committee
ZoI	Zone of Influence

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CHAPTER 1: INTRODUCTION

1. Name and Address of the Institution

1.1 Name of Proposal

The Title of the proposal is 'Initial Environmental Examination (IEE) study of Nayapul-Pawati-Dadakharka Road (19 km) in Dolakha District of Janakpur Zone, Central Development Region of Nepal.

1.2 Name and Address of the Proponent

The project will be implemented by The District Development Committee (DDC) in its respective district of the upcoming Rural Reconstruction and Rehabilitation Sector Development Program, Phase-2 (RRRSDP-2), which is the follow-on of RRRSDP-1. Evidently as the owners or proponents of the subprojects, DDC is responsible for the Initial Environmental Examination (IEE) studies. Hence, the DDC of Dolakha is the proponent being the implementing agency of the Nayapul-Pawati-Dadakharka Road. The detailed address of the proponent is as follows:

District Development Committee, Dolakha
Phone: 049-421724, 421049
Fax: 049-421829
Website: www.ddcdolakha.gov.np
Email:dolakhadto@gmail.com ,shiwakotinp12@gmail.com,neupanemc@gmail.com

The Rural Reconstruction and Rehabilitation Sector Development Program, Phase -2 is coordinated by Project Coordination Unit (PCU) of DoLIDAR, the address of which is as follows

Project Coordination Unit (PCU)
Rural Reconstruction and Rehabilitation Sector Development Program -2 (RRRSDP-2)
Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR)
Shreemahal, Pulchowk, Lalitpur.
Phone No. 977-1-5532172; Fax No. 977-1-5550482,
Web: www.rrr.gov.np

1.3 The Consultant

The consultant for Initial Environmental Examination (IEE) study of this project is Environment and Resource Management Center (ERMC) Pvt. Ltd. The address of consulting firm is as following

Environment & Resource Management Center (ERMC) (P.) Ltd.
New Baneshwor, Kathmandu, Nepal
P. O. Box: 12419, Kathmandu
Tel.: 977-01-4483064, 4465863, **Fax:** 977-01-4479361
Email: safe@ermc.wlink.com.np, **Web:** www.ermcnepal.com

Experts:

Environmental Expert: Name: Binod Baniya

Team leader Name:Salil Devkota

CHAPTER 2: SUMMARY OF THE PROPOSAL

2. Summary of the Project

2.1 Background

The Rural Reconstruction and Rehabilitation Sector Development Program, Phase 2 (RRRSDP-2) is a proposed follow-on program of RRRSDP, Phase 1 which was successfully completed in June 2013 having implemented more than 97% of the total program with many valuable significance and rewarding achievements due to full compliance of environmental friendly as well as negative impact mitigation methods, social safeguards, resettlement plans and many other spectacular economic and employment generating works in line with the program's underlined objectives, defined targets and envisioned outputs. As a result, the Government of Nepal approved to carry over this program into another phase. It is noteworthy that all RRRSDP-2 works of preparatory stage is considered a unique program of DoLIDAR without any external PPTA support. Subsequently, it has been decided by DoLIDAR that it will embark on the RRRSDP-2 to design and upgrade/construct the roads subprojects that will be in range of some 50 km per district. Similarly, it will also conduct feasibility study of 35 motorable bridges in prospect of decision making on the feasible bridges about detailed survey/design.

The Rural Reconstruction and Rehabilitation Sector Development Programme, Phase-2 (RRRSDP-2) covers 20 districts same as that of RRRSDP-1 namely Panchthar, Ilam, Jhapa, Morang, Sunsari, and Dhankuta from the Eastern Development Region; Sindhuli, Dolakha, Sindhupalchowk, Kabhrepalanchok, Lalitpur, Bhaktapur, Kathmandu, and Chitwan from the Central Development Region; Manang, Mustang, and Parbat from the Western Development Region; Rolpa and Rukum from the Mid-Western Development Region; and Dadeldhura from the Far-Western Development Region. The road starts from Nayapul (Tamakoshi), Ward no- 6, Bhimeshwor Municipalityand ends to Pokhari, Ward no-4 of Vetpu VDC. The alignment passes through a forest, cultivation land and settlement. It is an open track having total length of 19 km. With completion of IEE process, the road will be upgraded and blacktop.

This Initial Environmental Examination (IEE) Report has been prepared for the environmental assessment of proposed sub-project. In the IEE, potential environmental impacts have been identified, their significance assessed, and mitigation measures devised to avoid these impacts or reduce them to an acceptable level. Then, these mitigation measures have been incorporated in the Environmental Management Plan (EMP). The extent of the present study is to prepare a comprehensive IEE study for Nayapul-Pawati-Dadakharkaroad for its improvement.

2.2 Objective of IEE

The main objective of the IEE study is to identify the impacts of physical, biological, socio-economic and cultural environment of the sub-project area. The specific objectives of the proposed IEE study include to

- Identify the major issues that may arise as a result of proposed works on bio-physical, socio-economic and cultural environment of the project area,
- To recommend practical and site specific environmental mitigation and enhancement measures, prepare and implement environmental monitoring plan for the sub-project, and
- Make sure that IEE is sufficient for the proposed road sub project.

2.3 Rationality of Conducting IEE Study

The proposed Nayapul-Pawati-Dadakharka RoadSectionis the roads that is to be upgraded under the Rural Reconstruction and Rehabilitation Sector Development Program -2 (RRRSDP-2) The

proposed upgrading works provide an asphalt road which makes the access smoother, faster and comfortable eliminating tortuous travel journey.
An IEE of the proposed road enables to assess the environmental consequences of the proposed development projectthat helps to suggest appropriate, practical and site specific mitigation and enhancement measures. Besides,IEE is a legal requirement by the Government of Nepal (GoN) according to article 3 of Environment Protection Act (EPA), 1997 and rule 3 of Environment Protection Rules (EPR), 1997 (amended in 2007) as mentioned in schedule1. The approval of the IEE Report by the concern agency, MoFALD is mandatory before commencing the upgrading work.

2.4 Technical Information of the Proposal

This chapter contains a detailed description of the environmental and social setting in the project area, relevant policies review and forming the basis for the impact analysis of the project's effects on the bio-physical and social environment after completion of works.

2.4.1 Project Description

The road section is a 19km in length existing from Nayapul to Dadakharka. The road section is part of the sub-projects of the RRRSDP-2. The sub-project lies in the Dolakha district of central development region of Nepal. The road alignment starts from Nayapul (Tamakoshi), Ward no- 6, Bhimeshwor Municipalityand ends to Pokhari, Ward no-4 of Vedpu VDC. The road passes through forest, cultivation land and settlement. The salient features of the road are present in the Table 2.1. After the completion of upgrading work, it will provide aneasy transportation access to the peoples living in this area. Moreover, it will reduce total transport cost and help people of the region to enhance their social-economic condition. Salient features relating to this road are shown in the following table.

Table 2.1:Salient Features of the Project

Name of the Project	Rural Reconstruction and Rehabilitation Sector Development Program (RRRSDP-2)
Name of the Sub-project	Nayapul-Pawati-Dadakharka Road
LOCATION	
Development region	Central Development region
Zone	Janakpur
Project Districts	Dolakha
Start Point	Nayapul (Tamakoshi), Ward no- 6, Bhimeshwor Municipality
End Point	Pokhari, Ward no-4 of Vetpu VDC.
Affected VDCs	Bhimeshwor Municipality andFasku, Pawati, Ghyang Sukathokar and Bhedapu VDCs
Major settlements	Charange, Fasku, Saute, Adharikhola, Satdobatepati, Mirge, Sukathokar, Ghang, Bhedpu, Ghang pokhari
GEOGRAPHICAL FEATURES	
Terrain	Hill
Alignment	Hilly/Rolling
Altitude	1367m at Nayapul Tamakoshi (Starting point) and 1275 at Pokhari (end point), Vetpu VDC of Dolakha.
Climate	Sub-tropical, Humid and Mesothermal
Road Type	
Classification of Road	
Existing Class of road	Earthen Road
Propose class of road	Blacktop
Length of Road	19km

Slope Stability	The road alignment comprises of 25% of forest, 40 % of settlement, and 25 % cultivation land and remaining 10% of barren/bush land. The steepness of land is generally up to 30 degree.
Design Parameters	
Right of Way	10 m on either side from the centre line of the road
Carriageway Width	5 m
Existing Width	3 m
Design Road Width for District Road	5.25 m (3.75 m carriage way and 0.75 m shoulder on either side). To this drainage width to be added as per design for the total formation width.
Nature of road	Intermediate lane
Type of work	Upgrading
Shoulder	1.5 m (0.75 m * 2)
Cross section	15 m on either side of road centerline
Benchmark / Control point	250 m interval on an average.
Gradient	
Gradient Max	12%
Ruling	7%
Limiting gradient	10%
Exceptional gradient (%) for up to 100 m length	12
Minimum gradient on hill roads (for better drainage) (%)	(Max 1%)
DTMP Code	22DR013
Cost of Project	NRs. 405,003,661.19
Environment Assessment	IEE is enough for the sub project

The road section starts from Nayapul settlement in river corridor by taking land from forest(0+000 to 0+700) and ends at Agriculture land with few settlements of Vedpu VDC (Km18+000 + 19+000) in Dolakha. The project road initially ascends and later passes along the settlements and agriculture land. The project road crosses the ghyang khola at the southern pawati VDC boundry.

The sub-project road section has been opened as earthen road standard. The road alignment starts from Nayapul (Tamakoshi), Ward no- 6, Bhimeshwor Municipalityand ends to Pokhari, Ward no-4 of Vetpu as shown in figure 2.1.

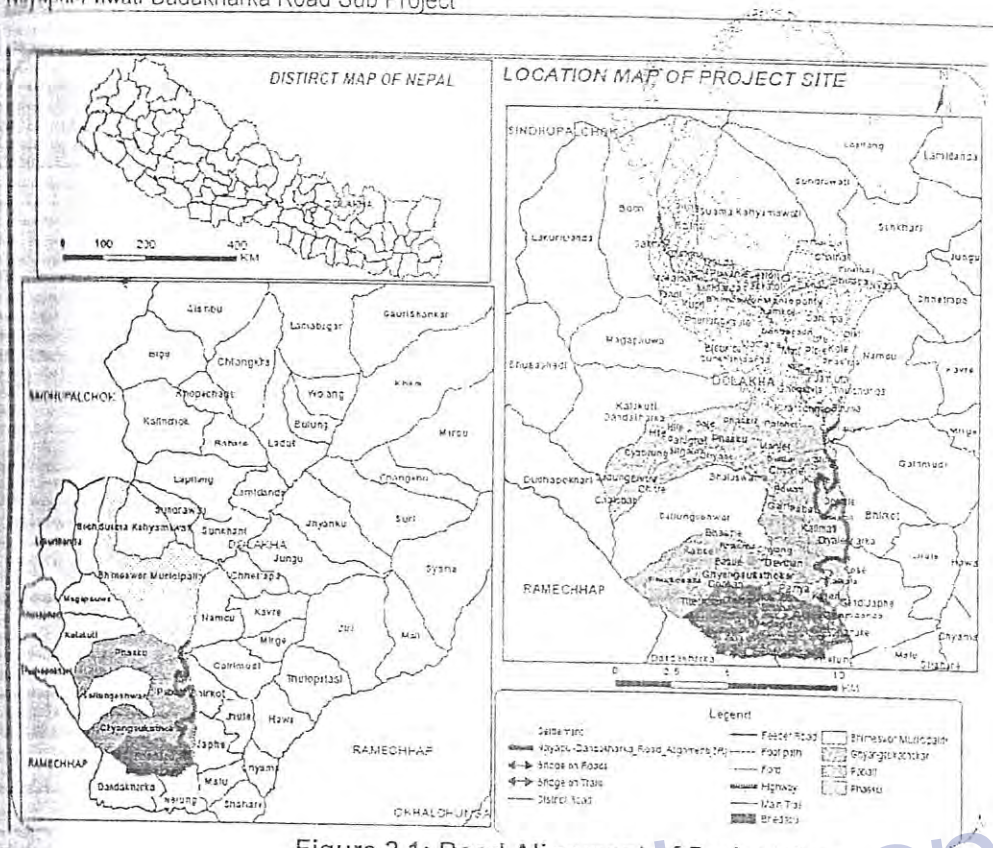


Figure 2.1: Road Alignment of Project Area

2.4.2 Technology and Materials to be used

All the construction material will be imported from various sites to reduce haulage costs. The basic materials required for the road construction are soil, gravel, and crushed rock. Soil is used for embankment upgrading, gravel is used for sub-base upgrading and crushed stones are used for base-course upgrading and for bituminous surfacing.

According to detailed engineering study, availability of construction materials in economic haulage distance is limited. Rock and colluviums along road could be used as sources for stones, pit gravels, etc. but quality may vary. Emission Resulting from Implementation of the Proposal

Solids: As project is mainly an upgrading works, there will be relatively small quantity of materials to be excavated and discharged as spoil.

Noise: As the traffic is low during all season, the noise level along the road is low (maximum 40 dBA). During construction phase, the noise level will increase to certain level with the operation of construction plant and equipment and movement of vehicles.

Dust: The level of dust particle in the air is low, except during passing of occasional vehicles along the road. The upgraded road will have sealed bituminous layer, and hence the dust emission will be controlled.

2.4.3 Energy to be used

Mainly diesel and petrol vehicles and machineries are used for the upgrading work; LPG and kerosene as energy for cooking for labor camp. All such energy demands will be fulfilled by the contractor from outside the project area so as not to create pressure on local fuel demand. The project strictly prohibits illegal use of fuel wood.

2.4.4 Details of the Technology

Machineries and labor are the basic requirement to operate the upgrading work. Equipment and Machineries is mainly used for particular works such as use of vibrator for surface laying and compacting, use of distributor for laying and use of compactor for finishing bituminous seal etc whereas labor is employed for the manual work like earthwork, upgrading of side drain, bioengineering etc.

2.4.5 Manpower Requirement

For total project period (18 months) work force required for the project works is 200 skilled and 400 unskilled laborers

2.4.6 Resource required for the Implementation of the Proposal

The construction of road may begin at the start of 2015. A 12-month construction period is estimated followed by a 6-month defects liability period enabling the completed project roads to be opened by the end of 2015.

2.4.7 Other Necessary Materials

Sources of water for construction works could be available from various points (13 km from the start point ghyang khola)from the proposed road. Water quality will be tested to acquire water for construction. The construction work may begin from 2015. 12-month construction period is estimated followed by a 6-month defects liability period enabling the completed project roads to be opened by the end of 2015.

CHAPTER 3: DATA REQUIREMENT AND STUDY METHODOLOGY

3.1 Data Requirement and Study Methodology

In order to meet the objectives of IEE, primary and secondary information were generated from field studies and literature review. The primary data were collected employing the following techniques: PRA, focus group discussions, field observation, and walkover along the road alignment. Secondary information were collected from various documents, reports, maps, designs and cost estimates. Socio-economic and cultural information were thoroughly edited, crosschecked and analyzed. The likely impacts (both positive and negative) were identified and/ or predicted by adopting the simple checklists and matrix methods outlined in the environmental guidelines. Based on the likely impacts in terms of its magnitude, duration and extent, the suitable mitigation measures have been designed. Similarly, Environmental Monitoring Plans have been prepared taking into consideration the types of impacts and suggested mitigation measures. Following approach and methodology were adopted during the IEE report preparation.

3.2

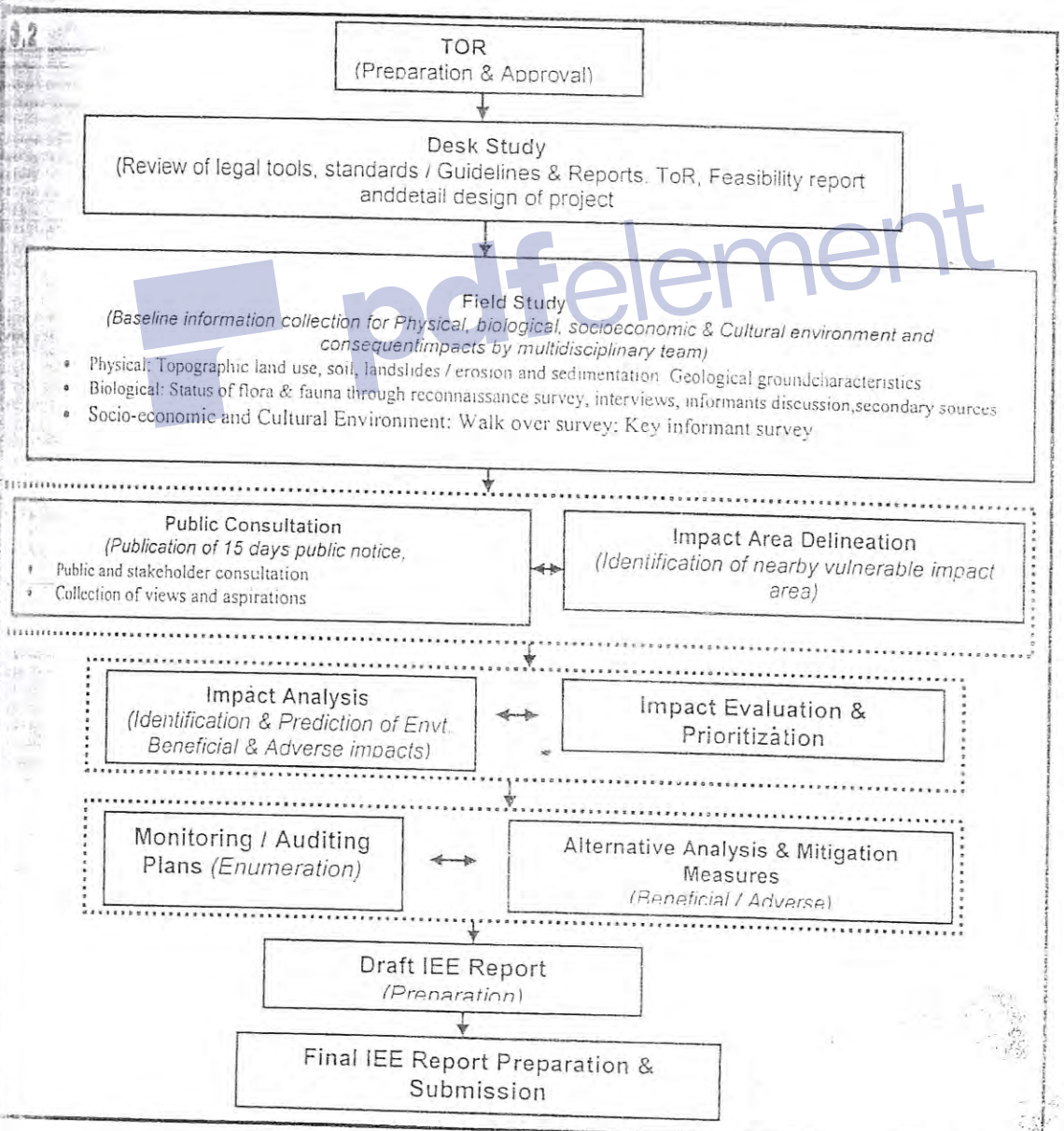


Figure 3.1: Study Approach & Design

Methodology Adopted for IEE Study

Terms of Reference (TOR) for the IEE Study of Nayapul-Pawati-DadakharkaRoad upgrading, was approved by the Ministry of Federal Affairs and Local Development (MoFALD) on May 2014. Based on approved TOR, IEE Study of the subproject road has been conducted. The current study has followed the procedures outlined in approved TOR. The major activities undertaken during the preparation of this report are as follows.

3.2.1 Desk Study

Different secondary information data and figures were collected relevant to project on physical, biological and socio-economic and cultural environment of the subproject area. Policies and legislations relevant to the subproject were also reviewed. The Design Report of Nayapul-Pawati-Dadakharkaroad upgrading and the other relevant reports were thoroughly reviewed. DDC profile of Dolakha district, data published by Central Bureau of Statistics and various published and unpublished reports, maps and photographs related to the subproject were consulted to generate the secondary information.

3.2.2 Delineation of geographical boundary of the Zone of Influence (ZoI) area

The geographical boundary of ZoI has been taken as the area within 5km walking distance from the road until other road does not prevail. For the collection of environmental features related to biophysical environment, maximum 100 meter distance observable from the centre of the road alignment was taken as an influence area. The project affect VDCs are Bhimeshwor Municipality, Pasku, Pawati, Ghyang Sukathokar and Bhedapu VDCs. The concerned VDCs and areas within 5 km from the road on either side of centre line are referred as Zone of Influence (ZoI), the areas within 10/10 m from the road on either side of centre line are referred as corridor of impact (CoI) in this Report. The area, within which upgrading work is carried out, is referred as formation width (5m).

3.2.3 Field Survey

During April 2014, a walkover survey along the proposed route was carried out to gather information on the physical, biological, socio-economic and cultural environment of subproject area. Data on physical environment have been derived from available topographical map, site observation, photography and consultation with local communities. Information on the flora and fauna, protected, rare and endangered species, sensitive habitats in the subproject areas were noted through the responses by locals and observation during the site visit. Socio-economic and cultural environment of subproject area was studied through various methods of primary and secondary data collection. These included literature review and other formal and informal information collection methods.

3.2.4 Data Processing

Different Primary and secondary data generated were processed through commonly used analysis methods. Available maps were interpreted. The impacts of the activities on bio-physical, social, economic, and cultural resources in the defined influence area were analyzed. The impacts were classified in terms of extent (site specific, local, and regional), magnitude (low, medium, and high) and duration (short term, medium term and long term) as well as nature (direct, indirect), reversibility (reversible, irreversible) and level (low, moderate, and significant). The likely impacts were assessed covering both adverse and beneficial ones.

3.2.5 Public Consultation

According to Rule 7 (1) of EPR, a 15 days Public Notice seeking the written opinions from the concerned people and institutions on possible impacts from implementation of the Proposal was published in Abhiyan, a national daily newspaper on 1st of Ashwin, 2071 (Appendix B). Copies of the public notice were pasted at the offices of DDC, VDC, schools, post offices etc. and a public deed of act (Muchulka) were collected confirming the pasting of such notice. Some comments or suggestions from the concerned stakeholders and affected peoples were observed.

3.2.6 Preparation of IEE Report

The appropriate beneficial impacts, maximization measure and adverse impacts mitigation measures were prepared based on the analysis of impacts and their nature. Such measures were based on site-specific issues, past experience on similar projects and expert judgments. Monitoring plan for the implementation of mitigation measures was prepared. This Report has been prepared as per the format prescribed in EPR, Schedule 5 pertaining to Rule 7 of the EPR.

CHAPTER 4: Existing Environmental Condition

4.1 Description of Existing Environment (Baseline Information)

This section describes the environmental and socio-cultural setting of the subproject area for the upgrading works of Nayapul-Pawati-Dadakharka road. The information presented in this section is based on (i) primary field studies (ii) stakeholder meetings and public consultation, and (iii) secondary data. Technical details are obtained from the Detailed Design report for the upgrading works for Nayapul-Pawati-Dadakharka road subproject.

4.1.1 Physical Environment

Climate

Climatic condition of Dolakhadistrict resembles to other part to country that experiences noticeable seasonal and special climatic variations. The hill has moderately warm summer months while the winter is cool.

Temperature

The project area lies in between Janakpur Zone Central Development Region. The yearly average temperature is 21.3°C with a daily mean minimum of -2.2°C in winter (January) to mean maximum 24.6°C in summer (July) (DHM 2006) as shown in the Table4.1

Table 4.1:Atmospheric Temperature

Month	Air Temperature Celsius				
	Mean			Absolute Extreme	
	Max	Min	Daily	Max	Min
Jan	18.2	-2.2	8	23.5	-4.9
Feb	19.1	4.5	11.8	24.5	-0.5
Mar	20	2.9	11.5	24	-0.6
Apr	21.7	6.9	14.3	25.5	3.6
May	23.3	12 4	17.8	27.2	7.2
Jun	24.2	15	19.6	26.5	10
Jul	24.6	17.3	21	26	14.6
Aug	24.5	16.7	20.6	27	12.5
Sep	23.5	15.3	19.4	26	10
Oct	22.2	9.8	16	25.6	2
Nov	18.1	3.5	10.8	22.4	-2.8
Dec	15.7	-0.5	7.6	19.5	-3

DHM 2006

Rainfall

Monsoon winds bring 80% of rainfall that starts around the middle of June and continues until the end of August. There are rainfall in the pre monsoon (April - May), post monsoon (September - October), and in winter. The pre monsoon and post monsoon rains are local events causing intense rainfall of short duration usually in the late afternoon or evening accompanied by thunderstorm. Winter rains between December and March are caused by the westerly disturbances. The Annual precipitation of the Dolakha is present in the Table 4.2 below.

Table 4.2: Annual Rainfall

PRECIPITATION mm							
Total	Maximum in 24 hrs	Number of rainy days					
		≥ 1.0	1.0 to 9.9	10.0 to 24.9	25 to 49.9	50 to 99.9	≥ 100
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
33	32	2	1	0	1	0	0
37	24	4	3	1	0	0	0
117	61	4	1	1	1	1	0
291	79	10	2	3	3	2	0
263	63	11	3	4	2	2	0
59	20	4	1	3	0	0	0
492	201	12	2	6	0	3	1
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

2006

central development region receives about 1700 mm rainfall per annum while the surrounding have a much more variable rainfall, about 2000 mm. Similarly, the Charikot receives 2037 mm ial precipitation and 1714 mm monsoon precipitation.

ive humidity

rage annual humidity is 83%, the maximum being in the monsoon and post monsoon period and imum in the winter and pre-monsoon period (Table 4.3).

Table 4.3:Relative humidity

RELATIVE HUMIDITY %		VAPOUR PRESSURE mb	
Observed at			
08:45 NST	17:45 NST	08:45 NST	17:45 NST
86	52	5.4	7.5
94	67	9.7	11.4
80	56	9.4	10.3
77	66	12	12.4
83	81	17.4	18.5
86	84	19.4	20.8
91	87	21.3	22.2
92	90	20.6	21.5
92	88	19	19.8
93	87	15	17.6
96	80	9.4	12.1
96	83	6.8	10.1

MM 2006

pography

ne main purpose of the geological study is to confirm the stability condition as well as to confirm the rface geology and the soil and rock hazard of the road alignment. The road follows the rocks of g Ulleri Formation and Seti Formation of the Lesser Himalaya. The Ulleri Formation and Seti ation are comprised of augen gneiss. The road alignment passes through the rocky terrain of Lesser Himalaya as well as residual soil and alluvial deposits. More than 60% terrain passes ugh the different soil deposits mainly the alluvial and residual soil deposits and remaining in the ky area. The road alignment passes through wet and dry cultivated land, grassland, forestan d. The road crosses numerous small tributaries and rivulets. The topography along the gnment is gentle to steep slope

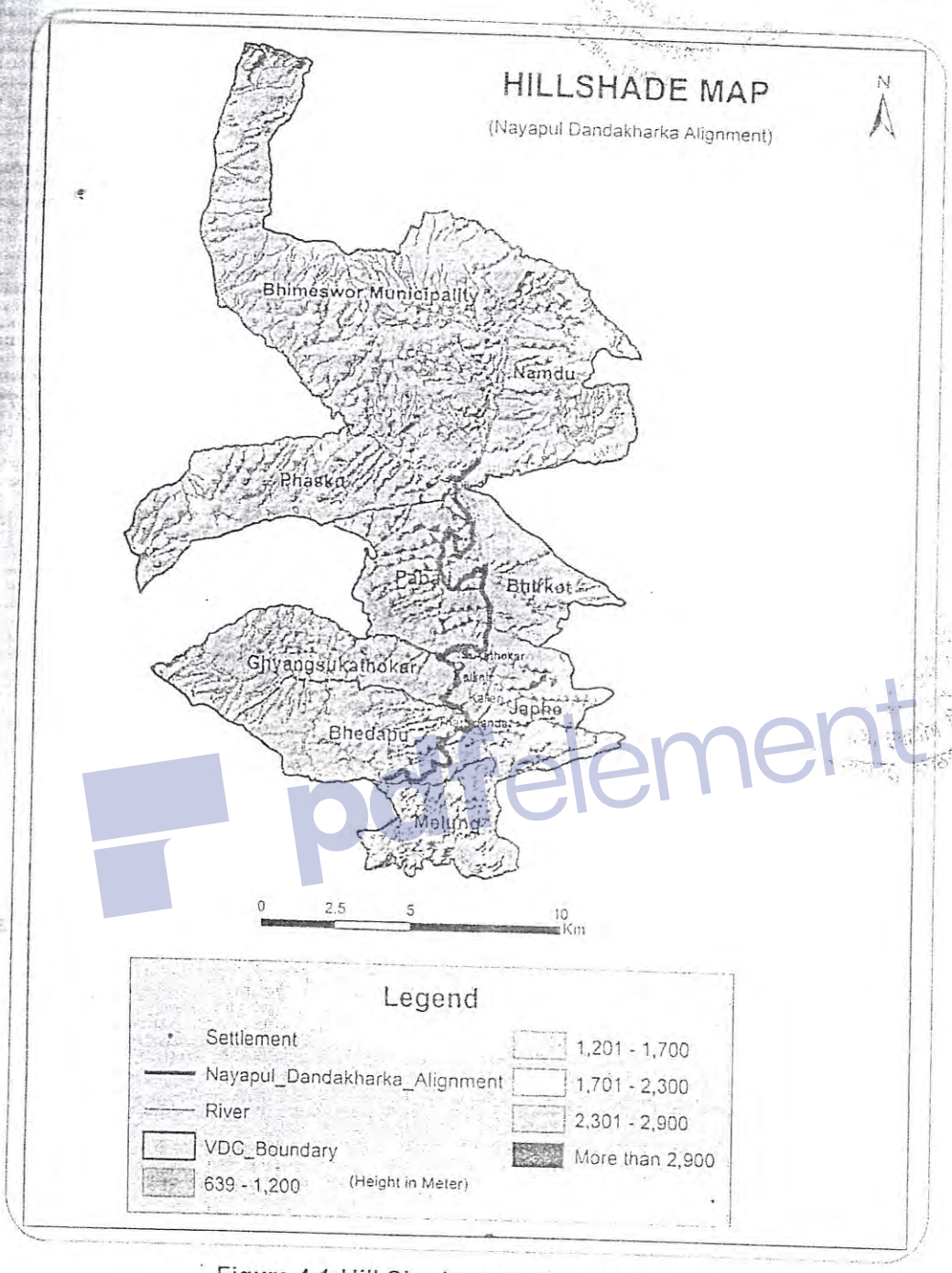


Figure 4.1:Hill Shade map of Project Area

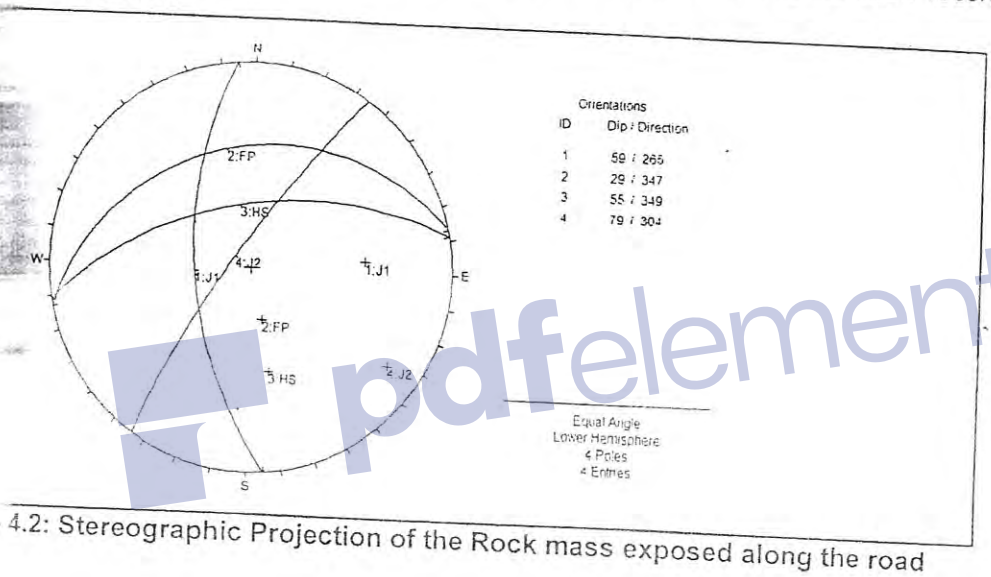
gy

ad alignment passes on colluvial and deposits and some part on residual soil deposits. kness of residual soil and colluvial deposits range from 4 to 10 m. Most of length of the gnment covered with dry hydrological condition some area is wet with development of the spring. nd use pattern is wet to dry cultivated land, forest, baren land and grassland. Numerous cut failures are found along the road alignment due to loose materials on the hill slope, seepage well as the poor drainage management. The failures occurred along the road can be mitigated by

of cut slope, applying bioengineering as well as drainage, sub surface drainage nt and arrangement of the gabion wall. Most of the area along the road can be stabilized d also the previously developed engineering structures.

ility

of gneiss of the Ulleri Formation can be found along the road section, Thick colluvial, l and alluvial deposits are observed. Similarly, numerous cut slope failures are observed its are mostly in alluvial deposits and residual soils. The main causes of slides are , surface water condition, groundwater and undercutting slope by road cutting. Almost all occurred after opening of the road. There is possibility to occur failures in rock along the e. The stereograph shows relation between natural hill slope and foliation plane is ssibility of failure (Figure 4.2). The wedge formed by joints with foliation plane is stable. oil and rock hazards are there in the project site, but there is no such record of ncidentin the past.



4.2: Stereographic Projection of the Rock mass exposed along the road

s1367m at Nayapul Tamakoshi (Starting point) and 1275 at Pokhari (end point), Dolakha district.The road alignment comprises of 53% of cultivated land, 14% of bush land, 4% of Waterbody, 3% of grass and remaining 2% of barren/bush land.

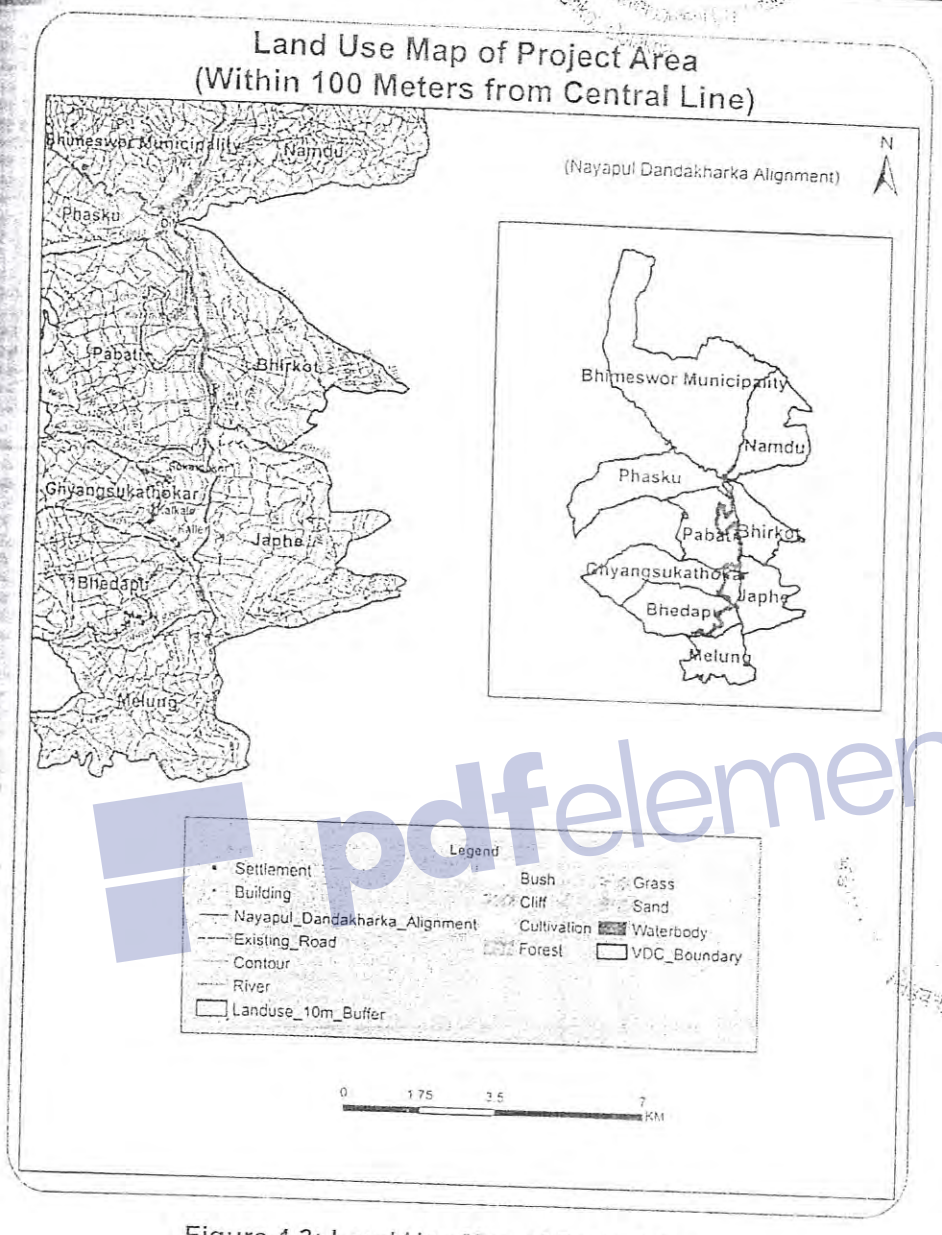


Figure 4.3: Land Use Map of Project Area

...ise and Water Quality

...t area is devoid of air pollution sources. The air, water and noise quality parameters of the ...rea are observed to be of good quality. People use springs, pipe/tap water and small ... drinking purpose.

...nd Hydrology

...ollows valley and hill routes and has few Kholsi's and river crossing the alignment. The ...ages are present at these natural gullies, Kholsi's, rivulets and as well at vertical ... points. The drainage map is shown in the figure 4.4 below.

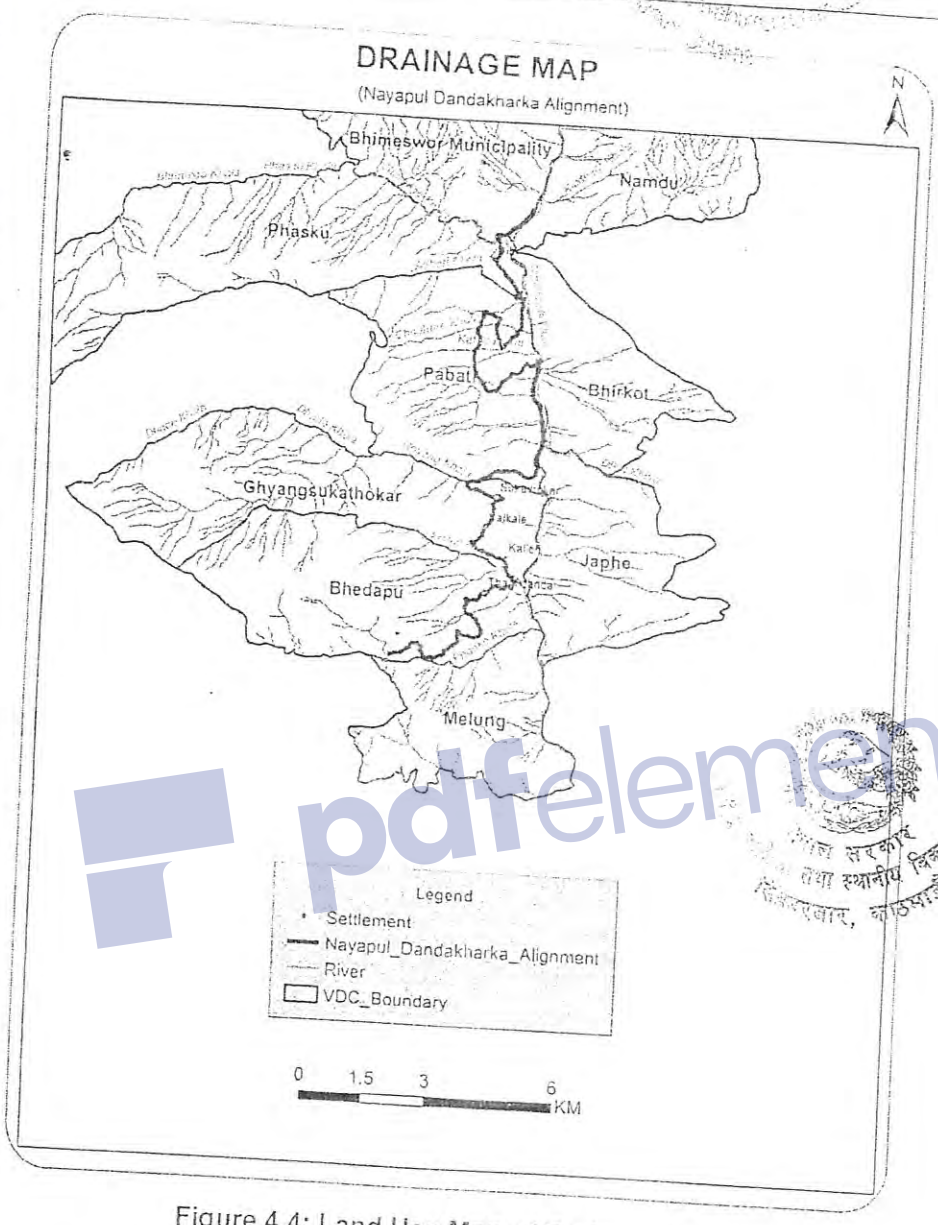


Figure 4.4: Land Use Map of Project Area

logical Environment

orest and Trees

of biological species were observed during the field survey.Starting from beginning of the 2+500 to 3+300 km there is a dense pine forest area followed by mixed forest 3+300 to h different varieties of trees. As project area lies between 1367m-1275maltitude, forest aracterized by sub-tropical climate. The major floras found in project affected area are Sal obusta),Chilaune (*Schima wallichii*), Salla (*Pinus roxburghii*), Parijot (*Nyctanthes arbo-*al (*Pericampylus glaucus*), Kutmero (*Litsea monopelata*), Uttis (*Alnus nepalensis*), Bambusa vulgare), Bar (*Ficus benghalensis*), Mango, Mauwa (*Engelhardia spicata*), ava (*Psidium guajava*), Dudelo (*Euphorbia hirta*) and Lapsi(*Choerospondias axillaris*). The nical plants observed are*Timor*(*Zanthoxylum armatum*), *salla*(*Pinus*

roxburghii),pipal(Pericampylus glaucus), bar(Ficus benghalensis), amala(Ohyllanthus emblica)(Field Survey, 2014).

Terrestrial Wildlife

The wild mammals species observed in the project area were squirrels (Faunambulus sps), Dumsi (Hystrix, brachyuran), Chituwa (Panthera pardus), Phaura (Vulpes, bengaleasis), Monkey (Macaca, mulatta), Sarus (Grus, nigricollis) (Field Survey, 2014). Common herpeto fauna species include Bufo melanostictus, frogs (calotes vensicolor), Snakes (green snakes). The common bird species observed in the project site are sparrows, Kalij (Caphura leucomelanos) Kafal pakyo, kag, Parrotand flying fox.The sub-project area does not contain any national park, wildlife reserve, conservation area, hunting area, including buffer zone area, world heritage site and other protected areas.

Protected Rare or Endangered Species

Highly significant protective species are not observed in the project site. Most of the species are commonly found mammalian species. Among the reported animal,none of the animal are listed under CITES – II category. Species mentioned in IUCN RED LIST and Forest Act doesn't exist in the project area.

4.1.3 Socio-economic and Cultural Environment

The delineated project impact site are categories into Directly Impact site (area within RoW from Nayapul (Tamakoshi), Ward no- 6, Bhimeshwor Municipality to Pokhari, Ward no-4 of Vedpu VDCand Indirectly Impact area (within 100m distance on either side of road, Chaurange, Fasku, Saute, Adharikhola, Satdobatepati, Mirge, Ghangsukathokar, Ghang, Bhetpu and Ghang pokhari.The project affected VDCs are Bhimeshwor Municipality and Fasku, Pawati, Ghyang Sukathokar and Bhedpu.

Population and Demography

Total population of project affected VDCs are 39,383 of which 46% are male and 54%. Total household in the project affected VDCs are 10,252.Of Dolakha District, about 21.1% of population lives in the project affected VDCs (CBS, 2014). The average HH size of the VDCs is represented by 3.97 persons per HH and Average sex ratio is 81.01.

Literacy and Education

The average literacy rate of the project VDCs is 62.37% (CBS, 2014). Among male and female literacy rate, male population are educated more than female population. Among the educated population, 11% of population have completed the SLC & equivalent, 7% of population have passed Intermediate & equivalent, 2% of population are graduated & equivalent, 1% are post graduated & above and population with non-formal education are about 5% in the project VDCs.

Ethnic Groups Language and Religion

Majority of Ethinic groups belongs to Chhetree (i.e. about 41%). Most of the Chhetree community is found in the Bhimeshwor Municipality.Similarly, Newar Community is second most densely populated in the project VDC followed by Tamang (13%), Brahman (10.41%), Kami (5%), Damai/Dholi (2%), Sarki (2%), Sanyasi/Dashami (0.4%)(CBS, 2014). Whereas other cast such as Rai (0.1%), Gurung (0.5%), Koiri/Khushwaha (0.04%), Dhanku (0.03%) Kathbaniya(0.09%), Thakuri/Chhetri (0.08%), Sunuwar (0.09%), Haluwai (0.04%), Jirel (0.1%) and Sherpa (0.05%) found in the Bhimeshwor Municipality only. Gharti/Bhujel (3%) is found in Bhimeshwor municipality, Fasku, Ghyang Sukathokar and Pawati. Nepali is the most spoken language in the project VDC (i.e. 75% of population mother tonge). Similarly, 15% of population speaks tamang language. Shrepa population is less; about 0.8% of population mother tonge is shrepa from Bhimeshwor Municipality. 5% of population has Newar as their prime language which are only found in Bhimeshwor Municipality, Ghyang Sukathokar and Pawati.

Settlements and Housing Patterns

Different types of house patterns are observed in the project VDC. In case of house foundation, 84% of households are Mud bonded bricks/stone, followed by cemented bonded brick (6.4%), RCC with Pillar (7.6%), Wooden Pillar (2%) and others (0.15%). Similarly, Most of the houses walls are constructed from mud bonded bricks/stone (82%). Cemented bonded bricks/stone are comparatively less in number (about 15.2%). Similarly, 1.7% of houses have Wood planks as its outer wall and 0.4% of houses are built with Bamboo. Galvanized Iron (56.2%) is a common roof type in the VDCs. Tile/Slate (24.3%) is a second roof type in the VDCs. Other roof type in the project VDCs are Thatch/straw (5%), RCC(13%), Wood/Planks (0.5%), Mud (0%) and other (0.3%) (CBS, 2014)

Water Supply and Sanitation

Major source of water in the project VDCs are spring water that is supplied from Tap/pipe line (79%). Other sources of water used by people are spout water (17%), uncovered well/kuwa (3%), River/stream (0.5%) and covered well/kuwa (0.1%).This shows that project site have adequate water sources. In case of toilet, 23% of household don't have toilet facilities whereas rest used toilet of different types such as flush toilets and Ordinary toilet. 44% of population have flush toilet in their houses. Ordinary toilets are also equally used in house represented by 33%. About 0.33% of toilet facilities are not stated.

Energy and Electricity

About 90% of household are connected to the National Grid. There is not any problem in supply of electricity in the project site. Still few settlements are devoid of electricity facilities and use alternatives such as Kerosene. Clean energy sources in the VDCs are Bio gas (0.02%) and Solar (0.2%).

Household Facilities

About 87% of households have at least one of the facilities such as radio, television, cable television, computer, Internet, etc. Majority of households have radio and mobile facilities. Television and Cable are available in selected households. Rest 13% of household doesn't have any such facilities.

CHAPTER 5: IMPACT OF THE IMPLEMENTATION OF THE PROPOSAL ON THE ENVIRONMENT

Impact of the proposed project activities are from construction and operation. In the chapter all the plausible impact are assessed and identified. The impact of the activities will be on physical, biological, socio-economic and cultural resources. Both beneficial and adverse impacts are included in the report. Thesignificance of impacts are categorized in terms of their magnitude of significance (low, moderate and high), extent (site specific, local and regional) and duration (short term, medium term and long term) as well as their nature (reversible, irreversible)[1].The possible impacts from the proposal during the upgrading and operation stages are depicted as following.

5.1 Beneficial Issues/Impacts

5.1.1 Socio-economic and Cultural Environment

Construction Phase

As proposed upgrading road passes through different settlements of project VDC, construction works will attract many people from neighboring areas for various opportunities ranging from labor works to spin-offs leading to improved farm and off-farm activities, which may ultimately benefit the local economy.

Employment opportunity of local peoples

As road Construction is a labor intensive job, it requires large number of workforce. During the road construction, it is expected to create employment opportunities for400md unskilled and 200 skilled laborers. It requires large investment on the manpower which will be the source of income to the local people as a wages. This income will enhance the local economy that can be supportive for various ancillary economic activities and enterprise development. This impact is direct, beneficial, high significance, local but short term in nature. If the earned wage income is saved and utilized for micro-enterprises, benefit can be of long duration

Increase income of local people

Access road will facilitate the local people to export different resources to the market. At the same time customers and retailer can visit to the place to make a business deal. Especially farmer will get opportunities to bring latest available technology and use in the farmer to better up the agriculture product. Varieties of crop grown in the project site can be sold directly to the market. This will improve the trade and business in the places which will help to uplift the life of local people of the place.

Enhancement of technical skills

It is estimated that the project construction requires significant number of technical individuals (about 200 skilled labors). The required skill manpower has to be fulfilled by transforming unskilled locals to skilled manpower through training and teaching. The circumstance will compel the contractor to employ local labor otherwise, construction phase will be time consuming and mismanaged. These raw hands will have opportunities to receive the technical experiences of working in construction activities such as construction of masonry, gabion boxes, slope cutting, bio-engineering works, road side plantation etc. These skills will benefit them in getting further employment opportunity in this construction sector. The impact is indirect, medium significance, local but it is long-term in nature and enables them to create employment in future.

1. *Short-term - project period- project construction duration*
- Medium-term - 3 years after completion of project
- Long-term - > 5 years after completion of project)

Small Scale enterprises development and business promotion

Large number of workforce will be in the project site for certain period of time. Local resources will be in great demand to these labors for their basic needs. Local shops and market place are the common place to get these goods. In order to fulfill the increasing demand of good, small scale business will be flourished in the project site during the time period of construction phase. The impact is direct, highly significant, long term and local in nature.

Rent from land acquired temporarily during construction

During Construction period, temporary land shall be needed for establishment of camp site, spoil disposal area, batch area and so on. The contractor will be looking for the suitable land for lease or rent from the local which will be another means of income to the local. This is positive impact of short term and local in scale.

Commercialization in agricultural products among local communities

Different type of commercial activities will be flourished to meet the demand of labor groups, construction crew and project team. The local business that will be established in the project site can be food installs and teashops, groceries, lodges and restaurants for serving large numbers of people. As project site is away from the urban area, the main sources of food will be from agricultural product (local resources) such as pulses, milk, meat, vegetables, fruits which will be in high demand. This will also contribute to the local economy. Such benefits may contribute to enterprise development, which often continues to entrench beyond construction period. This is direct impact from the project, of high significance, local and short-term to medium-term in nature.

Operation & Maintenance Stage

With the completion of construction phase, local people will be benefited from the operational stage that is highlighted in the following sub topics below.

Increase economic valuation of land of project affected VDCs

Road access to the VDC will increase the land values ofarea. It enables locals to either sell the land in high price or makes easier to borrowloans on collaterals. Bank and finance easily accept to provide loan on high value lands as per the need of land owner. The present land value ranges from NRs 3 lakh per Aana to 10 lakh per Aana along the road side. This impact will be an indirect medium significance, local and long term in nature.

Reduce Travel Cost

With the operation of road fromNayapul to Dadakharka, it will reduce the present 5hrs walking distance to the 1hrs vehicle transport distance which is quick and energy efficient. The improved road surface will minimize the wear and tear of vehicles that further reduce the unnecessary maintenance costs. It will increase the fuel efficiency and lessen vehicular emissions. This will make the transportation facility reasonable to the people. Theimpact is direct, medium significance, regional and long-term in nature.

Mainstreaming of local culture and products

With the transportation facilities, the incoming visitor to the place will rise up. This is a good opportunities for local people to demonstrate their culture and unique products to attract the tourist. As the project location have variety of unique product and goods, the local can improve their products and sell to the tourist. Further, this will make the place more pleasing and unique to the tourist. Presentable and attractive product and improvement in demonstration of local culture will please the tourist and make the place unique. Further this will improve the economic conditions of the place. The impact is direct, medium significant, local and long term in nature.

Increase cost opportunity of local farmers for their agricultural products

With the accessibility to the place, it will increase incoming visitorsand trade to the place. Especially farmers will be benefitted from it which makes them easy access to seeds, chemical fertilizer and facilitate to introduce latest agricultural technologies. Further, the place can be evolved as market centersof the region which ultimately increase local economy with the effective use of local resources.Moreover, this may add scope for establishment of industries such as Agro-industriesor other industries in nearby areas based on local products and available raw materials. In addition, easy access will make the local farm products competitive and increase in sale. Such impacts are indirect, high significance, regional in extent and long term in nature.

Employment of local people

With the improve transportation facilities, other socio-economic development such as education, health, irrigation, water supply, electricity, communication and market will be improved. The local will have easy connectivity to urban center where they can be benefitted from better service of competent agencies and can engaged themselves into the organization.The road facility will encourage qualified service providers or doctorsto visitand stay in the VDC in the time of urgency. With this, the VDC can be fulfilled with other facilities and open the door of employment opportunities to the local within and outside the VDC. Hence this will provide better earning platforms to all level people. This impact will be indirect, high significance, regional and long-term.

Market development opportunity

The easy road access to the place will directly and indirectly enable the local peoples to set a new market for business, tourism, agri-farm products and other commercial activities. Similarly, the peoples will encouraged to install shops, supply dealer and marketing shops to carry agricultural products from Charikot to Kathmandu. The impact is indirect, local, high significance and long term

Women empowerment

As the road will make easy access to places like schools, health centers, administrative offices, market centers and other institutions, this will enable women to reach these places with less hardship and will create safe environment to use all these facilities. Similarly, introduction of new helping hand to women group such as NGO/CBOs/INGOs based on women empowerment to the places will provide ample of opportunities for the improvement of women life and eliminate sufferings which opens door for them to be independent and be a leader of society. Further, the number of awareness programs for these private and government sectoron different topic such as HIV/AIDS, safe sex, girl and boy traffickingwill help to prohibit the crime and injustice against the women. In addition, the will create an environment of gender equity in the society. This impact of the project is indirect, medium significance, local to regional and long-term

Easy access of local people to district head quarter and main streaming of country

Construction of road will shorten the 5 hour walking distance to the 1 hour drive. This will facilitate local people to reach different places with less effort and time. Road access will bring lots of visitors from different part of country to the place. Similarly, local people will have easy access to the district head quarter and other region of the countriestoo. The impact is direct, highly significant, regional, and long term in nature.

Dissemination of spiritual and religious values of different place that the local peoples were adopted in project affected areas

Better road access and improvement to transport facilities will certainly flourish the tourism sector in the VDCs. Local will be encouraged to establish and maintain existing recreational and aesthetic site. This will promote tourism in the places which will be alternative source of income to the local people. At the same time, it will disseminate the spiritual and religious values of the places. The impact is direct, local, highly significant and long term in nature.

5.2 Adverse Issues/Impacts

5.2.1 Socio-economic and Cultural Environments

Construction Stage

Issues of land and property acquisition and resettlements

The upgrading Nayapul to Dadakharkaroad doesn't need to acquire private property/asset in order to maintain RoW.The project will adjust its alignment, in case if it affects the assets such as cowshed, houses. The proponent have to address a land acquisition issues as per needed while maintaining RoW. The impact will be on individual level, direct, high significance, site specific, and short-term in nature.

Population Displacement

The road alignment does not pass through dense settlement. If necessary, few house or important structure will be kept undamaged by diverting the road alignment. From the project, it is expected to have minimal damage to property/asset as a result implementation of project will not lead to population displacement. Disturbance such as noise, air pollution and unwanted waste discharge during construction might affect the settlements of road corridor and plan to find a better place to be free from the pollution. The project will not exert pressure to the large settlement during construction period. The impact will be direct, less significant, site specific and short-term.

Impacts due to loss of structures/infrastructures existing in RoW of proposed road

As road alignment passes through few structures, overall impact from the road construction will be minimal. The road will be diverted to protect the structure as per requirement. All the loss of structure will be compensated by the project. The impact is direct, lesssignificant, site specific and short-term

Pressures on social service facilities such as water, electricity, irrigation canals, open etc

Large number of labour requires common facilities such as water, electricity, and other basic need during the construction period. This will increase the consumption rate of water, energy sources and other facilities within the project site. Further, it might cause scarcity and shortage of local resources The impact of this kind is direct, highly significant, local and short term in nature.

Employment loss for locally available labour force

Construction work is a labour intensive work. The requirement of labour can be fulfilled with the involvement oflocal peoplein different activities during the construction phase. The project will not hamper or affect any daily activities of the project site. The locally available jobs will not the affected by the road construction. Rather the project willcreate highly paid employment opportunities to the local people. But few people who have to travel a long distance for the jobs through vehicle might be affected. Otherwise there is not such issue of job loss from the construction phase. The impact will be indirect, medium significant, local and short-term in nature.

Workforce camp operation

Large number of population in one place will exert pressure on the local facilities such as telephone water supply, health facilities and transportation. Demand of basic needs will be increased and will be used in its maximum level. Waste generation, waste water and emission level will exceed the existing condition as a result it may bring consequences such as contamination of water sources open defecation, waste water discharge in nearby river or rivulet and other health and sanitation problems. This may invite serious health problem to the worker as well as local people. There is always a chance of endemic diseasessuch as dysentery, diarrhea and cholera to the project area. The proponent and local have to aware of this case and prevent measures should to taken prior to the project implementation. The impacts will be direct, high significance, local and short-term in nature.

Cutting, filling and drain scouring

The road will havecutting on the either side of the road to maintain designated RoW. Similarly, the pit holes and other land area will fill to level up the road line for black topping. The waste generation from the construction is unavoidable which need to be managed regularly. The waste discharge from cutting and filling are soil, vegetation, and rocks. Instead of dumping as a spoil, it is better to be managed within the project or transport to isolated place. The major impact from the activities to the site can be instability of the land surface if not done properly. Similarly, Local people will be disturbed by the activities of cutting and filling. The excessive cutting, spoil dump and unplanned fill might lead to the land slide and soil erosion within the project site. People will be annoyed by this activity. The impacts from these activities cause direct effect, mostly site specific, Medium significant and short-term.

Construction hazard such as landslide, slope failure and spoil disposal

The cutting of edges and disposal of spoil always create possibilities of landslide and slope failure. Especially, during cutting of slope hills or cliff if the cutting is not done properly there is chance of slope failure that may leads to landslide. These are the accidental events which can be minimized with the precaution and adopting safety measure, but the riskis there to occurring during the construction activities. These construction hazards may damage property/assets and damage to the road as well. The impact is direct, site specific, high significance and short-term in nature.

Social conflict and disputes

Gathering and interaction of large mass of workers at a place will create dispute either with the local communities or among local community. Reasons of conflict will be disturbance in local's territory, resources, relationship, behavior and attitude. Misunderstanding and ambiguous behavior of works also create problem that may leads to the violence or quarrel. Similarly, while hiring the local people there will be some aggression from the locals that leads to conflicts. If the conflict are not solved and prolonged, it may leads to strikes and delays the project activities to be accomplished in time. The proponent needs to take this issue seriously while starting the project. The impacts will be direct, high significance, local, and short-term in nature.

Issues of health, Sexually Transmitted Disease (STD), HIV AIDs

Different business will be established to fulfills the demand of large number of crew/workforce. Similarly prostitution is one of the businesses which are likely to increase during the project construction phase. Such types of business always create chances of STD and HIV AIDs. It is important to alert and aware people on the STD and HIV AIDs during the construction phase. The impact is Indirect, moderately significance, local and long term in nature.

Occupational and safety hazard

Occupation and safety measures are inseparable part of the construction stage of any project. Large number of labor will be exposed to the different level of risk. It is necessary to have better plan and well equipped safety measuresprior to the construction phase. As project is of road construction, health hazards to the labors are from rock cutting, slope cutting, handling of hazardous material, machinery movement, bitumen works, side casting, tree feeling, slope stabilization and so on. Other potential impacts to health are respiration and eye disease due to exposure to dust and emissions due to pavement work. The impact is direct, moderate significance, site specific and short term in nature.

Cultural Invasion and Social Threat

During construction phase, historical, archeological and religious important site will not affect while maintain RoW. The project areas have diversity of caste, culture and religion. During construction stage, large number of workforce comes to the place from different environment; they can disobey the local rule and culture. This may disturb the local people. The impact is direct short term and local. The project contractor needs to understand these issues prior to the project implementation.

Operation & Maintenance Stage

Road side safety issue with peoples living near to the road side due to vehicular movement

Introduction to vehicle will bring plentiful of road safety problem, as local people are habitual to walk to different place. It will take some time to accommodate with this sudden change and understand all the road safety measures. Prior to the road operation, the local people understanding for its operation have to be elucidated through thorough training and teaching session. This will helps to minimize the accidents and injuries from the road. The impact is direct, long term, local, and highly significant.

Road Safety and possible accidents

The project site communities and people are not use to with frequent vehicular movement. It is new for the local people. Therefore, it is important to have road side safety along the road alignment. There is always chance of road accident and problem of crossing the road during vehicle movement. Similarly as the road is new to incoming visitor, the road should have all the signals and sign to guide the traveller to the safe ride. The contractor has to plan and install the required traffic signal and sign to make the road safer for the visitors and local people. The impact is direct, highly significant, long term and local.

RoW Encroachment

Accessibility of road brings lots of visitor to the places. To please the incoming visitor, road side will be filled with small shop,installs, tea shop and other small markets.Encroachment of shops and stalls in RoW will constrict easy flow of vehicles. The road will be vulnerable to accidents and increase the unsafety. The impact of this kind is direct, highly significant, long term and local in nature.

Population pressure and impact due to new settlements along the road alignment and possible ribbon settlements development

With the construction of road, settlement, shops, food stall and other markets will grow along the roadside that will be an economic opportunities to the local people. Better road access increase the abut land value which may stimulate haphazard or uncontrolled development in the place. The negative consequences of ribbon settlement are the blockage of road by the unmanaged encroachment of a right of way constructing houses and shops as a result it will delay in private and public transport, increment in accidents, hindrances for maintenance of work, haphazard garbage disposal, poor sanitation undesired landscape aesthetics, and reduction of the overall road capacity. The impact will be medium, local level and long term in nature.

Health and Pollution

Labor camps, site office, work camps and the project office will be generating solid wastes during construction period. If it is not managed, it will effect on operational time too. Though these sites will be located at the different locations, haphazard dumping of the solid wastes will degrade the environment of the vicinity. It may spread different types of diseases if the biodegradable wastes are allowed to decay at the open space. Consequently, it will affect the public health. During operation phase the passenger will through different wastes openly onalignment, passing zone and lay-bys. Excessive people movement in the place will trigger to increase many business sectors including the prostitution. This increases chance of spreading of Sexually Transmitted Diseases including HIV/AIDS. Similarly, the local peoples will start to import food varieties from a nearest city. So that organic production will deteriorate. They will easily access for chemical fertilizer and pesticides. The foods produced by excessive use of these chemicals will harm to human health. The impact is of regional scale, medium in magnitude and long term in duration.

Social Conflicts due to change in community structures

The roadwill improve the connectivity of the VDC to different urban centers that will facilitate to ameliorate quality of life, education, health care facilities and easy infrastructure development. These activities will change the mentality of local people with changes in attitude and social norms. People may leave their family in their villages to dwell near the new spots for economic incentives. This will ultimately affect the traditional bonds, norms and functions of the family. This will also cause impact on social and cultural transition. Similarly, there will be loss of employment opportunities of porters, mules. Furthermore, after the construction of road, there will be influx of more people to the area from different parts with different ethnicity. Hence, there will be cultural mixing which may result to conflicts or violence among different cultural groups. The impact will be indirect, medium, local and long term in nature.

Possible cultural invasion and social disputes

Road will bring migrant from other part of country. Interaction with the new people and understanding their religion takes time. Any wrong behavior from local to their culture or religion might ignite disputes. Incoming visitors to the place might misjudge the local tradition or religion or culture or values and norms which may also invite the case of conflict/dispute. These are not a long run issues but accidental and will change with times. The impact is of Medium significant, direct and medium and short term in nature.

Increase problem in social security

Road construction is a labor intensive job which needs large flux of labor in the project site. With the entry of large labor force in the work site, it is obvious that there will be spat and dispute within the labors and with locals. Outsiders, Especially workers may cause different social evils. Increase in crime such as robbery, rape, gang fights and other different criminal activities will create social security problem in the society. In order to reduce the impact, it is important to strengthen the social security by the local bodies. At the same time, the contractors have to keep their labor in discipline bound with certain rules and regulation. The impact is direct, local, highly significant and short term in nature.

Threat in cultural assets found in project affected areas

From the construction of road, there will not be any damage to the cultural and traditional assets of the site. But, increasing number of outsiders to the site is threat to the cultural assets/properties.Since,the incominglabors are unaware of the cultural asset of the project site, their activities such as haphazard construction of camp site and discharge of waste will threat to the cultural assets of the project affected areas. As the project site don't have significant cultural asset, the threat to the cultural asset is minimal. The impact is direct,local, highly significant, and short term in nature.

5.2.2 Physical and Chemical Issues

Construction Stage

Issue regarding route clearance

The project will clear certain number of trees and structures to maintain the designated RoW. Local people will have lots of complaints to the proponent which need to be solved with right compensation.About 131 trees will be removed to construct the road. These tree have to replanted at the ratio of 1:25 i.e. removal of one tree equivalent to 25 replantation. Similarly, project will affect the corridor settlements. The impact of this kind is direct, local, short term, and high in magnitude.

Impairment of cultural and historical monuments/areas

Cultural and historical monuments/areas are completely absence along the road alignment. The cultural and historical area will not be affected by the road construction. The impact is indirect, less significant, local, short term in nature and high in magnitude.

Change in Land Use pattern of project affected areas

During the construction phase, the road upgrade will bring changes in land use especially in agriculture land and settlement.Some part of agriculture land might be taken away. Blockage in the road and disturbance might shift settlements to another location. With the loss of segment of agricultural land, farmer might use grassland as an alternative to maintain the consistency in crop production. This will encourage farmers to producesmore cash crops; it will increase horticulture practices and fast growing crops instead of conventional agricultural trend. Similarly, while maintaining RoW and constructional activities this might take away agriculture land and settlements. The envisaged impact is long term, local in extent and medium in magnitude.

Landslide, erosion and downward/upward slope destabilization

The cut slope failures were observed along the road alignment.The area seems to be very sensitive while maintain a RoW. The high instabilities are found between the chainage 3+537 to 3+743 and 12+010on hill slope. Slope cutting during widening in this area can trigger landslides. The impact due to this will be direct, medium significance, local, and long-term in nature. Thehill slopes cutting and removal of vegetation will expose land surface area for erosion. Erosion will also occur along drainage outfall. The eroded soil will be deposited in agricultural land, streams, forest, etc. This cause degradation of land value, water pollution and affect habitat of wild life as well. This is an impact of medium magnitude, local in scale and medium term in duration.

Sedimentation and change in aquatic ecosystem

The road alignment passes through different rivers and rivulet. During construction phase, there is high chance of dumping the spoil and other waste into the nearby water sources. This will cause water contamination and disturb the aquatic ecosystem. The impact is direct, local, moderately significant and medium in magnitude.

Solid waste disposal, muck disposal and issues of excavated waste

Spoil is byproduct of the cutting and filling of land. Spoil disposal on the hill slope will create problems to cultivation and forest land.The spoil are generated from labor camp also. The common problems from inappropriate disposal of spoils are contamination of water bodies, bad odor, forest degradation, damage to property downhill, and degradation of agricultural land especially when combined with unmanaged surface water runoff. The impacts from spoil disposal during the upgrading of the proposed road will be direct,of high significance, site-specific and short-term in nature.

Hazards caused by combustible and toxic waste due to use of bitumen and their storage, heating, spreading, fuel lubricants, oil, acid use of other chemicals for construction

Bitumen is used in sealing road which is highly combustible and can cause fire hazard. This material has to be kept away from the fire igniting source as well as from the public. The contractors have to plan for its storage prior to its use in the project site. The material causes severe burns if handlers skin get in touch with it, and is also severely toxic to naked eyes. It needs to be store in the safe condition. The bitumen Impact is indirect, low - medium significance, site specific, and short-term in nature.

Issues of pollution (water, noise and land pollution)

The noise and excessive dust emission is common to the road construction. Roadside dwellers travellers, vegetation will be affected by this noise and dust. Main sources of noise and dust will be operation of vehicles, operation of heavy equipment, crushing and excavation activities and working of labours. As most of the construction work will be carried out during dry season, dust emission will be unavoidable. Different types of heavy machineries and vehicle will be deployed for the road construction. In order to operate these vehicle smoothly, it requires regular maintenance. Different materials such as lubricants, oil, acids and other chemical will be used to maintain the conditions of

vehicles and prevent from its malfunction. There is always a chance of spillage, leakage and discharge of these chemical in the project site which might cause nearby river pollution. Despite construction use, fuel and other chemicals might be used in the generating electricity. These materials should be used in proper manner and safely stored to ensure that these don't cause anyenvironmental hazards. The impact will be direct, of medium significance, site-specific and short term in nature.

Stockpiling of construction materials

During upgrading stage of road, construction material storage site pose adverse impact through soil erosion. The stockpiled material cause the soil erosion that may contaminate the nearby water sources resulting water pollution, land value degradation, loss of agricultural productivity and nuisance. This impact is short term in duration, medium, local to regional in scale and direct in magnitude.

Operation & Maintenance Stage

Reclamation of spoil disposal site

The spoil sites arelease land area which is to be return back with the completion of the lease period. During the spoil disposal, the material and different structure dump in the site will certainly damage land. The proponent has to reclaim the condition with the neutralization of damage to the spoil disposal site. To have a minimal damage to the spoil site, Different precaution needs to be taken into consideration while disposal of spoil to the site. The impacts will be direct, medium, site-specific and long-term in nature.

Removal of labor camp/construction camp

Completion of project will remove labor camp and construction camp. With this the waste and pollution that is created during their stay have to be removed from the site. The lease land has to be handover to the owner without any damage to the land. Earlier precaution on using the land will be advantageous to preserve the original condition of land. The impact of this nature will be direct, medium, site-specific and short-term in nature.

Clearance of stock piling materials like bitumen, drums, leakage chemicals etc

With the completion of project, all the spoil and other stock piling have to be cleared. During the process of clearance of these materials there is always a chance of chemical leakage to the land surface and nearby water sources. The impact of this kind may lead to health effect to people and water pollution. The impact is direct, medium, site-specific, and short term in nature.

Issues regarding slope instability

Inadequate drainage works, faulty construction, de-vegetation of the area, haphazard disposal of spoil and quarrying stones/soil are the major precursor to the destabilization. Similarly, the cutting along the road alignment is another factor that will destabilize nearby hill slope which result landslide and soil erosion. The impact is indirect, site specific, long term and medium in magnitude.

Issues regarding drainage management

To prevent the water logging in the road, drain will be made on the either side of the road.With the operation of the project, drainage management will not be a major problem. But the blockage on drain will impact on the project site, especially on the nearby agricultural land and settlements. The impact is indirect, medium, long term, significant, site specific and local in nature.

Change in Land Use

With the road construction, the pattern of settlements, agricultural land and grassland will be changed. Different types of market will be evolved in the corridor of the road alignment. Similarly different new buildings, recreational site, bust stop and other different facilities will be added in the

project site. The impact is positive, medium, long term, highly significant, site specific and local in nature.

Sedimentation Air dust and noise

Air pollution and noise pollution are the major drawbacks of vehicular movement. The noise of horns arising from vehicles can be a nuisance at the sensitive spots like settlements and forest. The road alignment passes through a forest land acts as a shelter belt for noise and air dust so the impact will be indirect, of low significance, site-specific and long-term in nature.

5.2.3 Biological Environment

Construction Stage

Issues regarding vegetation clearance (route clearance) of community and national forest

The road alignment does not pass through the national forest, buffer zone and natural reserve. Starting point of the road will invade the settlement area followed by community forest. About 124 numbers of trees have to be cleared prior to the road construction. The tree species that are to be removedfor the road construction areas follows Sal (30), Chilaune (8), Pine (30), Parijot (2), Peeple (5), Kutmero (6), Mango (1), Uttis (20), Bamboo (1), Bar (2), Mauwa (11), Lakuri (2), Guava (1), Dudelo (2) and Lapsi (1). However some of the trees can adjust while maintaining RoW. The impact will be confined to the road alignment and thus will be local, direct, long-term and of medium significance.

Cutting of trees and clearing of shrubs and herbs of the forest area which eventually causes loss of habitat/biodiversity of the project area.

About 131 trees will be felled along with the shrubs and herbs prior to road construction. The local species and bird habitat will be loss. As the project site has less animal species, the impact will be minimal.

Issues on the rare species of fauna

The mammals reported in the project area are squirrels (*Faunambulus sps*), Dumsi (*Hystrix brachyuran*), Chituwa (*Panthera pardus*), Phaura (*Vulpes, bengaleasis*), Monkey (*Macaca, mulatta*) Sarus (*Grus, nigricollis*) (Field Survey, 2014). Common herpeto fauna species include Bufo melanostictus, frogs (*Calotes versicolor*), Snakes (green snakes). The common bird species observed in the project site are sparrows, Kalij (*Caphura leucomelanos*) Kafal pakyo, kag, Parrotand flying fox.The road alignment does not fall under any protected areas or buffer zone, wetlands of biological importance or other ecologically sensitive areas.Among the reported animal,none of the species are listed under CITES – II category. Species mentioned in IUCN RED LIST and Forest Act doesn't exist in the project area. The project site don't have any rare animal species, the project will not bring any issue of rare species loss.The impact is direct, less significant, local and short term.

Disturbances in Wild life activities and corridor of wildlife movements

The project location has diverse plant and animal species. As road starts from forest area, it will disturb the habitat of wildlife.With the vehicle and machineries operation during construction period,the nearby animal will be disturbed. Illegal hunting of animals by labor camp may also result in loss of wild animals. Labors camp, stockpiling of materials, quarrying of materials and borrow pit operation, bituminous heating and other constructional trafficking will effect on wildlife habitat. The anticipated impacts will be of medium significance, locally confined and long-term.

Fragmentation on existing ecosystems

The road construction through the forest will fragment the ecosystem. All the plant species along the alignment will be cleared. Similarly, different construction activities will cause air and noise pollution that will also cause ecosystem fragmentation. The impact on ecosystem will disturb the animal habitat and food chain. The impact is direct, medium significant, local and long term.

Disturbances on specific ecological niche of rare species of fauna

The project site doesn't have any ecological niche of rare species of fauna and it will not affect any rare species. The impact is direct, less significant and local in nature.

Operation & Maintenance Stage

Impact on forest resources

With the operation of vehicle it will influence forest ecosystem. Noise and air pollution will disturb the wild habitat and affect the nearby vegetation. Along with vehicle movement, people well have easy access to the forest site which makes them easy for illegal extraction of timber and other forest products (NTFPs),chances of incidental forest fires, and the introduction of invasive species (weeds pests). The impact will be indirect of high significance, regional, and long-term

Possible illegal hunting and poaching of wildlife

The road alignments passing from the forest will easy the illegal hunting and poaching of wild life The impact is highly significant, site specific and long term in nature.

Disturbances on specific ecological niche of rare species of fauna

As the project sites don't have any specific ecological niche of rare species of fauna, thereis not any chance of disturbance in specific ecological niche. The impact is negligible. .

Table 5.1:Beneficial and Adverse environmental impacts

Beneficial Impacts

Aspect	Impacts	Nature	Magnitude	Extent	Duration	Rating
Socio-economic and Cultural Environment						
Construction Stage						
	Employment opportunity of local peoples	Direct	H60	L20	ST05	HS90
	Increase income of local people	Indirect	M20	L20	LT20	HS85
	Enhancement of technical skills	Indirect	M20	L 20	LT 20	MS60
	Small Scale enterprises development and business promotion	Direct	H60	L20	ST05	MS60
	Rent from land acquired temporarily during construction	Direct	M20	L 20	ST 05	HS85
	Commercialization in agricultural products among local communities	Direct	H60	L20	ST05	HS85
Operation Stage						
	Increase economic valuation of land of project affected VDCs	Indirect	M20	L20	LT20	MS75
	Reduce Travel Cost	Direct	M20	L20	LT20	MS60
	Mainstreaming of local culture and products	Direct	M20	L20	LT20	MS60
	Increase cost opportunity of local farmers for their agricultural products	Indirect	H60	R60	LT20	HS100
	Employment of local people	Indirect	H60	R60	LT20	HS100
	Market development opportunity	Indirect	H60	L 20	LT20	HS100
	Women empowerment	Indirect	M20	R60	LT20	MS60
	Easy access of local people to district head quarter and main streaming of country	Direct	H60	R60	LT20	HS95
	Empowerment of Commercialization of existing agricultural business such as Agro-Silvi Pastoral farming	Indirect	M20	R60	LT20	MS60
	Dissemination of spiritual and religious values of different place that the local peoples were adopted in project affected areas	Direct	H20	L20	LT20	HS80

Adverse Impacts

Aspect	Impacts	Nature	Magnitude	Extent	Duration	Rating
Socio-economic and Cultural Environment						
Construction Stage						
	Issues of land and property acquisition and resettlements	Direct	H60	SS10	ST 05	HS80
	Population Displacement	Direct	L10	SS10	ST05	LS40
	Impacts due to loss of structures/Infrastructures existing in RoW of proposed road	Direct	L10	L20	ST05	LS40
	Pressure on Social service facilities such as water, electricity, irrigation canals, open etc.	Direct	H60	L20	ST05	MS70
	Employment loss for locally available labour force	Indirect	M20	L20	ST05	MS70
	Workforce camp operation	Direct	H60	L20	ST05	HS80
	Cutting, filling and drain scouring	Direct	M20	SS10	ST05	MS70
	Construction hazard such as landslide, slope failure and spoil disposal	Direct	H60	L20	ST05	HS85
	Social conflict and disputes	Direct	H60	L20	ST05	HS85
	Issues of health, Sexually Transmitted Disease (STD) HIV, AIDS	Indirect	M20	L20	LT20	MS65
	Occupational and safety hazard	Direct	M20	SS10	ST20	MS60
	Cultural Invasion and social Threat	Direct	L10	L20	ST05	LS40
Operation Stage						
	Road side safety issue with people living near to the road side due to vehicular movement	Direct	H60	L20	LT20	HS75
	Road safety and possible accidents	Direct	H60	L20	LT20	HS80
	RoW Encroachment	Direct	H60	L20	LT20	HS80
	Possible township/ribbion development along the road	Direct	M20	L20	LT20	MS60
	Health and population	Direct	M20	R60	LT20	MS55
	Social conflicts due to change in community structures	Indirect	M20	L20	LT20	MS55
	Possible cultural invasion and social disputes	Direct	M20	L20	ST05	MS55
	Increase problem in social security	Direct	M20	L20	ST05	MS55
	Threat in cultural assets found in project affected area	Direct	L10	L20	ST05	LS40
Physical and Chemical Environment						
Construction Stage						
	Issue regarding route clearance	Direct	H60	L20	ST05	HS70
	Impairment of cultural and historical monuments/areas	Indirect	L10	L20	ST05	LS40
	Change in land use pattern of project affected area	Direct	M20	L20	LT20	MS55

pect	Impacts	Nature	Magnitude	Extent	Duration	Rating
	Landslide, erosion and downward/upward slope destabilization	Direct	M20	L20	MT10	MS55
	Sedimentation and change in aquatic ecosystem	Direct	M20	L20	MT10	MS70
	Solid Waste disposal, muck disposal and issue of excavated waste	Direct	H60	SS 10	ST05	HS75
	Hazards caused by combustible and toxic waste due to use of bitumen and their storage, heating, spreading, fuel lubricants, oil, acid use of other chemicals for construction	Indirect	M 20	SS 10	ST 05	MS65
	Issues of pollution (Water, noise and land pollution)	Direct	M20	SS10	ST05	MS55
	Stockpiling of construction materials	Direct	M20	L20	ST05	MS55
eration Stage						
	Reclamation of spoil disposal site	Direct	M20	SS10	LT 20	MS55
	Removal of labor camps/construction camps	Direct	M20	SS10	ST05	MS55
	Clearance of Stock piling materials like bitumens, drums, leakage chemicals etc.	Direct	M20	SS10	ST05	MS55
	Issues regarding slope instability	Indirect	M20	SS10	LT20	MS55
	Issues regarding drainage management	Indirect	M20	SS10	LT20	MS55
	Change in land use	Direct	M20	SS10	LT20	MS60
	Sedimentation Air dust and noise	Indirect	L10	SS10	LT20	LS30
logical Environment						
struction Stage						
	Issues regarding vegetation clearance (route clearance) of community and national forest	Direct	M20	L20	LT20	MS60
	Cutting of trees and clearing of shrubs and herbs of the forest area which eventually causes loss of habitat/biodiversity of the project area	Direct	M20	L20	LT20	MS55
	Issues on the rare species of fauna	Direct	L10	L20	ST05	LS30
	Disturbances in Wildlife activities and corridor of wildlife movements	Direct	M20	L20	LT20	MS60
	Fragmentation on existing ecosystems	Direct	M20	L20	LT20	MS60
	Disturbances on specific ecological niche of rare species of fauna	Direct	L10	L20	MT10	LS40
eration Stage						
	Impact of forest resources	Indirect	M20	R60	LT20	MS60

Aspect	Impacts	Nature	Magnitude	Extent	Duration	Rating
	Increase a consumption rate of NTFPs from existing communication and national forest	Direct	M20	L20	LT20	MS55
	Habitat Fragmentation and disturbances to wildlife	Direct	M20	SS10	LT20	MS55
	Possible illegal hunting and poaching of wildlife	Direct	M20	SS10	LT20	MS55
	Disturbances on specific ecological niche of rare species of fauna	Indirect	L10	SS10	ST05	LS30

Note: Legend: *Magnitude- L= Low, M= Medium; H= High; Extent- L= Local; R= Regional, SS= Site Specific,Duration- Lt= Long Term; MT= Medium Term; ST= Short Term*

Type	Criteria	Impact	Symbol	Rating
	Hard to Mitigate or high positive effect	High	H	60
Magnitude	Mitigate with some precaution or medium positive effect	Moderate	M	20
	Easily mitigate or low positive effect	Low	L	10
	Within NP/VDC	Regional	R	60
Extent	Within Project Ward	Local	L	20
	Within Project Site	Site Specific	SS	10
	> 5 years	Long Term	Lt	20
Duration	1 to 5 years	Medium Term	Mt	10
	< 1 years	Short Term	St	05

Nature of Impact: D = Direct / IN = Indirect

Significance of Impact:

Total Score	Significance	Symbol
> 75	High Significant	HS
50 – 75	Medium Significant	MS
< 50	Low significant	LS

CHAPTER 6: ALTERNATIVE ANALYSIS

Alternative analysis is a significant part of any IEE study thatforeseesalternative ways of achieving objectives of the proposed subproject. The objective of alternative analysis is to come up with a development option, which maximizes the benefits while minimizing the adverse impacts. The various alternatives to achieve the subproject objectives with minimum environmental degradation are discussed below.

6.1 Design and Construction Approach

The traditional road construction comprise of use of heavy machineries and equipment, explosives, heavy concrete structures for retaining slopes and bituminous surfacing. Green road approach is a labour based, environment friendly and participatory method that focuses to minimize disturbance to local topographical settings and conserve the fragile mountain ecology. Considering these approach, construction work should be done manually by the local labour without using heavy machinery and explosives. Spoil disposal is minimized through balance in cut and fill. The project should use soft engineering structures. The design and construction includes vegetation conservation activities such as re-vegetation and stabilization of slopes with application of bio-engineering. Project will use the local labor helps which increase local economy through the wages earned by the people. Further this will also make them feel ownership among the community towards the road.

The proposed road has been designed considering combination of both the LEP approach for works possible through manual labor (earth excavation, bio-engineering, gabion structures), and contract based approaches for works that require mechanized applications (gravelling or construction of RCC cross drainage structures)

6.2 Project Site (Route)

The main purpose of the project is upgrading/construction of existing road alignment from Nayapul-Pawati-Dadakharka. The improvement measures have minimum environmental impacts and it does not need additional land and clearance of large segment of forest area. Thus, alternative alignment to the project area is not feasible and alignment select/purpose is a best suited to the side from any dimension.

6.3 Time Schedule

As per the work plan, the construction and upgrading work will be start during pre-monsoon season (i.e. April, May) and winter season (Dec, Jan, Feb). Therefore, the constructional activities will not be ruined by heavy rainfall. The project will have maximum involvement of local labors. So, agriculture off- season is appropriate time to start the work. In addition, farmers will be a bit free from agricultural activities who can actively participate as a labor in the construction work.

6.4 Raw Materials (Resources) to be used

The required raw materials for the road construction are boulders for gabions and stone for dry masonry wall, gabion wires, aggregates of different sizes for sub-base, base course, surface dressing and concreting. Other required materials are sand which can be extracted from nearby river beds and bank. The steel rods and cement have to be bought from the market places. As the site is far from the urban centre, the road construction will give more priority to the local resources. In order to improve the quality of construction, there are no cost-effective alternatives to the selected materials.

6.5 No Action Option

The alternative prevents the implementation of the proposal and it deprives the beneficial impacts to the local peoples. In absence of this proposal the travel time from Nayapulto Dadakharka will be 4

hrs on foot. Further, the local will not have better access to other facilities. So, absence of project will limit the access of local people to few kilometres and make community remote and isolated from a main stream of the country and increase severe poverty. Since the road does not cause significant negative impact on the environment, no action option is immaterial.

CHAPTER 7: MITIGATION MEASURES

7. Alternatives to Reduce or Control the Impact of Implementation of Proposal on the Environment

In this chapter all the proposed measures and action complementing the identified beneficial aspect will be included as well as proposes a plausible mitigation and precautionary measure to counteract the potential adverse impacts.

7.1 Mitigation Measures

7.1.1 Benefit Augmentation Measures

Socio-economic Environment

Construction Phase

Employment opportunity of local peoples

Contractors will be encouraged to include local workers during construction phase. The Project will encourageto employ local poor, vulnerable, socially excluded, disadvantaged people and women as far as possible.

Increase Income of local people

The access road will open ample of opportunities to local people. The road will enable people to visit places and create a job for them. Similarly, Local resources will be exported to the different market places. Farmer will get opportunities to import better agriculture technology to enhance their crop production. Varieties of crop grown in the project site can be sold directly to the market. This will improve the trade and business in the places which will help to uplift the life of local people of the place.

Enhancement of technical skills

The local labours will get chance to enhance their skill in construction techniques, mechanical and engineering works. They will get opportunity to gain knowledge about application of environmental health and social precautionary measures. By augmenting their capacity, local people can find skilled jobs in future that will secure their livelihood with an alternative/additional occupation to agriculture.

Small Scale enterprises development and business promotion

To fulfil the increasing demand of good, small scale business will be flourished in the project site during the time period of construction phase. This will give opportunities for local people to earn money by selling their local goods.

Rent from land acquired temporarily during construction

The project will manage a considerable rental payment to the local peoples for land acquired temporarily during construction. The land will be required for stock piling of constructional materials

Commercialization in agricultural products among local communities

The project will encourage local people to establish small-scale industries, cultivate cash crops animal husbandry, diary and NTFP and expand other micro enterprises. The local NGO/CBO can take initiative to promote these businesses and encourage entrepreneurship skills among local people.

Operation Phase

Increase economic valuation of land of project affected VDCs

Road accessibility to the different location of the project will increase the land value. With the operation of road it leads to rising of land values along the road corridor. Increased land values also enhance farmer's capability to involve in commercial farming and agro-business activities. They can use a land for the welfare of their family.

Reduce Travel Cost

Operation of road will make people to have easy access to the place. The road will make traveling distance short and less time consuming. Local will be benefitted from the cheap travelling cost.

Mainstreaming of local culture and products

Road access will bring visitors to the place which increase the consumption of local products. Local culture and tradition can flourish as an attraction to the tourist. This will improve the economic condition of the local people.

Increase cost opportunity of local farmers for their agricultural products

Local resource such as agriculture products is main goods for the market. Improvement in the agriculture sector will enhance the condition of the local people. Introduction of new technology and better farming practice will bring significant improvement which will give farmers to uplift their living standards.

Employments of local people

Agriculture will flourish with the road access to the market place. This will grow the number of farmers in the region. Similarly, different private sector will come to the place which create another employment opportunities to the local people.

Market development opportunity

With the construction and operation of road, different market centre will be developed in the road corridors. Some of local peoples will start a small business along a road side for example tea-shops, restaurant, general shops and collection centre of agricultural product for easy marketing and transportation.

Women empowerment

The upgrading of road will attract different NGOs/CBOs to visit the project area. With the enter of women development focused NGOs/ CBOs eventually result in a number of awareness programs that will address problems like HIV/AIDS, safe sex, girl and boy trafficking and women health, education with training and extra curriculum activities which supports to women empowerment.

Easy access of local people to district head quarter and main streaming of country

The construction of road will improve the transportation in the area, this facilitate local people to visit district head quarter. Similarly, the outside will have easy access to the place. Increase in tourist will bring income to the local people.

Dissemination of spiritual and religious values of different place that the local peoples were adopted in project affected areas

Easy access of transportation will promote the locally identified tourism spots, religious place and spiritual area thataware the local peoples about the domestic tourism and explore the route and beauty of place.

7.2 Adverse Impact Mitigation Measures

7.2.1 Socio-economic Impacts

Construction Phase

Issues of land and property acquisition and resettlements

All private lands and structures damaged/destroyed/acquired by project will be compensated at a rate determined by Compensation Fixation Committee (CFC) of DDC. The compensation amount will be supported by the Project.

Population Displacement

There is not any household along the road alignment. The access road possesses minimal damage to the property/assets. Major problem from the road to the local will be disturbance such as noise, air pollution and unwanted waste discharge during construction. This may induce local to shift to another territory. The project management team/crew/contractor will work to their best to minimize the potential environment disturbance from the road construction.

Impacts due to loss of structures/infrastructures existing in RoW of proposed road

As road alignment passes through few structures, overall impact from the road construction to the structures will be minimal. As per importance of structure, the road will be diverted to protect the structure. All the loss of structure will be compensated by the project.

Pressures on social service facilities such as water, electricity, irrigation canals, open etc

Increase in incoming workforce will exert pressure in social services. The contractor will guide the labour to use facilities and resources properly so that they don't misuse it. Otherwise it might cause scarcity and shortage of those resources in the area.

Employment loss for locally available labor force

Road construction will obstruct the daily activities of the labor. But the project is less likely affect the jobs of the local. There is a chance of hampering the business of the nearby shops on the road side during the period of construction. Although few local businesses will be affected for short time, the project will create highly paid employment opportunities to the local people during construction period.

Workforce camp operation

The waste disposal at the camp site by the large flux of workers will degrade the environmental condition of the place. If the wastes is not managed and reduced, there is always a change of epidemic diseases. The contractor shall maintain the discipline of workers and better waste management facilities shall be practiced within the project affected area.

Cutting, filling and drain scouring

Activities related to cutting, filling and drain may bring different consequences such as landslide and soil erosion. Major environmental impacts of these activities are air pollution, noise pollution and water contamination. To avoid the consequences of cutting, filling and drain scouring, these activities should be done with precaution and in full awareness with planning.

Construction hazard such as landslide, slope failure and spoil disposal

A construction hazard may damage properties, lives and road itself. The construction phase should be conducted with the better planning and taking precaution in order to minimize the unwanted hazard such as landslide and slope failure.

Social Conflict and Disputes

Contractor will organize orientation/interaction program with CBOs to make workers aware of possible conflict. Contractors will also give priority to the local peoples in project to maintain balance in the project. Similarly, the labour will comply with the code of conduct set by the contractor.

sues of health, Sexually Transmitted Disease(STD), HIV AIDs

ere is always as chances of prostitution activities when large flux of people comes together in a ace. This may invited the disease such as STD and HIV AIDS. It is important that project have to my out awareness activities with collaboration with NGOs/CBOs in the area.So that people will be nscious on doing such thing with precaution.

cupational and safety hazard

ntractor will provide safety equipment like helmets, globes, boots etc. to workers. Contractor will so purchase insurance to cover physical damage to workers. Potable water and basic first aid kit l be provided to the camp.

tural Invasion and Social Threat

s of the cultural, religious and historical structure falls under road alignment. The contractor will nt to their works to respect and not to ignore on existing practices of the community.

ation Phase

d side safety issue with peoples living near to the road side due to vehicular movement

rent road side safety issue will be raised by the local people with the operation of the road. Prior e road operation, the local people understanding for its operation have to be elucidated through ugh training and teaching session. This will helps to minimize the accidents and injuries from oad.

d Safety and possible accidents

e people should be educated and trained on the different safety measure on riding and walking road. The road should have all the signals and sign to guide the traveller to the safe ride. It is y of contractor to plan for the installation of different traffic signals and sign to facilitate the le to prevent from any severe accidents. This will be taken into consideration while constructing oject.

Encroachment

e increase in incoming tourist, different shops, market site and hotel logde will flourish in the This will reduce the available space in the road which may result in road congestion and traffic nts. It is the duty of local bodies to discourage and charge the local to construct any structures oad corriode.

la township/ribbon development along the road

th their sister bodies will works with local peoples to discourage to set a settlement with in e road. The settlements near at RoW will provide awareness focus programs including ment of law, Plantation of trees in the RoW, Awareness programthrough local organizations proper settlements and regulate settlement growth with proper planning etc.

st pollution

ects will appeal functioning of CBOs to minimize a health risk of local peoples from the n of road. It emits dust, pollutants to the local environment. Similarly, there will be high epidemic of disease, HIV/AID due to inter mixing of peoples from different areas. So, the eoples will be making aware regarding these issues. Similarly, the contractor will be le to manage all type of soil waste produce during construction phase. On the other hand t will encourage to NGOs/CBOs to participate on area for the sanitation and conservation ronment. They could empower the peoples to manage the waste produced within theirdoor.

Similarly, some waste collection point and proper drainage will be designate on alignment point, passing zone and lay-bys.

Social Conflicts due to change in community structures

The project requires large number of labor workforce which are from different part of country. They are unaware of the tradition norms and value of the project site. There is always a chance of conflict among these mix groups of people. The labor camp and working area shall be delineated by the boundary so that interaction of the people is less with the worker. Labor force must be oriented on the tradition, culture and habits of the local people. Contractor is major focal person to guide their work to conduct the work smoothly without any contention with local people.

Possible cultural invasion and social disputes

Access road will facilitate migrant to come to the places which may be from different caste and religion. Misbehavior from this group of people will ignite the conflict/dispute. Similarly, income tourists may initiate such issues of conflict or disputes. Therefore, local people shall be aware on these issues. NGOs/CBOs can be helpful to disseminate the awareness on the issues to local to minimize the possible disputes.

Increase problem in social security

Large group of people at the same place will invite different social evils. In order to reduce these consequences, it is important to improve the social security. Similarly, contractor has to monitor the labor force effectively and keep them in discipline to avoid any issues of social security.

Impact in cultural assets found in project affected areas

The project site is devoid of any significant cultural asset. There is not any threat to the cultural assets in the project affected areas.

7.2 Physical and Chemical Environment

Construction Phase

Issue regarding route clearance

Trees and other vegetation come across the road alignment will be removed. All these plant will be compensated through the replantation at the ratio of 1:25.

Impairment of cultural and historical monuments/areas

Cultural and historical monuments/areas are completely absence along the road alignment. The project will not impact to such places.

Change in Land Use pattern of project affected areas

The land use planning will help to mitigate the impact due to change in land use. The acquired land from the center of road will be demarcated and fenced in order to avoid encroachment. In hilly, the forest area will be cleared only to maintain the designed formation width. Plantation will continue along the right of way areas in order to stabilize roadsides greenery.

Landslide, erosion and downward/upward slope destabilization

Retaining wall, toe wall, gabion wall, plantation, drainage management etc. will be done to stabilize unstable cut slope failures. Bioengineering methods will be used to keep newly exposed area under vegetative cover as soon as possible. Re-vegetation of cut and fill slope or exposed areas will be implement as soon as possible by using native plant species and the project will ensure minimum disturbance of vegetation during upgrading. No upgrading work during rainy season.

...tion and change in aquatic ecosystem

...ors have to take precaution during dumping waste in water sources. The waste dumping ...ne in plan way so that it is not dump directly in water sources.

... disposal, muck disposal and issues of excavated waste

...ll be disposed especially for the protection of the bank of the prevailing water resources. ... dispose and managed at designated site with minimum environmental damage. ... engineer will give approval for disposal site of spoil. Wherever possible, surplus spoil ... to fill eroded gullies, quarries and borrow pits, depressed areas etc.

Haza... caused by combustible and toxic waste due to use of bitumen and their storage, spreading, fuel lubricants, oil, acid use of other chemicals for construction

...ned to be used andstored in safe condition.The project will avoid heating and disposal ... near water sources. The permission from the land owner will be obtained before ... storage activities. If bitumen has spread over the land accidentally and in improper ... be cleared immediately. The bitumen will not be discharged into the drain structure ...ng on the sub-base material and Bitumen related work will not be carried out during the ...

... pollution (water, noise and land pollution)

... and machinery with lower sound power levels will be selected for the use. Silencers will ... to construction equipment and machinery and maintained properly. Similarly, the ... be provided protection devices such as ear plugs/ or ear muffs during period of ... noise generating machines. Noise levels will be measured to ensure the effectiveness ... measures. The workers will be encouraged to use face mask to minimize air pollution ...neration. Water sprinkling will be carried out in dust prone locations, unpaved haulage ...works, stockpiles including asphalt mixing plant areas. Chemicals such as oils, ...paints, acids etc will be stored in leak proof container and disposed in pit safely after use. ...es ... not be washed directly into the water bodies. The vehicles and equipment will be ... time to time to ensure any leakage from them.

... of construction materials

... disposal of stockpiling materials will create a risk to local peoples. Construction ... be covered with tarpaulin during stockpiling to prevent from rain water and dust ...erated from the stockpiling site. It should be encircled with side barriers and covered ...nce of mix up with toxic materials is about to happen. The stockpiling could be done at ...re... which has already been acquired by GoN.

... Maintenance Stage

... of spoil disposal site

...ction phase, the use of the spoil disposal site will be maintained and used with ... many, with the completion of the construction phase, the spoil disposal site will be ...y. Any activities which might cause serious damage to the site will be stop ... The project team will reclaim any damage to side by the spoil materials.

... or camp/construction camp

... of waste will be formed from the labor camp/construction camp. Unmanaged and ... disposal of waste to the labor/construction camp might degrade the land value or ...ductivity of land. The contractor and crew member will be aware of this matter. Earlier ... be taken on handling the camp site to avoid any severe damage to the land surface.

of stock piling materials like bitumen, drums, leakage chemicals etc.
time of clearing the stock, the supervising engineer have to be aware of the possible ination to the surround land or water resources. The necessary precaution have to be taken ing such works.

regarding slope instability
are will be taken during the cutting of the sloppy area. Different technical skills and will be used to stabilize the land surface in order to avoid the landslide and soil erosion.

regarding drainage management
water logging, drainage system will be developed along the road alignment. Proper ering design will be applied to prevent the road from any water blockage in future.

ge in Land Use
road will attracts local to build settlements, shops and market centre in the road s will change the land use of the place. To prevent from the haphazard construction, the s shall implement a better urban planning method along the road side.

ruction Air dust and noise
movement is the major cause of the air and noise pollution. Similarly, dust pollution will be cutting on the road side. No horn signals will be added near the settlement and forest area the need. The road alignment passes through a forest land acts as a shelter belt for noise and e project is far from the urban center, vehicle movement will low to medium. The road any heavy traffic.

ological Environment
Phase
nding vegetation clearance (route clearance) of community and national forest
site is away from the national forest. The road alignment passes through the community Trees lost will be compensated by plantation at the ratio of 1:25. Private trees will be ated.

es and clearing of shrubs and herbs of the forest area which eventually causes /biodiversity of the project area.
uction period small fraction of forest will be cleared /removed. The project will have less ose of habitat of animal. Regarding biodiversity of the project area, the remove tree will at another part of the area at the ratio 1:25. This will help to preserve the loss minimal level.

rare species of fauna
e don't have any rare animal species, the project will not bring any issue of rare.

on Wild life activities and corridor of wildlife movements
ns of preventing/minimizing disturbances to local wildlife is to raise awareness to both local people, and to avoid works being carried out during night hours. Hunting and by the construction workforce and project staff will be strictly prohibited.

on existing ecosystems
impact on the ecosystem through disturbance in animal habitat and food chain. of plant species during construction will impact nearby animal species. As the road small forest area, it will have less impact to the ecosystem of the forest area.

...rbances on specific ecological niche of rare species of fauna

...roject site doesn't have any ecological niche of rare species of fauna and it will not affect any ...pecies.

Operation Phase

...t on forest resources

...ct on forest resources will be minimized through the strengthening the forest monitoring to ... illegal extraction of timber. Proper fencing and awareness to the local will help to make the ...ver.

...at fragmentation and disturbances to wildlife

...ad alignment is passes through a community Forest. The movement of wildlife and its habitat ...in the forest will be affected. Vehicular movement and excessive use of horn in the forest can ... wildlife. Further this will cause disappearance of the species from the region. Other impacts ... to the wildlife are collision with wild animals and easy access for those practicing poaching ...ing of wildlife. The impact is limited to project site, having medium significance and long term ...tion.

...ble illegal hunting and poaching of wildlife

...ity in the opening forest area along the forest side needs to be improved. Proper fencing and ... is required to prevent from the direct entry to the forest area. Coordination with DFO and ...Os to control the activities like illegal hunting and poaching of wild fauna, especially listed in ... and IUCN red data book by enforcing acts and regulations strictly.

...rbances on specific ecological niche of rare species of fauna

...project site don't have any specific ecological niche of rare species of fauna, the is not any ...disturbance.

Local

Action, Impact and Mitigation Measures

The following describes the Action Plan for activities to be carried out in order to enhance the positive (Table 7.1) and control/mitigate the adverse impacts (Table 7.2). The tables also indicate the ranking status of the impacts, and responsible agencies to implement the proposed measures.

Table 7.1: Beneficial Impact Augmentation Measure

Beneficial Impact Augmentation Measure

Activity	Effect	Beneficial Impacts	Impact Ranking Status	Benefit Augmentation Measures	Responsibility for Enhancement Measure
Socioeconomic Impacts					
Construction Stage					
Employment opportunities of local people	Increase in Employment Opportunity	Employment opportunity of local peoples	HS90	Involve local people to the extent possible to implement works that can be carried out manually through labor-based approach	Project, Contractor
Increase Income of local people	Increase in the Income of the local people	Market demand of local resources	H85	Extensive use of local resource	Local people
Enhancement of technical skills	Improvement in technical skill of local labors	Enhancement of technical skills	MS60	Familiarize local labors on improved technology used for construction so that they can enhance their skills	Project, Contractor
Small Scale enterprises development and business promotion	Increase in local business	Consumption of local resources and source of income to local people	MS60	Allocation of space on the road side for the establishment of market place	Local people
Rent from land acquired temporarily during construction	Income generation from use of unproductive land	Rent for land acquired temporarily	HS85	Opportunities of income generation from the unproductive land	Local people
Commercialization in agriculture products among local communities	Extensive use of agriculture product	Better income source for farmers	HS85	Improvement in agriculture sector and best use of the land for crop growth	Farmers,
Operation Stage					
Increase economic valuation of land of project affected VDCs	Increase economic status of peoples	Increase land value	MS75	Identify the projects DIZ, IIZ and ZOI so that local peoples will get benefit from the land values and important	Project, local people
Reduce Travel Cost	Increase in vehicular facilities	Cheap road access	MS60	Increase in number of vehicle from different route of the urban centre	Project, local people, bus owners
Mainstreaming of local culture and products	Attraction to the incoming visitor or tourist	Economic benefit to the local people	MS60	Promotion of local culture and production of local products, Encourage locals to show up their tradition, culture and religion	Local people
Increase cost opportunity of local farmers for their agricultural products	Improvement in local crops	Increase in market value of the local agricultural products	HS100	Motivation to the local farmers on local crop farming, promotion of cash crops and vegetable farming	Local farmers

Activity	Effect	Environmental Impact	Ranking Status	Benefit Augmentation Measures	Responsibility for Enhancement Measure
Employment of local people	Opportunities of new works and jobs	Growth of different income generation sector	HS100	Establish different private sector, NGOs/CBOs, Introduction of INGOs project and flourish in commercial sector	Local people, NGO/CBO/INGO, Investors,
Market development opportunity	Growth of market centres	Easy access to different goods and products within the area	HS100	Attract people towards the business, improve provision for the banking facilities for investments, enhancement in trade	Local people, private company, local Businessman,
Women empowerment	Women will increase awareness level and they will get access on health, education, work and decision making level	Women empowerment	MS60	Awareness training, participation of women in community organization in decision making	Locals, CBO, NGO
Easy access of local people to district head quarter and mainstreaming of country	Facilitate to travel to the different places	Increasing in income visitor from different places	HS95	Facilitate to increase in public transportation	Local businessman, private sector
Dissemination of spiritual and religious values of different place that the local peoples were adopted in project affected areas	Increase in the visitor to the religious and spiritual sites	Income generation from the tourist to these places	HS80	Maintenance of spiritual and religious importance place, identification of other recreational and aesthetic site	Local people, CBO, NGO, Private sector, DDC

Adverse Impacts and Proposed Mitigation Methods

Activity	Effect	Adverse Impacts	Impact Rating Status	Mitigation Measure	Mitigation Cost	Responsibility for Augmentation Measures	
						Responsible Executing Agency	Relevant Monitoring Agency
Socio-economic Environment							
Construction Stage							
Issues of land and property acquisition and resettlements	Loss of cultivated/private land	Loss of land, structure and property/assets	HS80	Compensation for lost land	Reported by Resettlement team of project and DDC	Project	Proponent/ Consultant
Population Displacement	Migration of people	Decline in public participation	LS40	Minimize pollution level and other disturbance during road construction	Reported by the contractor	Project	Proponent
Impacts due to loss of structures/Infrastructures existing in RoW of proposed road	Social conflict	Dispute and violence	LS40	As road alignment passes through few structures, overall impact from the road construction to the structures will be minimal.	NA	Project	Project/ Proponent
Pressure on Social service facilities such as water, electricity, irrigation canals, open etc.	Scarcity and shortage of resources	Crisis of basic needs	MS70	The contractor will keep the discipline and guide the labour to use facilities and resources properly so that they don't get misused.	Evaluated by contractor	Project	Project/ Proponent
Employment loss for locally available labor	Unemployment	Migration in search of better	MS70	Maximum involvement of	NA	Project	Proponent

		Impact	Impact Rating Status	Mitigation Measure	Cost	Responsibility Augmentation Measures Responsible Executing Agency	Relevant Monitoring Agency
force		opportunities		local people in the road construction activities commensurate to their skills and knowledge			
Workforce camp operation	Generation of waste	Pollution on the camp site	HS80	Strict rules and regulation on the camp site for waste management, water discharge and air pollution	Report by the contractor	Project	Proponent
Cutting, filling and drain scouring	Landslide and soil erosion	Air pollution, noise pollution and water contamination	MS70	Activities related to cutting, filling and drain scouring will be done in a planned way	Evaluated by contractor	Project	Proponent/ Consultant
Construction hazard such as landslide, slope failure and spoil disposal	Damage to the road and nearby settlements	Landslide, Slope failure and spoil disposal	HS85	Use of preventive measure to avoid landslide to reduce unwanted damage	Estimated by the supervising engineer	Project	Proponent/ Consultant
Social conflict and disputes	Social conflict	Excessive violence	HS85	Awareness program with collaboration with CBOs to make worker aware of the possible conflict	NA	Contractor	Proponent/ Consultant
Issues of health,	Increase in STD,	Endemic	MS65	carried out	50000.00	Project	Proponent/

Sexually Transmitted Disease (STD) HIV, AIDS	HIV AIDS patience			awareness activities with collaboration with NGOs/CBOs in the area. So that people will be conscious on doing such thing with precaution.			Consultant
Occupational and safety hazard	Decrease in worker	Health effect to the workers, increase the project expenses	MS60	Provision of health care treatment facilities and awareness on health to the workers	Reported by Contractor	Contractor	Proponent/ Consultant
Cultural Invasion and social Threat	Damage to the cultural site	Loss of cultural and religious monuments and site	LS40	No cultural site falls under the road alignment and work will be aware to show respect to the cultural site	Reported by Contractor	Contractor	Proponent/ Consultant
Operation Stage							
Road side safety issue with people living near to the road side due to vehicular movement	Difficulty on the road transportation	Increase in road accident	HS75	Awareness program on the road accidents to the local people, Improvement in the road safety measures	NA	Project	Proponent/ Consultant
Road safety and possible accidents	Discouragement on vehicle	Increase in road accident	HS80	All the signals and sign to guide	50,000.00	Project	Proponent/ Consultant

	movement by locals			traveler to have a safe ride			
RoW Encroachment	Increase RoW encroachment and unhygienic competition	Possible township/ribbon development along the road	HS80	Local peoples will discourage to set a settlement with in RoW of the road. The settlements near at RoW will provided awareness focus programs including Enforcement of law, Plantation of trees in the RoW, Awareness raising programme through local organizations to plan proper settlements and regulate settlement growth with proper planning etc.	30,000.00	Project/Contractor	Proponent/ consultant
Possible township/ribbon development along the road	Increase in settlements in the road corridor	Encroachment of RoW	MS60	Awareness to the settlements near at RoW , In addition enforcement of law, plantation of	Evaluated by project contractor	Project	Proponent/ consultant

				trees in the RoW, awareness program through local organizations to plan proper settlements and regulate settlement growth with proper planning etc.			
Health and population	Emission of dust, smoke, chemical waste increase health problem and vulnerability of health increases on epidemic of disease.	Health hazard	MS55	The projects will encourages functioning of CBOs to minimize a health risk of local peoples creates due to emission of dust, pollutants to the local environment. the local peoples will be making aware regarding these issues of HIV/AID and epidemic of diseased	50,000.00	Project/Contractor	Proponent/ consultant
Social conflicts due to change in community structures	Social conflicts	Increase in violence	MS55	The labor camp and working area will be delineated by the boundary	NA	Project	Proponent/ Consultant

				so that interaction of the people is less with the worker.			
Possible cultural invasion and social disputes	Disturbance in social harmony	Conflict/dispute	MS55	The local people shall be aware on these issues. The proponent in collaboration with NGOs/CBOs can be helpful to disseminate the awareness on the issues to local to minimize the possible disputes.	NA	Project	Proponent/ Consultant
Increase problem in social security	Social insecurity	Social Evils	MS55	The contractor will monitor the labor force effectively and keep them in discipline to avoid any issues of social security.	NA	Project	Proponent/ Consultant
Threat in cultural assets found in project affected area	Damage to cultural assets	Social conflicts	L10	There is not any threat to the cultural assets in the project affected areas.	NA	Project	Proponent/ Consultant
Physical and Chemical Environment							
Construction Phase							
Change in land use pattern of project	Loss of trees and vegetation	Change in Land Use	HS50	Regulating land use planning	Include in detail design	Project/Contractors	Proponent/ consultant

affected area	cover			The acquired land will be fenced and demarcated		Responsible Executing Agency	Relevant Monitoring Agency
Impairment of cultural and historical monuments/areas	Decrease in cultural and historical important of the place	Loss of cultural and historical monuments/area	MS65	The Cultural and historical monuments/areas are completely absence along the road alignment. The project will not impact to such places	NA	Project	Proponent/ Consultant
Landslide, erosion and downward/upward slope destabilization	Increase road induced slope failure and effect on down plain area	Slope Instability, land erosion and induced landslide	MS55	Bioengineering methods will be used to stable slopes, control soil erosion and induced landslide. Civil structure will be constructed to control a slope failures	5,00000.00	Contractor/ Project	Proponent/ consultant
Sedimentation and change in aquatic ecosystem	Impact on aquatic animals	Loss of aquatic animal species	MS70	The contractors have to take precaution during dumping waste in water sources.	Evaluated by Contractor	Project	Proponent/ Consultant
Solid Waste disposal,	Effect on land	Water pollution,	HS75	It will safely	Included in	Contractor	Proponent/

					Mitigation Cost	Responsibility for Augmentation Measures	
						Responsible/ Executing Agency	Relevant Monitoring Agency
muck disposal and issue of excavated waste	and environment			dispose and managed at designated site with minimum environmental damage.	detail design		consultant
Hazards caused by combustible and toxic waste due to use of bitumen and their storage, heating, spreading, fuel lubricants, oil, acid use of other chemicals for construction	Effect on water bodies and human health	Use of bitumen and their storage, heating, spreading etc	MS65	Safe practices in storage and use. The project will avoid heating and disposal of bitumen near water sources.	Included in detail design	Contractor	Proponent/ consultant
Issues of pollution (Water, noise and land pollution)	Effects on human health	Noise and dust pollution	MS55	The workers will be provided protection devices such as ear plugs/ or ear muffs during period of operating high noise generating machines. The workers will be encouraged to use face mask to minimize air pollution due to dust generation. Water sprinkling will be carried out	Included in detail design	Contractor/Project	Proponent/ consultant

Activity	Effect	Adverse Impacts	Impact Rating Status	Mitigation Measure	Mitigation Cost	Responsibility for Augmentation Measures	
						Responsible Executing Agency	Relevant Monitoring Agency
				in dust prone locations			
Stockpiling of construction materials	Increase land pollution and affect human health and agricultural productivity	Hazards due to Stockpiling of Construction Materials	MS55	The stockpiling site will be made far from the agriculture land and water bodies. Construction material will be covered with tarpaulin during stockpiling to prevent from rain water and dust emission.	Include in detail design	Contractor	Proponent/ consultant
Operation Phase							
Reclamation of spoil disposal site	Damage to the land	Reduce the value of land	M20	To have a minimal damage to the spoil site, Different precaution needs to be taken into consideration while disposal of spoil to the site.	Evaluated by the contractor	Contractor	Proponent/ consultant
Removal of labor camps/construction camps	Pollution on land surface	Reduce the value of land	M20	Earlier precaution on using the land will be advantageous to preserve the original condition of land.	Evaluate by the Contractor	Contractor	Proponent/ consultant

Activity	Impact	Adverse Impacts	Impact Rating Status	Mitigation Measure	Mitigation Cost	Responsibility for Augmentation Measures	
						Responsible Executing Agency	Relevant Monitoring Agency
Clearance of Stock piling materials like bitumens, drums, leakage chemicals etc.	Contamination of water and soil surface	Water pollution and land pollution that will impact to the vegetation and animal lives	MS55	The necessary precaution have to be taken on doing such works.	Included in project design	Contractor	Proponent/ Consultant
Issues regarding slope instability	Slope failure and block the roads	Possible slope failure and damage to the project structure	M20	Stabilization of slope by providing walls and plantation. Re-vegetation of cut and fill slope or exposed areas will be done	200000.00	Project/Contractor	Proponent/ consultant
Issues regarding drainage management	Water logging	Damage to the road structure	M20	Construction of drainage system in the road corridors	100000.00	Project/Contractor	Proponent/ Consultant
Sedimentation Air dust and noise	Affect on local peoples	Air dust and noise	M20	No horn signals will be added near the settlement and forest area as per the need, all parties will be made to follow the code of conduct	Estimated by supervisor engineer	Project/Contractor	Proponent/ consultant
Biological Environment							
Construction Phase							
Issues regarding vegetation clearance	Habitat lost for wildlife	Loss of forest	MS60	Trees lost will be	930000.00	Contractor/Project	Proponent/

Environment Protection Rules, 2054BS (1997 AD) with respective amendments

During the process of implementing EPA (1996) effectively the Environment Protection Rule (EPR) came into force in 1997 and was amended in 1999. The EPR contains elaborate provisions for the process to be followed during the preparation and approval of sub-projects requiring EIAs and IEEs including scoping documents, terms of reference, public consultations and hearings, and environmental monitoring and auditing. The environmental legislation empowers the concerned Ministry to monitor the environmental activities including mitigation measures and Ministry of Environment for environmental auditing. For IEE, the concerned Ministry, which is the Ministry of Physical Planning and Works in case of the road projects, is authorized to approve the Final IEE report. The EPR also lists the types of development activities requiring IEE or EIA level Study. It also gives an outline of content of the terms of reference document, IEE and EIA report.

Local Self-Governance Act, 2055 BS (1998 AD)

The Local Self-Governance Act, 1999 empowers the local bodies for the conservation of soil, forest, and other natural resources and implementation of environmental conservation activities. The Village Development Committees (VDCs), Municipalities and District Development Committees (DDCs) are mandated to take up the responsibilities for the formulation and implementation of a programme relating to the protection of the environment and biodiversity, and to give adequate priority for the protection of the environment during the formulation of local level plans and programme.

Soil and Watershed Conservation Act, 2039 BS (1982 AD)

Soil and Watershed Conservation Act makes provision to control floods landslides. The watershed conservation office is authority and district watershed conservation committee must implement watershed conservation practices and public participation for soil and land protection.

Plant Protection Act, 2029 BS (1972 AD)

The Act prohibits/regulates the entry of plants or plant products from any country. For the propose of the Act, "plant" has been defined as all living or dead plant or part thereof and it includes stem, branch, corm, bulb, tuber, bark, root, leaf, nursery stock, vegetative propagated materials, fruit, vegetable and seed. Section 3 of the Act authorizes the government to conserve plants with respect to the importation of plants and plant products into Nepal.

Land Acquisition Act, 2034BS (1977AD)

The Land Acquisition Act (1977, as amended 1993) guides the compulsory acquisition of land. GoN can acquire land at any place and in any quantity by giving compensation pursuant to the Act for the land acquired for any public purpose(s) or for operation of any development project initiated by GoN institutions

Labor Act, 2048 BS (1991AD)

The Labor Act, 1992 (first amendment 1998) deals with manual labor. Clause 46 under Section 7 deals particularly with Construction industry. The Act defines working time as eight hours a day and a weekend leave. A half an hour break should be given as snack and tea break before continuous work of maximum five hours. Attendance registry should be maintained properly. Clause 27 to 32 under Section 5 gives details for occupational health and safety requirement to be maintained for workers. Child labor (below 14 years) is prohibited, and between14 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.

Child Labour (Prohibition and Regulation) Act, 2057 BS (2000 AD)

The labour act 2000 says that child labor (below 14 years) is prohibited to be employed in any risky process or job.

CHAPTER 8: REVIEW OF ACTS/RULES, PLANS/POLICIES

Review of Acts/Rules, Plans/Policies, Guidelines, Standards and Conventions

8.1 Constitution

Interim Constitution of Nepal, 2063 BS (2007 AD) (with amendment)

The Interim Constitution of Nepal clearly set the provision on the right for every person to live in a clean environment. Article 35(5) also provisions that the State shall make necessary arrangements to maintain the natural environment. The State shall give priority to special protection of the environment, rare wildlife and prevent further damage due to physical development activities, by increasing awareness of the general public about environmental cleanliness.

8.2 Acts and Rules

Environment Protection Act, 2053 BS (1996 AD)

The Environment Protection Act, 1996 has stated several provisions to institutionalize the integration of environmental aspects in development sub-projects including road sector and empowers Ministry of Science, Technology and Environment (MoSTE) approve EIA report. Similarly, in case of IEE level study, line Ministry, which is Ministry of Physical Planning and Works is authorized to approve the Final IEE Report. The following are the highlights of the EPA, 1996;

The Act recognizes the interdependence between development and the environment and shows the concerns for minimizing the impacts of environmental degradation on people, animal, and plant species and their physical surroundings. The act obliges the proponent to undertake IEE and EIA of proposal, plans or sub-projects which may cause changes in existing environmental condition and authorizes Ministry of Environment to clear all EIA and line Ministry for IEE study.

Forest Act, 2050 BS (1993 AD)

The Forest Act, 1993 recognizes the importance of forests in maintaining a healthy environment. The Act requires decision makers to take account of all forest values, including environment services and biodiversity, not just production of timber and other commodities. The basis of Act is resource oriented rather than use oriented. The Forest Act, 1993, (with amendment) contains several provisions to ensure the development, conservation, management and sustainable use of forest resources, based on approved work plan. Section 23 of the Act empowers the government to declare any part of the national forest, which has 'special environmental, scientific or cultural importance', as a protected forest. Section 49 of the Act prohibits reclaiming lands, setting fires, grazing cattle, removing and damaging forest products, felling trees of plants, wildlife hunting and collecting boulders sand and soil from the National forest without the prior approval. However, the government may enforce Section 68 of the Forest Act to provide parts of any type of forest for the implementation of a national priority plan with the assurance that it does not adversely affect the environment significantly.

Forest Rules (1995 AD)

The Forest Rules 1995 (with amendment) further elaborate legal measures for the conservation of forests and wildlife. Based on forest legislation, thirteen plant species are included in the level protection list. Of them, GoN has banned the felling, transportation and export of Champ *(Michelia champaca)*, Khayer *(Acacia catechu)* and Sal *(Shorea robusta)*. The Rule also stipulates that the compensatory expenses for cutting and transporting the forest products in a forest area to be used by the proposed project shall be borne by the proponents of the project.