

**Initial Environmental Examination
of
Tila Bridge
*Surkhet- Jumla Road***



Submitted by:

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Submitted to:

**Ministry of Physical Infrastructure
and Transport**
Singha Durbar, Kathmandu

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कार्यकारी सारांश

१. प्रस्ताव

प्रस्तावित तिला पुल सुर्खेत-जुम्ला सडक खण्ड अन्तर्गत कालिकोट जिल्लाको भर्ता र मान्म गा.वि.स.को सिमाना हुँदै बग्ने तिला खोलामा पर्दछ । प्रस्तावित आयोजना क्षेत्र समुद्री सतहबाट ७९२ मी. माथी पर्दछ । यस आयोजनाले कालिकोट जिल्लालाई तराईका जिल्लाहरूसँग जोड्ने मात्र नभइ जुम्ला हुँदै सडक निर्माण प्रस्ताव गरिएको मुगु र डोल्पा लगायतका कर्णाली क्षेत्रका जिल्लाहरूलाई समेत जोड्ने काम गर्दछ । यस तिला खोला पुल निर्माणको प्रस्तावको नाम र ठेगाना निम्न अनुसार रहेको छ ।

भू-वातावरण तथा समाजिक शाखा,

सडक विभाग,

चाकुपाट, ललितपुर

फोन: ०१-५००५५२०

ईमेल: gesunit@dor.gov.np

त्यसै गरी आयोजना कार्यान्वयन गर्ने निकायको नाम र ठेगाना यस प्रकार रहेको छ:

सडक क्षेत्र विकास आयोजना,

बैदेशिक महाशाखा,

सडक विभाग,

सानो गौचरन, काठमाडौं

२. प्रस्तावको विवरण

प्रस्तावित तिला खोला पुलको कुल लम्बाई ५०.४९ मी.को हुनेछ भने यसको चौडाइ ११ मी. को हुनेछ । पक्की ढलान गरेर निर्माण गरिने उक्त पुलको दूया-बाँया थप २४४ मी. सडक सुधार गर्नु पर्ने देखिन्छ । भौगर्भिक रुपमा २९°०८'०.४६" उत्तर अक्षांश र ८१°३९'३९.८९" पूर्व देशान्तरमा अवस्थित उक्त आयोजना निर्माणका लागि कुल रु.७,१६६,५७८७.९४ लाग्ने अनुमान गरिएको छ ।

३. प्रस्तावको सान्दर्भिकता

वातावरण संरक्षण नियमावली, २०५४ को अनुसूची १ को नियम ३ अनुसार कुनै पनि मुख्य पुलहरू निर्माण गर्दा प्रारम्भिक वातावरणीय परिक्षण गर्नु पर्ने कानुनी प्रावधान रहेको छ । राष्ट्रिय पुल मापडण्ड २०६७ का अनुसार २५ मी. भन्दा बढी लामो स्पान भएका पुलहरू मुख्य पुल भित्र पर्दछन् । प्रस्तावित तिला खोला पुलको स्पान ४० मी. भएकाले उक्त पुल निर्माण गर्नु पूर्व त्यस पुलको प्रारम्भिक वातावरणीय परिक्षण तयार गरी भैतिक पूर्वाधार तथा यातायात मन्त्रालय मार्फत स्वीकृत गराउनु पर्ने कानुनी व्यावस्था रहेको छ ।

४. प्रारम्भिक वातावरणीय परिक्षणको उद्देश्य

यस प्रारम्भिक वातावरणीय परिक्षणको मुख्य उद्देश्य प्रस्तावित आयोजनाको कार्यान्वयनबाट आयोजना क्षेत्रको भौतिक, जैविक, सामाजिक, आर्थिक तथा साँस्कृतिक वातावरणमा पर्न सक्ने सकारात्मक तथा नकारात्मक प्रभावहरूको अध्ययन गरी सकारात्मक प्रभावहरूको बढोत्तरी तथा नकारात्मक प्रभावहरूलाई न्यूनीकरण गर्ने उपायहरू पहिल्याउनु हो ।

५. कार्यविधि

यो अध्ययन प्रतिवेदन वातावरण संरक्षण नियमावली २०५७ दोस्रो संसोधनको प्रावधान अनुसार तथा यसै प्रस्तावको कार्यसूची (Terms of Reference)मा उल्लेख गरिए अनुसार तयार पारिएको हो । यसका लागि सान्दर्भिक ग्रन्थहरूको पुनरावलोकन तथा आयोजना प्रभावित क्षेत्रको निर्धारण गर्ने कार्य गरियो । अध्ययन टोली द्वारा सामूहिक रूपमा २०७२ साल चैत महिनामा स्थलतः सर्वेक्षण गर्ने, आवश्यक सूचनाहरू संकलन गर्ने र स्थानीय समुदाय र सरोकारवालाहरू सँग समूहगत छलफल, परामर्श गर्ने कार्य गरियो । स्थलगत अध्ययन अर्थात् सरोकारवालाहरूको जानकारीको लागि राष्ट्रिय दैनिक राजधानिमा मिति २०७२ साल चैत २० गते सार्वजनिक सूचना प्रकाशित गरियो ।

६. विद्यमान वातावरणीय अवस्था

प्रस्तावित आयोजना निर्माण स्थल मध्यपश्चिमाञ्चल विकास क्षेत्रको पहाडी भेगमा पर्दछ । तिला खोला पुल निर्माण स्थल तिला र कर्णालीको दोभान भन्दा १.५ कि.मी. माथि तिला नदीमा पर्दछ । उक्त पुल निर्माण स्थल वरपर मुख्य गरी खोलाले बगाएर ल्याएको ढुङ्गा, माटो प्रशस्त मात्रामा पाइन्छ । खोलाको सतह र हाल विद्यमान सडक बिच करिब ४० मी. अन्तर भएको हुनाले त्यस क्षेत्रमा वढीको न्यून सम्भावना रहेको छ । यसै गरी प्रस्ताव कार्यान्वयन गरिने क्षेत्र वरपर हाल कुनै किसिमको प्राकृतिक प्रकोपको जोखिम समेत छैन । उप-उष्ण किसिमको जलवायु रहेको उक्त क्षेत्रमा सरदर १३२० मी.मी. वर्षा हुने गर्दछ । उक्त क्षेत्रमा भूकम्पको दृष्टिले मध्ययम किसिमको जोखिम रहेको पाइन्छ । वन-जंगलको बाहुल्यता रहेको आयोजना क्षेत्र वरपर आयोजनाले प्रभाव पार्ने ठाँउमा कुनै पनि सार्वजनिक संरचनाहरू छैनन् ।

रोहिनी, सिमल, धुसुरे, काउलो, साल, सिरिस, आदी लागयतका पहाडी वनस्पतीहरूको बाहुल्यता रहेको उक्त क्षेत्रमा पुल निर्माणका क्रममा कुनै पनि रुख कटन नपर्ने देखिन्छ । आयोजना क्षेत्र वस्ती नजिकै भएको हुनाले वन्य जन्तुहरूको वासस्थान आयोजना क्षेत्र भन्दा केही पर रहेको छ । स्थानिय वासिन्दाहरूसँग अर्न्तक्रिया गर्दा सङ्कलित जानकारी अनुसार आयोजना क्षेत्र वरपर स्याल, बाँदर, मृग, दुम्सी, चितुवा, आदी जस्ता वन्य जन्तुहरू पाइन्छ । चरहरूको सन्दर्भमा आयोजना क्षेत्र वरपर ढुकुर, हल्लेसा, कालिज, तित्रा, आदी प्रजातिका चराहरू पाइन्छ । तिला खोलामा पाइने माछाहरूमा चुच्चे असला, बुच्चे असला, गड्यौला, सिङ्गे, आदी पर्दछन् ।

जतिय हिसाबले क्षेत्री, ब्रमण, ठकुरी र दलित जातिको बासेवास रहेको उक्त क्षेत्रमा शिक्षा, स्वास्थ्यको राम्रो प्रवन्ध रहेको छ । यद्यपी तुलनात्मक रूपमा हर्ने हो भने पुरुषको तुलनामा महिलाहरू निकै कम साक्षर रहेको पाइन्छ । आयोजना क्षेत्रमा लघु विद्युत गृह भएता पनि हाल सञ्चालनमा नरहेकाले स्थानिय वासिन्दाहरू सौर्य उर्जामानै

निर्भर रहेका पाइन्छ । सडक सञ्जाल राम्रो भएका कारण केही घरधुरीहरूमा खाना पकाउन ग्यासको समेत प्रायोग हुने गर्दछ ।

आयोजना निर्माणबाट २ परिवारका २ वटा संरचनाहरूमा असर पर्न जाने देखिन्छ । आयोजना प्रभावित २ घरधुरी ठकुरी जाति रहेका छन् । शिक्षका दृष्टिले आयोजना प्रभावित परिवारका सदस्यहरूको अधिकतम शिक्षा प्राथमिक तह रहेको छ । आयोजना प्रभावित परिवारको मुख्य आयश्रोत व्यापार हो । आयोजना प्रभावित घरहरूमा शौचालय प्रयोगको अवस्था निकै कमजोर रहेको छ र हाल समेत खुल्ला ठाउँमा शौच गर्ने चलन विद्यमान छ । आयोजना क्षेत्र वरपर लैङ्गीक भेदभाव विद्यमान छ र विकासको पहुँचका हिसाबले महिलाहरू निकै पछि रहेका छन् ।

७. वातावरणीय प्रभावहरू

आयोजना कार्यान्वयन हुँदा आयोजना क्षेत्रको वातावरणमा सकारात्मक र नकारात्मक दुवै खाले प्रभावहरू हुने देखिन्छ । सकारात्मक प्रभावका कुरा गर्दा स्थानिय रोजगारीको सृजना, सिप प्रवाह तथा अभिवृद्धि, सहज तथा सुलभ यात्रा र कर्णाली विकासको सम्भावनाका ढोक खुल्नु सकारात्मक विषय हुन ।

नकारात्मक प्रभावहरूमा पुल निर्माण तथा सडक सुधारका क्रममा भित्ताहरू काट्दा बढ्न जाने पहिरो लगायतका प्रकोपहरूको जोखिम, खानी सञ्चालन गर्दा निम्तने वातावरणीय प्रभावहरू, आयोजनाका औजार तथा सावरी साधन सञ्चालन गर्दा हुने वायु तथा ध्वनी प्रदुष्ण, पुलको जग खन्दा तथा सडक सुधार गर्दा निस्कने ढुङ्गा माटोको व्यवस्थापन गर्ने चुनौती, कामदारका अस्थायी शिविरबाट निस्कने फोहोरहरूले सृजना गर्ने वातावरणीय प्रभावहरू, अवैध रुपमा हुने रुख विरुवा, माछा लगायतका जलचरमा पर्ने असर, जडिबुटी र वान्यजन्तुको चोरी शिकारी, घर जग्गा अधिग्रहण, सामाजिक कलह, दुर्घटनाका सम्भावनहरू, पेशागत स्वास्थ्य तथा सुरक्षाका सवालहरू, आदी पर्दछन् ।

८. वातावरणीय प्रभाव न्युनिकरण तथा वातावरणीय व्यावस्थापन योजना

वातावरणीय प्रभाव न्युनिकरण गर्नका लागि यस प्रतिवेदनमा विभिन्न उपयहरू पहिचान गरिएको छ । जसमा प्रकृतिक प्रकोपको सम्भावना न्युनिकरण गर्न इन्जिनियरिङ तथा जैविक प्रविधिको प्रयोग गर्ने, ढुङ्गा माटोको उचित व्यावस्थापन गर्ने, खानी सञ्चालन गर्दा वातावरणमा प्रतिकूल प्रभाव हुन नदिने, आयोजना प्रभावित परिवारलाई उचित क्षतिपुर्ती प्रदान गर्ने, पेशागत सुरक्षाका उपायहरू प्रयोगमा ल्याउने, धार्मिक तथा साँस्कृतिक संरचनाहरूको जर्गेना गर्ने, लगाएतका उपायहरू यस प्रतिवेदनमा उल्लेख गरिएको छ ।

यसै गरी यस प्रतिवेदनमा वृक्ष रोपणको समेत प्रावधान राखिएको छ । जसमा ६० वटा विभिन्न जातका स्थानिय विरुवाहरू रोप्न प्रस्ताव गरिएको छ । यसरी प्रस्ताव गरिएका विरुवाहरू मध्य ३० वटा आयोजनाको जग खन्दा तथा पहुँच मार्ग निर्माण गर्दा निस्कने माटो व्यवस्थापन गरिने स्थानमा र ३० वटा पहुँच मार्ग वरपर रोपिनेछन् । आयोजना सँग सम्बन्धित कामदारहरूले स्थानिय जैविक विविधतामा प्रतिकूल प्रभाव नपर्न भनेर प्रतिवेदनमा उनीहरूलाई रुख विरुवा काट्न, माछा मार्न र शिकार गर्न रोक लगाउने कुरा समेत उल्लेख भएको छ । सडक निर्माणका क्रममा हुन सक्ने दुर्घटना कम गर्न संकेतहरू राख्ने, रातको समयमा बत्तीहरू बाल्ने व्यवस्था मिलाउने लगायतका उपायहरू प्रतिवेदनमा समावेश गरिएको छ ।

यसरी प्रस्तवित तिला खोला पुल निर्माण गर्दा स्थानिय वातावरणमा पर्न सक्ने प्रतिकुल प्रभावहरु न्यूनीकरण गर्ने, सकारात्मक प्रभावहरुलाई बढोत्तरी गर्ने र प्रतिवेदनमा उल्लेख गरिएका गतिविधिहरु निरिक्षण गर्ने प्रावधान सहित वातावरण व्यवस्थापन योजना समेत प्रतिवेदनमा उल्लेख छ । वातावरण व्यवस्थापन योजना कार्यान्वयन गर्नका लागि रु. १९,२०,७५०.०० विनियोजन गरिएको छ ।

९.निष्कर्ष

प्रस्तवित तिला खोला पुललाई कर्णाली विकासको मुख्य द्वारको रुपमा त्यस क्षेत्रका वासिन्दाहरुले लिएका छन् । उक्त पुल निर्माण गर्दा वातावरणमा कम मात्र नकारात्मक प्रभावहरु पर्ने सो प्रभावहरुलाई प्रतिवेदनमा उल्लेख गरिएको उपायहरु अवलम्बन गरेमा सजिलै समाधान गर्न सकिने हुनाले यस पुल निर्माण प्रस्ताव यथाशिघ्र अधि बढाउन सुझाव सहितको निष्कर्ष निकालिएको छ । साथै आयोजना कार्यान्वयन गर्नका लागि प्रारम्भिक वातावरणीय परिक्षणनै पर्याप्त छ ।

Executive Summary

1. The proposal

The Tila Bridge is proposed over the Tila River which is located along the Surkhet-Jumla Road at the boundary of Manma and Bharta VDC of Kalikot district. The proposed location for the construction of Tila River Bridge is 792 m above the mean seal level. The proposed bridge not only connects two VDCs of Kalikot district, but also links the people of Jumla and Mugu through road network. The details of the proponent of the proposed project are as follows:

Geo-Environment and Social Social Unit,

Department of Roads,

Chakupat, Lalitpur

Phone: 01-5005520

Email: gesunit@dor.gov.np

Similarly, the name and address of the implementing agency is;

Road Sector Development Project,

Foreign Cooperation Branch,

Department of Roads,

Sanogaucharan, Kathmandu

2. Details of the Proposal

The length of the proposed Tila Khola Bridge is 50.49 m while its breadth is 11m. The construction of permanent concrete bridge over the Tila River requires construction of 244 m approach road (including both side), which is more upgrading of existing road. The geographical location of the proposed bridge is 29° 8'0.46"N and 81°35 '39.89"E. The total cost for the construction of the proposed project is NRs. 71,665,787.94.

3. Relevancy of the proposal

As per the mandate on the EPR, 1997, Initial Environmental Examination (IEE) is compulsory prior to the construction of Major Bridge. The Bridge Standard, 2010 defines the bridge with span greater than 25m as the major bridge. Since, the Tila Khola Bridge has span greater than 25 m, an IEE report has to

be prepared for it, which has to be approved by Ministry of Physical Infrastructure and Transport (MoPIT).

4. Objectives of IEE

The main objective of IEE is to identify beneficial and adverse impact upon the implementation of the proposed proposal and recommend the measures for the enhancement of beneficial impacts and mitigation measures for the adverse impacts.

5. Methods adopted for IEE study

The IEE report has been prepared based on the mandate of EPR. For this Terms of Reference had been prepared and approved by the MoPIT. Then after literature review, field visit (on April 2016) to collect environmental baseline and publication of public notice was done. Based on the primary and secondary information, impact analysis was carried out, and suitable mitigation measures for each of the significant measures are proposed and finally Environment Management Plan was prepared and the report was finalized.

6. Existing Environmental Condition

The proposed location for the implementation of Tila Khola Bridge lies in the Hilly region of Mid-Western Development Region. The proposed location is about 1.5 km upstream from the confluence of Karnali and Tila River. Mostly alluvial deposits are available around the proposed bridge location. The existing road and settlement is about 40 m above the river channel and thus the chance of flooding is very low in case of Tila River. The hills on either side of the Tila River are relatively stable and the probability of natural disasters is low. The total precipitation around that area is 1320mm. From the earthquake perspective the area is less vulnerable. Forest and shrubs dominates the land use of the area and no public structures lies near the bridge axis.

Rohini, Simal, Dhusure, Kaulo, Sal, Siris, etc. are the dominant vegetation observed in the forest near the proposed location. The location for the construction of the bridge is not the habitat of the wildlife. Interactions with the local people suggest that Jackal, Langur, Monkey, Deer, Dumsi, Leopard, etc. are the wildlife observed around the forest of project affected VDCs. Similarly, birds like Spotted Dove, Halesa, Kalij, Tetra, etc. are common in that area. Asla, Gadela, Singhe are the common fish species observed in the Tila River.

Chhetri, Brahmin, Thakur and Dalit are the ethnic group residing around the project area. The status of education and health facilities is satisfactory around the project area; however, the educational status of people is poor. The project area lacks the electricity supply as the only micro-hydro operating in that

area is damaged and the local people has to rely on solar lamp to light their dwellings. The use of LPG in the project area is very less. People still rely on fire wood for cooking purposes.

The construction of the proposed bridge will affect two structures belonging to two owners. Both the projects affected households belongs to Thakur ethnic groups. The highest education received the members of project affected families is primary Level. Business is the main occupation of the members of project affected families. The status of toilet use is very poor around the project affected area and open defecation is still prevalent. Gender discrimination is very high and women in the project affected areas do not have developmental access.

7. Environmental Impacts

There are both positive and negative impacts due to the implementation of the proposed project. Positive impacts include employment to the local people, skill enhancement, improved mobility and the initiation of new avenue for the overall development of Karnali region.

Adverse environmental impact include the risk of disasters due to excavation of hill slope for the construction of the approach road, environmental issues associated with quarry site and spoil disposal site, air and noise pollution associated with the operation of machineries and vehicles, environmental issues associated with spoil management, environmental impacts of solid and liquid waste from labor camp, illegal hunting, fishing and trade of wildlife and medicine, social issues associated with land acquisition, possibility of accidents, issues associated with occupational health and safety, etc.

8. Environmental Impact Mitigation and Environmental Management Plan

Suitable measures for the prevention of environmental impacts are recommended in the document. This includes the use of engineering and biological technique for the mitigation of landslide and associated disasters linked with slope excavation, quarry operation, and spoil management. Similarly, there is a separate provision for compensation, resettlement and rehabilitation for the project affected families, occupational health and safety instruments, improvement and conservation of religious and cultural sites, etc. in the IEE report.

Furthermore, the document also has the provision for tree plantation. Altogether 60 saplings of local trees have been proposed for the plantation. Out of the 60 saplings 30 will be planted to reclaim spoil disposal sites, 30 along the approach road. To avoid the extraction of fuel wood from the nearest forest, fishing, and hunting of wildlife, this report recommends the formulation of strict code of conduct. In order to avoid accidental risks around the construction site, this report recommends the installation of sign boards and lighting system.

In this way the report includes all possible measures for the enhancement of positive impacts and mitigation of adverse impacts. There is a separate chapter called Environment Management Plan which guides for the implementation of mitigation measures and monitoring provision for those mitigation measures. For the successful implementation of Environmental Management Plan NRs. 19,20,750.00 has been allocated.

9. Conclusion

The project has very minimal environmental impacts that can be mitigated through the mitigation measures proposed in this document and the construction of the Tila Khola Bridge will open all the possibility for the overall development of Karnali Region. Thus, it has been concluded that the project should undergo construction as soon as possible with the implementation of all the mitigation measures and Initial Environmental Examination is sufficient for the construction of the proposed bridge.

Acronyms and Abbreviations

amsl:	above mean sea level
AP:	Affected Person
CBO:	Community Based organization
CBS:	Central Bureau of Statistics
CDO:	Chief District Officer
CITES:	Convention on International Trade in Endangered Species of Wild Flora and Fauna
DDC:	District Development Committee
DFO:	District Forest Office
DHM:	Department of Hydrology and Meteorology
DHQ:	District Headquarters
DoR:	Department of Roads
EIA:	Environment Impact Analysis
EMAP:	Environment Monitoring Action Plan
EMP:	Environment Management Plan
EN:	Endangered
EPA:	Environment Protection Act
EPR:	Environment Protection Rules
ERMC:	Environment and Resource Management Consultant
ESMF:	Environmental and Social Management Framework
F:	Foliation
FAR:	Financial Administration Regulation
GESU:	Geo-Environmental and Social Unit
GIS:	Geographic Information System
GoN:	Government of Nepal
HH:	Household

HS:	Hill Slope
IEE:	Initial Environmental Examination
INGO:	International Non-Governmental Organization
IRC:	Indian Road Congress
IRDST:	Income Restoration and Skill Development Training
IUCN:	International Union for Conservation of Nature
J:	Joint
KII:	Key Informant Interview
LC:	Least Concern
LCF:	Local Consultative Forum
LCLA:	Local Community Liaison Assistant
LPG:	Liquid Petroleum Gas
MoPE:	Ministry of Population and Environment
MoPIT:	Ministry of Physical Infrastructure and Transportation
NEPAP:	Nepal Environmental Policy and Action Plan
NGO:	Non-Governmental Organization
N-M:	Narayanghat- Muglin
NT:	Near Threatened
PAH:	Polycyclic Aromatic Hydrocarbons
PAP:	Project Affected Person
PSC:	Pre-Stressed Concrete
PWD:	Public Works Directive
RAP:	Resettlement Action Plan
RCC:	Reinforce Cement Concrete
RSDP:	Road Sector Development Project
SLC:	School Leaving Certificate
SPSS:	Statistical Package for the Social Sciences

SRN:	Strategic Road Network
TMT:	Thermo Mechanically Treated
ToR:	Terms of Reference
VDC:	Village Development Committee
VOC:	Volatile Organic Compounds

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CHAPTER 1: NAME AND ADDRESS OF THE PROPONENT

1.1 Name and Address of the Institution Preparing the Report

The name and address of the institution preparing the Initial Environmental Examination (IEE) Report of Tila Bridge (Surkhet- Jumla Road) is as follows:

Geo-Environmental and Social Unit (GESU)
Department of Roads (DoR),
Ministry of Physical Planning and Transport (MoPIT),
Chakupat, Lalitpur
Phone No.: 01-5005521
Email: gesunit@dor.gov.np

The name and address of the implementing agency for the proposed project is:

Road Sector Development Project (RSDP),
Foreign Cooperation Branch,
Department of Roads (DoR),
Sanogaucharan, Kathmandu

1.2 Consultant

On behalf of RSDP, Kunhwa Engineering and Consultancy Co. Ltd., Korea in association in form of sub consultancy with Environment and Resource Management Consultant (ERMC) Pvt. Ltd. has prepared the Feasibility Report and Detail Design for construction of new bridges and maintenance of existing bridges (Contract No. RSDP/Cons/Bridge/01). Likewise, the consultant has prepared the Terms of Reference (ToR) for IEE as per task A 402 and the IEE Report of this Tila Khola Bridge. The name and address of the consultants preparing the IEE report is as follows:

Kunhwa Engineering and Consultancy Co. Ltd.
Korea
and
Environment & Resource Management Consultant (ERMC) Pvt. Ltd.
Mid-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

CHAPTER 2: GENERAL INTRODUCTION OF THE PROPOSAL

2.1 Background

Road Sector Development Project (RSDP), Foreign Cooperation Branch, Department of Roads (DoR) under the Ministry of Physical Infrastructure and Transport (MoPIT), Government of Nepal (GoN), has initiated upgrading of the existing roads to all season bituminous seal pavements to increase accessibility and connect all district headquarters. The main objective of RSDP is upgrading of about 700 Km of existing dry season roads to the seal pavement connecting in 8-districts headquarters namely, Darchula, Baitaidi, Dailekh, Kalikot, Bajhang, Jumla, Musikot and Jajarkot including improvement of existing intermediate lane to double land carriageway of Narayanghat-Mugling (N-M) road. In order to maximize the benefit from all season sealed roads in above 8-districts and from the proposed improvement to double land carriage way government intends to undertake design services for construction of new bridges including river training works and approach roads, maintenance of the existing bridges and traffic safety elements on all the bridges.

The scope of the consulting services is feasibility and detail design of the new bridges in Narayanghat--Mugling road and roads under Road Sector Development Project (RSDP) and Inspection and Design of Maintenance/Repair works of all existing bridges in RSDP roads including Narayanghat-Mugling road. Chhinchu-Jajarkot Road, Shitalpati-Musikot Roads, Nepalgunj-Surkhet-Jumla Road, Tallodhungeswor-Dailekh Road, Kalangagad (Bagthala)-Chainpur Road, Satbanjh-Gokuleswor-Darchula Road and Narayanghat-Mugling-Aanbukhaireni Road. For this, RSDP have engaged consultants to provide engineering expert service in Feasibility Study, Conceptual Design with alternatives and Detail Design for suitable alternative for construction of new bridges and Detail Design for suitable maintenance intervention of existing bridges, Environmental Management Action Plan and Resettlement Action Plan.

Tila Khola Bridge is proposed for new construction over the Tila River which is a perennial river. Tila River originates from Jumla makes confluence with Karnali River at 1.5 km downstream from the proposed Tila Khola Bridge at Kalikot District. The Surkhet-Jumla Highway crosses the Tila Khola at the chainage (141+360) which separates the Bharta and Manma VDC of Kalikot District. The estimated length of span of the proposed bridge is 1*50 m and the breadth is 11 m. The proposed bridge falls under the category of major bridge and in accordance to the legal provision of Government of Nepal, an Initial Environmental Examination (IEE) report has to be prepared and approved from Ministry of Physical Infrastructure and Transport (MoPIT). In this regard, IEE study has been conducted and IEE report has been prepared.

2.2 Objectives of IEE

The objectives of IEE are as follows:

- To document baseline on bio-physical, socio-economic and cultural environment of the project area.
- Identify the major issues that may arise as a result of proposed works and their severity on bio-physical, socio-economic and cultural environment of the project area.
- Identify easily implementable offsetting measures for the negative environmental and social issues and suggest remedial plans in case of residual impacts if any identified.
- Recommend practical and site specific environmental mitigation and enhancement measures, prepare and implement Environmental Monitoring Action Plan (EMAP) for the project.
- Inform decision makers about the outcome of implementation of the proposal.

2.3 Rationality of IEE

As per Environment Protection Rules (EPR) 1997, construction of a major bridge requires an IEE and its subsequent approval from its concerned ministry (Clause-4 of Road Sector, Schedule-1 Pertaining to Rule-3 of EPR). National Bridge Standard 2010 classifies a bridge as a major bridge when its span is more than 25 m long or the total length of the bridge is more than 50 m. The span of the proposed bridge is about 50m and hence, the proposed construction work requires IEE. Therefore, this IEE Report is prepared in accordance with the Rule-5 and Schedule-3 of EPR'97.

2.4 Relevancy of the Proposal

Surkhet-Jumla Road is the lifeline of common people for transportation of people and goods in Karnali region of the country. The road has also provided accessibility to people for various facilities and services including education, health, business etc. Currently a Bailey bridge is in operation in Tila Khola, which acts as an entry point to the headquarters of Kalikot and Jumla district. Government has been investing a huge amount to upgrade the Surkhet-Jumla Road into all season's road. In this regard, it is necessary to dismantle the short term Bailey bridge and construct a long term all Season Bridge. Therefore, a PSC Girder has been proposed over Tila Khola in order to transform the existing road into all season's road. The design of the Tila Khola Bridge has been made with seismic analysis. Hence, the bridge is earthquake resistant.

CHAPTER 3: PROJECT DESCRIPTION

3.1 Project Area

The proposed bridge is located across Tila River which separates Manma and Bharta VDCs of Kalikot district, located at Karnali zone of Mid-Western Development Region of the country. Geographically, the proposed bridge is located at an elevation of 792 masl with latitude of 29° 8'0.46"N and longitude of 81°35 '39.89"E.

There is no any settlement inside the direct impact area of the project. The land use of the project is characterized by the presence of forest and shrub land (40%), water body and river channel (18%), barren land and hill slopes (14%) and remaining agricultural lands. Among different first order streams, a seasonal stream is present upstream of the impact zone (within 200m of the project) of high gradient which is responsible for debris and flash flood near the bridge. The location map, topographical map and Google map are shown below:

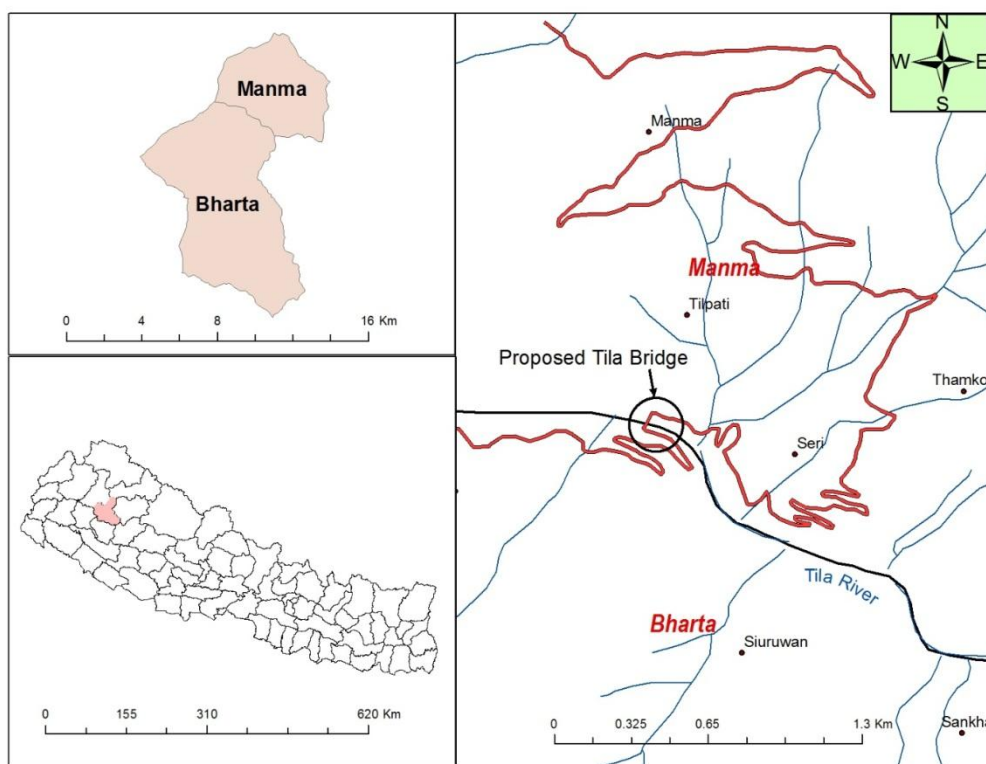


Figure 3.1: Location map of the proposed project.

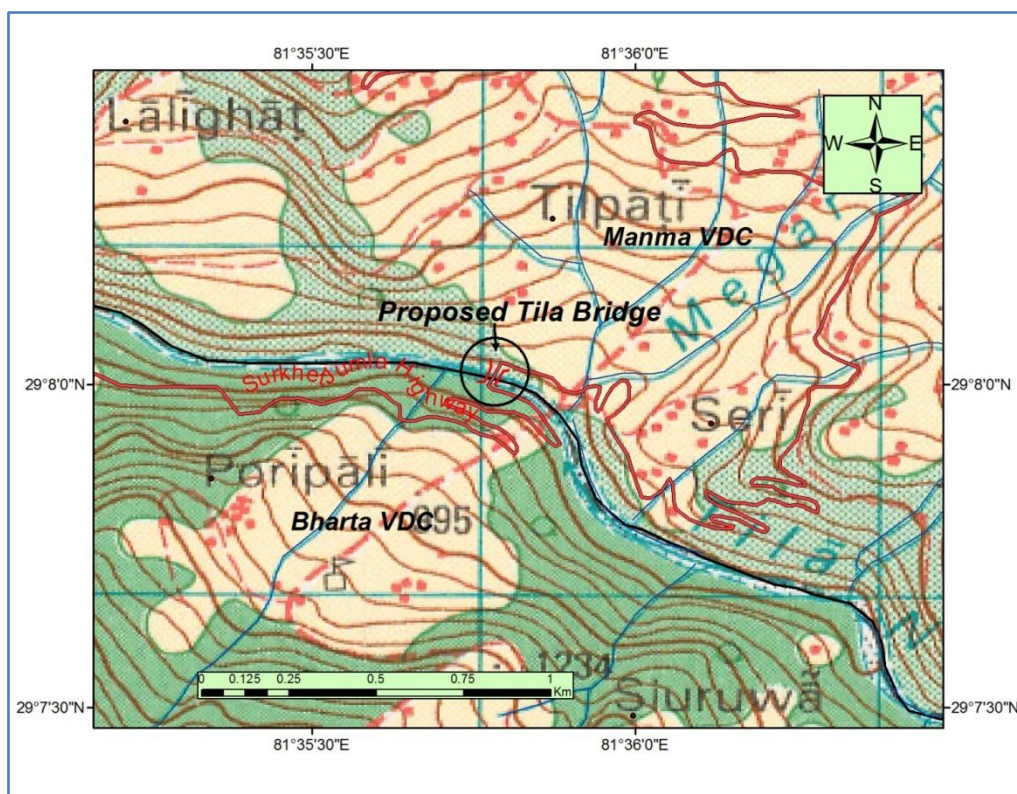


Figure 3.2: Topographical map of the proposed project.



Figure 3.3: Google location of the project area.

3.2 Salient Features

The salient feature of the proposed bridge is presented in the table below:

Table 3.1: Salient features of the project.

Name of the Project	Tila Bridge
Location	
Development Region	Mid-Western Development Region
Zone	Karnali
District	Kalikot
VDCs	Manma and Bharta
Name of the Road	Surkhet-Jumla Road
Chainage of the Bridge site	141+360
Geographical Location	Latitude 29° 8'0.46"N Longitude 81°35 '39.89"E.
Classification of Road	Highway
Type of Road Surface	Bituminious
Terrain / Geology	Hilly
Structure	
Total length of the Bridge	50.49 m
No of span	1
Total width of the bridge	11.0 m
Width of Carriage way	7.50 m
Width of Footpath with railing	1.5 m
Krebs	0.35 m
Type of Structure	Simply Supported
Type of Superstructure	Steel Truss

Type of Bearing	Steel Bearing
Type of Abutment	RCC (Gravity Type)
Type of Foundation	Open Foundation
Approach Road	
Left Side	130 m
Right Side	114 m
Design Data	
Live Load	IRC Class 'A', IRC class 70R
Net bearing capacity of soil	500 KN/m ²
Design Discharge	3348 m ³ /s
Scour Depth	3.23 m from minimum river bed level
Highest Flood Level	774.96 m
Lowest Bed Level	763.55 m
Concrete Grade	M45 – Superstructure, M25 Substructure and Foundation
Reinforcement Bars	Fe 500 (TMT Steel)
Approach Slab	RCC (3.5 m)
Total Project Cost	Rs. 71665787.94

3.3 Detail of project requirements

3.3.1 Land Requirement

The construction of Tila Khola Bridge and its approach road requires the total of 0.28 ha of land permanently belonging to barren land and hill slope. Similarly, another 0.2 ha of land is required temporarily to set the contractors and workers camp, stockpiling of construction materials, storing fuels and construction yard which will be set up on RoW.

Table 3.2: Land Requirement

SN	Project Component	Land use	Land Requirement	Area (ha)
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1	Bridge	Barren Land	Permanent	0.1
2	Approach Road	Hill Slope	Permanent	0.18
3	Labor Camp	RoW	Temporary	0.16
4	Stockpiling Site	RoW	temporary	0.04

3.3.2 Quantity of Construction Materials Required

The quantity of construction materials required for the construction of Tila River Bridge are listed in following table:

Table 3.3: Quantity of construction materials required

Item Description	Unit	Quantity	Remarks
Steel Structure (Without Railing and Anchorage Parts)	kg	115251	
Steel Bars (For Deck Slab, Approach slab)	kg	85102	
Concrete (For Deck Slab, Approach slab)	M ³	975.5	
Cement	Bags	72400	
Sand	M ³	400	
Aggregate	M ³	1040	
Stones/boulders	M ³	150	
Cable wire	km	7	
Gabion wire	M ²	282 m ²	

Project will acquire cement, steel bars, cable wire, gabion wire from the nearest market, preferably Surkhet and Nepalgunj. Sand, gravel and aggregates will be acquired from the quarry sites identified in this report.

3.3.3 Source of Construction Materials

The construction materials sands can be available along the riverbed from the Karnali River within 5 km distance. Boulders and cobble pebbles can be found as construction materials from the riverbed of the Karnali River.

Reliable source is Karnali River and some quarry site along Surkhet-Jumla Road within 5 km distance from bridge site area. Some materials can be taken from Tila River riverbed about 1 km from the site. Quarry site along the road can be used as material sources. Those materials are deposited during road cut.

The materials from the riverbed are required to be tested. During the construction the following test should be done.

For Aggregate: a. Los Angeles Abrasion Value b. Aggregate Crushing Value c. Alkali Reactivity Test d. Gradation e. Unit weight f. Sodium Sulphate Soundness Test g. Specific gravity and absorption Test h. Unconfined Compression test.

For sands: a. Grain size b. Compaction test c. Natural Moisture Content Test d. Specific gravity g. Atterberg limit test h. Organic content test.

Table 3.4: Quarry site as proposed by the project geological team.

Location	Distance	Slope stability	Source	Quantity m ³	Materials	Remarks
Karnali River	Within 5 km distance from confluence of Dahi Khola and Karnali River	Stable after extraction of materials due to wide flood plain	Sand and gravel from riverbed Quartzite and gneiss 60%, Phyllite 10%	500x10x3	Quartzite, gneiss, granite	Boulder 30%, cobble and pebble 50% and Sands 20%
Tila River	Along the road within 5 km distance	Riverbed	Gneiss from road alignment	200x20x5	Quartzite	Slope stability shall be good after excavation of the materials. Colluvium of the road side has disturbed during monsoon
Tila River	Within 1 km upstream	Riverbed	Gneiss 100%	little	Boulder and cobble from river bed	Stable

Source: Project Detail Report

3.3.4 Source of Energy during Construction

The project area is not connected with grid electricity supply and should completely rely on alternative sources. Electricity requirement during construction phase shall be maintained by operating generators while the labor camp shall be lighted with solar lamp. The generator will be high efficient emitting low operational sound and low air pollutants. Furthermore, the project will buy fuel wood from the licensed source for bitumen heating. The site for bitumen heating will be at least 200m away from the settlement and bitumen heating will be done as per the project need.

3.3.5 Labor Camp and Material Stockpiling Site

There is lack of open space along the bridge construction site and the proposed bridge is located between the steep hills. Hence, the RoW of the approach road will be used to set up the construction camp and material stockpiling site.

3.3.6 Spoil Management Site

A total of about 21,620m³ of earthen materials shall be excavated for the construction and maintenance of approach road and the construction of foundation. Similarly, about 15,000m³ of materials shall be used for back filling and gabion works, while rest of the materials shall be safely disposed in the recommended spoil disposal site. The disposal of spoil has been recommended at 150 m upstream on the right bank of the Tila River. This land is basically flood plain and the spoil disposal will serve as river training at the location.

3.3.7 Approach Road and Diversion

The project requires 244 m of approach road along the construction of the Tila Khola Bridge. Largely the construction of approach road will involve the upgrading of the existing width of the Surkhet- Jumla Road section. While upgrading the approach road, two houses belonging to private owners have to be acquired. The detail of the private properties to be acquired is included in Chapter 7.

3.3.8 Construction activities and scheduling

- **Construction technology**

The construction of proposed bridge will be conventional mechanized methods with partially labour based.

- **Construction Activities**

Activities during construction includes civil works and river training works including excavation, use of heavy machinery and equipment, drilling, quarrying, burrowing, use of construction vehicles. The equipment like Truck, Grader, Pump, Vibrator roller, Roller, Water Bowser, Loader, Boiler, Sprayer, Air compressor, Hand sprayer, Aggregate spreader, Pneumatic Tyre, Mixer, Vibrator/Compactor, Generator, Bitumen distributor, Chip spreader, Tractor and 10-15 ton Crane will be used during construction period.

- **Construction scheduling**

The project is planned to be constructed within 18 months after the contract award. The construction works will be halted during monsoon season (June to August).

- **Human Resource Requirements**

The construction of the proposed bridge requires an estimated, 18900 man-days of unskilled workforce, and 8100 man-days of skilled and semi-skilled workforce. The project will prioritize the local people in proposed bridge construction works.

3.3.9 Resources required during operation

The activities during project operation will be only regular monitoring of the bridge and regular and routine maintenance. While conducting regular maintenance no additional resources are required. However, in case of major maintenance resources required will be based on the activities to be conducted. During maintenance environmental safeguard measures have to be conducted.

3.3.10 Institution Involved in Project Implementation

The RSDP within Nepal's Department of Roads (DOR) under the Ministry of Physical Infrastructure and Transport (MoPIT) is the implementing agency for the proposed sub-project. DoR's Foreign Cooperation Branch (FCB) will be responsible for conducting all the implementing arrangement for the proposed sub-project. DOR's bridge branch will be responsible overseeing the technical design standards, norms, and safeguards applied to the project. The proposed sub-project will be implemented with IDA support using RSDP funding.

All safeguards related aspects of the project will be identical to the on-going RSDP project. The environmental and social aspects of bridges under the Bridge Project Unit are handled by the centralized Geo-environmental and Social Unit (GESU) of the DOR. The Bridge Project Unit coordinates with the GESU for environmental screening of the projects and outsourcing of the consultants for environmental assessment. GESU is the primary agency of the DOR for the environmental and social review of their projects including bridge projects and is the frontline agency to

review EA assessments and forward the EA documents for approval to the Ministry of Physical Infrastructure and Transport (MoPIT). Responsibility for implementing the Environmental Management Plan of Tila Khola Bridge involves a number of concerned agencies inclusively. The implementing agency for environmental safeguard of the proposed sub-project includes;

- Foreign Cooperation Branch, DoR
- Geo-environmental and Social Unit (GESU)
- Project in Charge
- World Bank
- Supervising Consultant-Environmental Safeguard Consultant
- Contractor

These stakeholders have their own roles and responsibilities for the activities associated including the design and implementation of mitigation measures during pre-construction, during construction and post construction works.

3.3.11 Maintenance approach

In the case of maintenance, persons assigned to Surkhet- Jumla Road will handle routine maintenance tasks such as clearing debris, and undertaking repairs that can be handled with basic hand tools. For more extensive maintenance requirements, DOR divisional offices will prepare status report of the bridges to undergo maintenance and the maintenance works will undergo through funding from the Roads Board Nepal, the national budget or funding from international donor agencies.

3.3.12 Possible emission and waste generation during construction

Different type of wastes and pollutants are assumed to be produced during the construction phase of the project. Different natures of wastes produced during the construction phase are;

Solid Wastes: Solid wastes are produced mainly during the excavation, surplus materials used during construction and camp operation. These wastes will be managed in an environment friendly manner in designated site and will be managed immediately. Steel and other metal wastes will be assembled at designated site. The solid wastes or spoils from the construction work are expected to be minimal; however, they will be managed promptly after the generation of the solid waste.

Liquid and Semi-Liquid Wastes: Excavation works, slurry and, oil and grease used during the construction phase can cause water pollution. Project will conduct the activities to safely manage the liquid and semi-liquid wastes.

Air Pollution: During the excavation process, dust and soil particles can enter the atmosphere causing air pollution likewise, fuel combustion from vehicles and equipment can also degrade the air quality. Gaseous Pollutants like NO_x, SO_x, CO₂, CO and PM etc., will be produced while operation of dozers, transporting vehicles and diesel generators. Likewise, dusts are assumed to be produced during transporting of cements and sands.

Noise Pollution: Operation of diesel generators, excavators, dozers and other construction activities may increase the noise level.

CHAPTER 4: PROCEDURES ADOPTED WHILE PREPARING THE REPORT

The methodology and procedures adopted during the preparation of IEE report is discussed below:

4.1 Desk Study and Literature Review

Various information and useful data from reliable sources related with the project's IEE study were collected and reviewed. Such sources of information included existing laws, rules, guidelines and manuals, IEE reports of similar projects, Environment and Social Management framework published by DoR, GESU. Detailed Engineering Survey and Design Report of the Tila Khola Bridge Project were reviewed to determine the nature and scope of activities of the project. Similarly, pertinent sources of secondary information were identified, collected and reviewed to build acquaintance with the environmental settings of the project area under physical, biological, socio-economic, and cultural domains of the environment. These sources included publications of DDC Kalikot, Village Development Committee, CBS, NGOs, INGOs, CBOs and other governmental and non-governmental organizations and various research papers. Data on rainfall and other meteorological conditions were also acquired from DHM.

Map Reading: Map reading is one of the vital procedures as it built the preliminary acquaintance with the general environmental setting of the project area by reading the maps of different types like topographical maps, geological maps and Google maps. Similarly, geographical boundary of the impact area was defined and delineated on the topographical map.

Checklists and Questionnaire: Based on the desk study, project specific checklists were prepared for focus group discussion, key informant survey and data collection on physical, biological, social, economic and cultural baseline data of the project area. Similarly, structured questionnaire were prepared to aid collection of socio-economic data and other relevant information.

4.2 Field Survey

Field survey was carried out by the team of multidisciplinary experts (IEE study team) to collect the baseline information on physical, biological, and socioeconomic and cultural environment. Likewise, the data related to land stability, site specific observation of air and noise quality and physiographic condition of the project area was collected through field survey. Laboratory analysis of the water collected was also carried out. Similarly, the data on biological environment was collected through the sampling technique. Household's survey using questionnaire and checklists was done to gather the information on socio-economic and cultural environment of the project impact areas. Moreover,

interactions and consulting meetings with the people of project impact area was also conducted during the field visits.

4.3 Impact Area Delineation

The project the impact areas were identified during the preparation of ToR. Such areas were delineated based on the field conditions and nature of project development using the similar past experiences of the experts involved in the IEE process. Based on the environmental impacts of the project, the project-affected areas are classified as the following Table 4.1.

Table 4.1: Impact Area Delineation of the Project

Direct Impact Zone	Project implementation site, the adjacent land plots, built up structures, houses and property within 500 m from the project site
Indirect Impact Zone	Beyond 500 m away within the adjoining wards of the project implementation site.
Zone of Influence	Influence area will encompass the proposed bridge location as well as off-site and/or ancillary works such as burrow pits, quarry sites, river diversion, approach road, camp site, material stockpiling yard and also includes direct and indirect impact area of the project and project implementation VDCs i.e., Bharta and Manma VDC (Kalikot district).

4.4 Collection of Environmental Baseline Data/ Information

The following table presents a synopsis for the baseline information to be collected and the methods that were adopted for the collection of such baseline information of the project area.

Table 4.2: Methods to collect the baseline data

Data Requirement	Methods/ Tools
<i>Physical Environment</i>	
Physiography, Topography, Land use type and land use classification,	Remote Sensing and GIS analysis on the topographical maps published from the Department of Survey, Google image.
Hydrology - drainage network and drainage density	Remote Sensing and GIS (QGIS Brighton 2.6.1) analysis on the topographical maps published from the Department of

Data Requirement	Methods/ Tools
	Survey, Google image.
Geology – rock types and rock classification, seismicity, stability	Field Investigation / Direct Observation, Analysis of geological map as published by Department of Mine and Geology.
Soil Type and soil condition	Field observation, soil analysis
Sound / Noise conditions	Field observation, available secondary information
Weather and Climate conditions – Temperature, precipitation, climatic and bio-climatic classifications	Secondary information from Department of Hydrology and Meteorology (DHM), other published literatures.
Type, volume and source of construction material requirement	Secondary information from design engineers, feasibility / detail design reports
Information on burrow sites / tipping sites / stockpiling sites, camp sites etc.	Direct field observation / Interaction with design engineers, local stakeholders.
Traffic conditions	Direct observation, information from the stakeholders, traffic data from feasibility report
Information on public utilities	Direct field observation/Interaction with local stakeholders
Chemical Environment	
Air Quality	Direct Field Observation and available secondary information
Water Quality	Visual inspection of water around project area
Biological Environment	
Vegetation analysis	Field enumeration / survey
Faunal Environment	Key Informant Interview (KII)
Aquatic Animals	Field Sampling of Macro-invertebrates/Macrophytes, Visual Observation/ Key informant Survey, past literatures for

Data Requirement	Methods/ Tools
	Fishes
<i>Socio-economic and Cultural Environment</i>	
Demographic, Economic, and social services and facilities	Secondary Information from CBS, District Development Committee (DDC), and Primary information of the projects direct impact area and indirect impact area were collected through structured questionnaire survey
Cultural sites and cultural activities, historical sites, foot trails etc.	Key informant survey, Direct observation of cultural and historical sites.

4.5 Data Analysis

The experts of the relevant field analyzed the primary and secondary information qualitatively and quantitatively. Physical, chemical, biological, socio-economic, and cultural information were assembled and tabulated. The information was crosschecked and analyzed by the respective experts. The data were processed using computer-based spreadsheet (Excel) and SPSS and were presented in tabular and pictorial forms.

4.6 Impact Identification/ Prediction and Evaluation

The environmental impacts as a result of interaction between project activities and baseline condition were identified in terms of beneficial and adverse impacts, type (direct/indirect/cumulative), and magnitude of severity, extent, duration and reversibility/irreversibility during project construction as well as in operation stage works. The methods adopted to identify the impacts were through checklist, matrix, network or overlaying methods by using GIS software application.

The environmental impacts were evaluated as per the National EIA Guidelines (1993), based on the magnitude, extent and duration of the impact. Similarly, experts' judgment and experience from similar projects were used for the quantification of the impacts. For the impact evaluation, the matrix method with numerical ranking was used for the quantitative ranking of the predicted impacts. The numerical scale mentioned in the National EIA Guidelines (1993) was adopted for this study. The numerical scale is presented in Table 4.3.

Table 4.3: Impact Evaluation Matrix

Magnitude	Extent	Duration
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High(H)	60	Regional (R)	60	Long term (LT)	20
Moderate (M)	20	Local (L)	20	Medium Term (MT)	10
Low (L)	10	Site Specific (SS)	10	Short Term (ST)	5

Significance of the identified and predicted impacts was evaluated using the numerical values as proposed in the National EIA Guideline 1993, use of regulated list of species, discussion among the study them members, consultation with experts, and consideration of national policies, laws and local customs. The combined score of magnitude, extent and duration below 40 was termed as insignificant impact; scores ranging between 40 and 79 was termed as significant impact, scores ranging between 80 and 99 was termed as very significant and the scores above 100 was termed as highly significant impact.

4.7 Public Involvement

The local people in project area, concerned government organizations, local NGOs, CBOs, etc.were consulted during IEE study. In accordance with the Rule (7.1) of Environment Protection Rules, 1997, a 15-day public notice was published in a national daily newspaper, Rajdhani on 16th March, 2016. Furthermore, the copies of public notice were pasted at public places of project area and their evidences (Muchulka) were collected.

The following organizations were consulted during the preparation of the draft IEE:

Central Level Agency: Ministry of Physical Infrastructure and Transport, Department of Roads (DoR), Road Sector Development Project (RSDP), Geo-environmental and Social unit (GESU).

Local Level Agency: Village Development Committee, Non-governmental Organizations, Community Based Organization, etc.

Recommendation Letters: The recommendation letters from project affected VDCs were collected for the environmental clearance and implementation of the project.

4.8 Time schedule for project completion

The time schedule for the project is shown in the figure below:

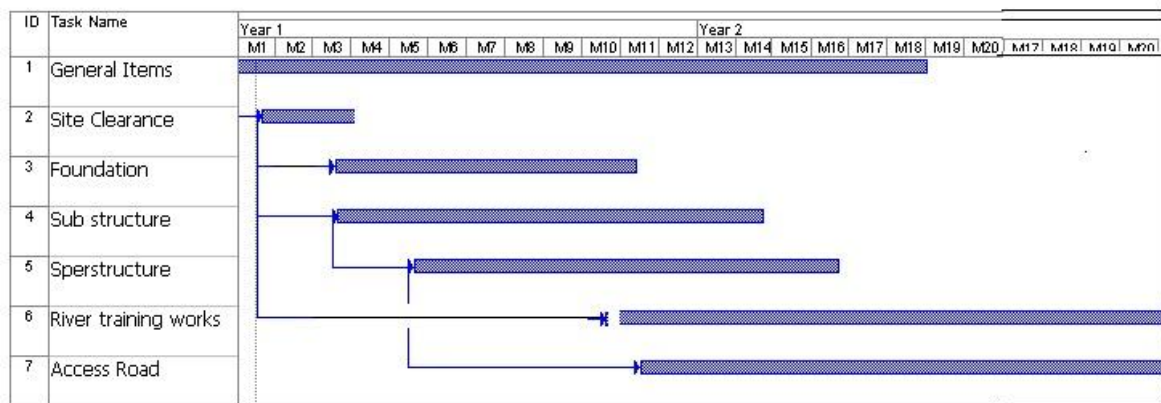


Figure 4.1: Time Schedule for the project completion.

CHAPTER 5: REVIEW OF RELEVANT ACTS, RULES, REGULATIONS AND GUIDELINES

Relevant legal measures including the constitution, acts and regulations, policies and plans, manuals and guidelines, standards and conventions were reviewed during the course of IEE study. Such relevant legal measures are listed in the following sub-sections.

5.1 Constitution of Nepal.

Article 30 of the Constitution of Nepal 2072 proclaims the rights regarding clean environment. Article 30 (1) states that each person shall have the right to live in a healthy and clean environment. Likewise 30(2) states that the victim of environmental pollution and degradation shall have the right to be compensated by the pollutant as provided for by law. Article 30 (3) ensures that any article of the constitution shall not be deemed to obstruct the making of required legal provisions to strike a balance between environment and development for the use of national development works. Acts and Regulations

5.2 Acts and Regulations

5.2.1 Environment Protection Act, 2053 BS (1997 AD)

Nepal has enacted Environment Protection Act (EPA), 1997 which is enforced through appropriate regulatory measures. Its preamble mentioned " whereas, it is expedient to make legal provisions in order to maintain clean and healthy environment by minimizing as far as possible, adverse impacts likely to be caused from environmental degradation on human beings, wildlife, plants, nature and physical objects; and to protect environment with proper use and management of natural resources, taking into consideration that sustainable development could be achieved from the inseparable interrelationship between the economic development and environment protection". Major highlights of the act are;

- Section 3: It requires the proponent to carryout IEE and EIA as prescribed.
- Section 4: No one is supposed to implement the proposal without approval from the concerned agency.
- Section 5: In order to implement any proposal, the proponent should submit the proposal along with its report on IEE or EIA to the concerned agency for approval.
- Section 6(1): The relevant agency is empowered to grant approval for the IEE report, only if it finds that no significant adverse effects will be caused to environment by the implementation of the proposal. The government agency is required to forward the EIA report submitted along with proposal to it, with its opinion on the report to the Ministry of Population and Environment (MoPE).

- Section 6(2): While preparing the IEE report of the proposal, if it is found necessary to carry out EIA of such a proposal, the concerned agency can issue an order to carry out EIA.

5.2.2 Environment Protection Rules, 2054 BS (1997 AD)

The EPR adopts the environmental assessment criteria mentioned in the National EIA Guidelines.

Major highlights of the Rule are;

- Rule 3: The proponent is required to carry out IEE as per Schedule 1.
- Rule 5: While preparing the IEE report, the proponent should prepare and submit the TOR and get approval from concerned body.
- Rule 6: In case, the approving agency of IEE report finds appropriate to carry out EIA, the proponent should fulfill all the formalities of the EIA process.
- Rule 7(1): The proponent should prepare IEE report in the format as indicated in schedule 5 of the EPR, 1997.
- Rule 7(2): In case of IEE report, the proponent should publish a public notice on the concerned VDC, municipality, DDC, schools, Health posts, and hospital through a National level daily newspaper seeking their opinions and suggestions in writing within 15 days and prepare a deed of public inquiry. The opinions and suggestions received should be included in the report.
- Rule 10: The proponent should submit 15 copies of the IEE/EIA report along with the recommendation of the concerned VDC or municipality to the concerned agency for approval.
- Rule 11: The concerned agency, after investigation should approve the IEE report within 21 days from the date of its receipt
- Rule 45-47: Anyone wishing to receive compensation may file the application to the Chief District Officer (CDO) and should forward the file to the concerned agency in case the evaluation of effects/loss. Once the loss is evaluated, the CDO should determine the amount of compensation within 60 days of receipt of application. The proponent should pay the compensation amount within 30 days of decision. In case the proponent (individual, institution or proponent) fails to pay within time limit, the victim may submit an application, and the CDO shall auction the property of the proponent and pay the amount of compensation as determined.

5.2.3 Solid Waste Management Act, 2068 BS (2011 AD)

This Act provisioned the duties, roles and responsibilities of local government to take action to control haphazard waste generation, disposal or collection and has provisions for various punitive measures against those engaged in activities detrimental to the intentions of the Act. The act considers offenses and is liable to punishment inter alia to discharge solid waste in ways other than the time and place prescribed by the local Body, to keep, throw, stack or discharge any kind of hazardous waste on the road or in any public place causing adverse effects to public health except in places prescribed by the Local Body. Section 4(2) mentioned that the responsibility for processing and management of hazardous waste, medical waste, chemical waste or industrial waste under the prescribed standards shall rest with the person or institution that has generated the solid waste. Section 5(2) mentioned that,

it is the duty of every person, institution or entity to reduce the quantum of the solid waste by making arrangements to dispose the disposable (biodegradable/Organic) solid waste within their own area or making arrangement for the reuse thereof and discharging the remaining solid waste thereafter. Chapter 9 section 38 assumes offences inter alia, if any person discharge solid waste in ways other than the time and place prescribed by the Local Body, to park any kind of transportation vehicle in the road or any public place during the time prescribed by the Local Body for carrying out cleaning or collection of solid waste or during the cleaning time, or to refuse to remove the vehicle from such place; to keep, throw, stack or discharge any kind of hazardous waste on the road or in any public place causing adverse effects to public health except in places prescribed by the Local Body.

5.2.4 Solid Waste Management Rules 2070 (2013 AD)

Rule 5 is relevant for the implementation of the proposed project which provisioned that no one shall discharge solid waste by mixing harmful, chemical, organic or inorganic waste with other waste. The arrangement for final discharge should only be made after processing of harmful, chemical, organic or inorganic waste into a general waste. Rule 7 provisioned that the collection, storage and transportation of harmful, chemical, organic or inorganic waste shall only be done by applying a safe mode.

5.2.5 Public Road Act, 2031 (1974)

Section 19 of the Act states that, permission of DoR is required to carry out activities within the limits of the road boundaries. Local governmental offices have to give notice to the DoR prior to the start of activities in the limits of the public roads (Section 29). The Act empowers DoR to acquire any land on a temporary basis (for storage facilities, construction camps, etc.) during road construction and upgrading. The temporary acquisition of land containing any buildings (e.g. houses, sheds, temples and schools) is avoided wherever possible. The Act also empowers DoR to “lift earth, stone or sand from any adjoining land” during construction and upgrading works. The Act does not provide for leasing of land. However, DoR is required to pay compensation for any damages caused to buildings, crops and trees, where the farming activity of the landowner is interrupted, and where the landowner has to incur expenses to restore the land after its return. Compensation is determined between DoR and the titleholder, or through mediation, involving officials from the relevant VDC and District. The GoN may prohibit, through notification in the *Nepal Rajapatra* (Government Gazette), the construction of any permanent structure (other than walls) within 6m of the road formation edge.

5.2.6 Labor Act 2048 BS (1992 AD)

The Act mandates the employer to give priority to the Nepalese citizen while employing personnel and workers in company. After a year of service, the company or employer has to employ the workers permanently with broadly defined position, roles and responsibilities and the pay scale. But employee under contract for short duration of time will not be entitled for permanent employment. The employer could terminate the employee with prior approval of the Department of Labour and prior notice to the employee as defined by the law. The labour act prohibits the employment of the child or under-aged person. The employer could not force the workers to work for long hours other than that defined by the law. The employer has the responsibility to ensure healthy environmental conditions of the workplace as defined by the law.

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

The Act empowers the VDCs, DDCs and Municipalities to conserve, manage and use their natural resources and collect tax, revenue from the sale and use of such resources and use it for local development. Section 25(e) of the Act requires the ward to help for protection of environment through plantation over the bare land, cliff and mountains. Section 28 has mentioned the functions, rights, and duties of VDC. The VDCs are required to protect the environment, nature and natural resources. Section 55 empowers VDC to levy taxes on utilization of natural resources. Section 68 lists the property of the VDC, which includes natural resources. Apparently, natural resources include mineral resources and thus, VDCs have an absolute authority over the natural resources.

5.2.8 Public Road Act, 2031 (1974)

Section 19 of the Act states that, permission of DoR is required to carry out activities within the limits of the road boundaries. Local governmental offices have to give notice to the DoR prior to the start of activities in the limits of the public roads (Section 29). The Act empowers DoR to acquire any land on a temporary basis (for storage facilities, construction camps, etc.) during road construction and upgrading. The temporary acquisition of land containing any buildings (e.g. houses, sheds, temples and schools) is avoided wherever possible. The Act also empowers DoR to “lift earth, stone or sand from any adjoining land” during construction and upgrading works. The Act does not provide for leasing of land. However, DoR is required to pay compensation for any damages caused to buildings, crops and trees, where the farming activity of the landowner is interrupted, and where the landowner has to incur expenses to restore the land after its return. Compensation is determined between DoR and the titleholder, or through mediation, involving officials from the relevant VDC and District. The GoN may

prohibit, through notification in the *Nepal Rajapatra* (Government Gazette), the construction of any permanent structure (other than walls) within 6m of the road formation edge.

5.2.9 Forest Act, 2049 (1993)

The forest Act, 1993 recognizes the importance of forests in maintaining a healthy environment. The act requires decision makers to take into account of all forest values, including environmental services and biodiversity, not just the production of timber and other forest commodities. The basis of the act's approach to forest and forest products is 'resource oriented' rather than 'use oriented'. Section 23 empowers the government to delineate any part of the national forest that has a special environmental, scientific or cultural importance as a protected forest. Section 49 of the act prohibits reclaiming lands, setting fires, grazing, removing or damaging forest products, felling trees or plants, wildlife hunting and extracting boulders, sand and soil from the National forest without the prior approval. The act opens avenues to carry out IEE of the development proposal if they are to implemented in the forest areas and/or pass through the forest areas. Section 68(1) of the Act empowers the government to permit the use of any part of Government managed forest, community forest, leasehold forest, if there is no alternative except to use the forest area for the implementation of a project of national priority without significantly affecting the environment.

5.2.10 Forest Rules 2051 (1995)

Rule 65 (1) of the Forest Regulation stipulates that in case the execution of any project having national priority in any forest area causes any harm to any local, individual or community, the proponent of the project itself bear the amount of compensation to be paid. Similarly, the entire expenses required for the harvesting, logging and transporting of the forest products in a forest area should be borne by the proponents of the project. In addition to this, Section 65(2) states that, "the proponent has to pay all the expenditures required during harvesting, logging and transporting operation of forest products cleared from the forest area". The Forest Regulation, 1995 (amended in 2001) has listed 3 species banned for collection, use, sale, distribution, transportation and export, 9 species banned for export and 7 tree species banned for felling, transportation and export.

5.2.11 Aquatic Animal Protection Act, 2018 BS (1961) (Amended 2056 BS)

The Aquatic Animals Protection Act (1961) and amendment indicates an early recognition of the value of wetlands and aquatic animals. Section 3 renders punishable to any party introducing poisonous, noxious and explosive materials into a water resource, or destroying any dam, bridge and water system with the intent of catching or killing aquatic life. There is no reported case of prosecution for a breach of

AAPA. This demonstrates the government's ineffectiveness in developing a surveillance system for conserving aquatic life. Under section 4, the government is empowered to prohibit catching, killing and harming of certain kinds of aquatic animals by notification in the Nepal Gazette. However, notice under this section has never been published by the Government. The act has been amended to include the provision that obliges the proponent to construct fish ladder at the dam site to ensure the movement of aquatic animal. If it is not possible, the proponent should establish fish hatchery or a nursery, close to the dam site of the water resource projects, for artificial reproduction and conservation (Section 5b).

5.2.12 National Foundation for the Development of Indigenous Nationalities Act, 2002

The act has provisioned the establishment and operation of “*National Foundation for Development of Indigenous Nationalities*” for social, economic and cultural development and upliftment of various Indigenous Nationalities of Nepal and for their equal participation in the mainstream of national development. The main objectives of the foundation are;

- To preserve and promote the language, scripts, cultures, arts and histories of the indigenous nationalities;
- To preserve and promote the languages, scripts, cultures, arts, and histories of the indigenous nationalities;
- To preserve and promote the traditional knowledge, skills, technologies and special knowledge of the indigenous nationalities and to provide assistance in its vocational use.
- To cause the indigenous nationalities to be participate in the mainstream of overall national development of the country by maintaining a good relation, goodwill and harmony between different indigenous groups, castes, tribes and religious communities of Nepal; and
- To provide assistance in building an equitable society by making social, economic, religious and cultural development and upliftment of indigenous nationalities.

5.2.13 Land Acquisition Act 2034 (1977) and Amendment, 2049

The act was promulgated for the purpose of acquiring land for public uses or for government institution. The Land Acquisition Act, 1977 clearly empowers the Government to acquire necessary land at any place in any quantity by giving the compensation pursuant to the Act for the land required for any public purpose or for operation of any development project initiated by government institution (Section 3 and 4). The Government shall provide compensation to the concerned person and organization as decided by the Compensation Fixation Committee. The committee consists of Chief District Officer, Chief District Land Administration and Revenue Officer, Project Chief and the Representative of the DDC. The compensation paid under this Act will be in cash. However, under the Section 14 of the Act it is stated that, the Government may allot land to those people whose land has been acquired, from the land it possesses such as Ailani, or Government-owned any other land, and if they prefer land for land.

5.2.14 Ancient Monument Protection Act 2013 (1956)

This depiction of the act has been done to maintain peace and order by preserving the ancient monument and by controlling the trade in archaeological objects as well as the excavation of the place of ancient monuments and by acquiring and preserving ancient monument and archaeological, historical or artistic objects. Section 12 of the act mentioned the following act as punishable,

- One who destroys, demolishes, removes, alters, defaces or steals having realized an amount equal to the claimed amount of such Ancient monument shall be punished with a fine of twenty- five thousand rupees to one hundred thousand rupees or with an imprisonment of five years to fifteen years or both.
- One who uses the ancient monument in an unauthorized way or harms it by any other means having realized an amount equal to the claimed amount of such ancient monument shall be punished with a fine up to twenty- five thousand rupees or with an imprisonment up to five years or both.
- One who destroys, demolishes, defaces, steals or removes or alters unauthorizedly or causes harm to the archaeological object by any other means, having realized on amount equal to the claimed amount of such archaeological objects shall be punished with a fine a five- thousand rupees to one hundred thousand rupees or with an imprisonment up to five years or both.

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

The Child Labour (Prohibition and Regulation) Act 2000 preclude that “whereas it is expedient to prohibit engagement of child in factory, mining and similar other riskful work and to make necessary provision for health, child's safety and services and facilities while engaging them in other work. Under the Section 3 of the Act, children below 14 years of age are strictly prohibited to work as a labourer. Section 4 of the act states that “Nobody shall engage in work a child as a labourer by pleasing, gratifying or misrepresenting him or under greediness or fear or threat or coercion or any other way against his will”. Under Section 6, in case any Enterprise has to engage a child in work, an approval has to be obtained from the concerned labour office or any authority or official prescribed by that office and from the father, mother or guardian of the child.

5.3 Policies and Plans

5.3.1 Policy on Land Acquisition, Resettlement and Rehabilitation for the Infrastructure Development Projects, 2071 (2015 AD)

The government has introduced Land Acquisition, Resettlement and Rehabilitation Policy, paving the way for developers of various physical infrastructure projects to acquire land without affecting livelihood of people who have to be relocated from the area where such projects will be built. The policy, which calls for creation of a scientific standard for land valuation and extension of compensation equivalent to minimum market value of land, is expected to facilitate developers to implement projects, like hydro,

roads and transmission lines, on time. This will reduce chances of significant cost overrun, which inflates project cost. Also, a provision in the policy that allows the government to take action against those who try to disrupt land acquisition process or create hurdles for project developers that have acquired land by following the due process is expected to help project developers in completing the projects on time. The policy has tried to address these complex issues of resettlement and rehabilitation so that the country can achieve its development goals without causing adverse impact on living standard of the people who are displaced or affected by the projects.

In this regard, the policy has stressed on the need to first assess economic and social impact of the development project. Based on this, projects will be categorized as high-, medium- and low-risk. High-risk projects refer to those which displace 50 or more households in the mountainous region, 75 or more households in the hilly region and 100 or more households in the Tarai. Medium-risk projects, on the other hand, are those that force relocation of less than 50 households in the mountainous region, less than 75 households in the hilly region and less than 100 households in the Tarai. Likewise, low-risk projects refer to those which cause productive property to shrink by up to 10 per cent.

Upon evaluation of these impacts, a strategy on land acquisition and compensation must be framed for low-risk projects. But in the case of high- and medium-risk projects, a detailed resettlement and rehabilitation plan must be designed. Also, families should be entitled to compensation if works like installation of transmission, telephone and underground drinking water pipe lines affect livelihood. And in case the projects affect yields of registered commercial crop, fruit or flower producers, compensation equivalent to five years of revenue must be given in cash. All expenses related to land acquisition, compensation and implementation of resettlement and rehabilitation plans should be considered as project cost, according to the policy. Also, interest should be paid on compensation amount depending on the days it took to release funds to those affected by the project. The interest calculation begins from the day a formal decision was taken to operate the project, says the policy. The compensation amount for those affected by the project will be fixed by a five-member compensation committee formed under chief district officer. The committee can form a technical team to determine the compensation amount. This team should derive the compensation amount by working closely with members of families that are likely to be displaced. The policy says that "Once the compensation amount is fixed by the committee, it cannot be reviewed," says the policy. Those not satisfied with land acquisition, resettlement and rehabilitation processes can lodge complaints at a body formed at the project office and complaint hearing offices at district and regional levels.

5.3.2 National Transport Policy 2058 BS (2001 AD)

The principal objective of the National Transport Policy is to develop a reliable, cost effective, safe facility oriented and sustainable transport system that promotes and sustains the economic, social, cultural and tourism development of Nepal as a whole. The policy states special attention shall be given to improving 'the comfort, reliability, safety, frequency, availability and affordability of public transport and to reducing harmful emissions arising from public transport operations among others. The policy also insists that the construction, improvement and management of the means of transport shall be done in harmony with the traffic safety and environmental effect.

5.3.3 Nepal Environmental Policy and Action Plan, 2049 BS (1993 AD)

Nepal Environmental Policy and Action Plan (NEPAP) has been prepared as a part of Government of Nepal's continuing effort to incorporate environmental concerns into the countries development process. The policy focuses on mitigating the environmental impacts due to urbanization, industrialization and infrastructural development. The policy further states that roads, irrigation, hydroelectric and other infrastructures project have the potential for imposing significant environmental cost if they are not designed and properly implemented. The policy also focuses that the greater involvement of the local people is a prerequisite for improving design and implementation.

5.3.4 Three Years Interim Plan 2070/71-2072/73 (2013/14-2015/16)

The plan identified the importance of road sector in promoting national unification, socio-economic development and regional balance contributing to overall development of the country. It has identified the importance of road network in promoting the access to service facilities like education, health and market, industry, tourism, hydropower development and so on. The plan focuses on upgrading and maintenance of existing roads and rendering them all weather as well as extension of the road network to places without road connection.

5.3.5 DoR Bridge Policy and Strategy, 2004

The DoR Bridge Policy emphasizes on safety, reliability and cost-effectiveness of the transport facilities. The policy has the strategies of strengthening the existing institutional capacity, establishing economic and financial norms, institutionalizing bridge maintenance and emergency works, incorporating environmental and social aspects in the management of bridges, establishing project management cycles, technical support and standardizing bridge definitions with other organization.

5.3.6 Twenty Year Road Plan, 2059 –2079 (2002-2022)

The Government of Nepal (GoN) has formulated a 20 Year Road Plan. One of the main objectives of the Plan is the development of Strategic Road Networks (SRN). The implementing strategies of the Plan include all weather road connection to the District Headquarters (DHQ) and provision of road linkages from the DHQ to the adjacent road network of the neighboring districts and countries. The strategy adopted by the 20 Year Road Plan is aligned with the priorities set out in the Tenth Five Year Plan (2002-2007) as that plan gives priority to constructing feeder and strategic roads connecting North to South.

5.3.7 World Bank Policy on Environmental and Social Safeguard

The World Bank Operational Policy OP. 4.01: Environmental Assessment

World Bank requires environmental assessment (EA) of projects that are proposed financing from World Bank to help ensure that they are environmentally sound and sustainable, and thus to improve decision making. EA evaluates a project's potential environmental risks and impacts in its area of influence, examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. EA takes into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and cultural property), and transboundary and global environmental aspects.⁴ EA considers natural and social aspects in an integrated way.

The Bank undertakes environmental screening of each proposed project to determine the appropriate extent and type of EA. The Bank classifies the proposed project into one of four categories, depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts. The proposed sub-project (ie., construction of Tila Khola Bridge) falls within Category project. As per World Bank Operational Policies a proposed project is classified as Category B if its potential adverse environmental impacts on human populations or environmentally important areas—including wetlands, forests, grasslands, and other natural habitats—are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases mitigatory measures can be designed more readily than for Category A projects.

For sector investment loans (SILs), during the preparation of each proposed subproject, the project coordinating entity or implementing institution carries out appropriate EA according to country requirements and the requirements of this policy. The Bank appraises and, if necessary, includes in the SIL components to strengthen, the capabilities of the coordinating entity or the implementing institution

to (a) screen subprojects, (b) obtain the necessary expertise to carry out EA, (c) review all findings and results of EA for individual subprojects, (d) ensure implementation of mitigation measures (including, where applicable, an EMP), and (e) monitor environmental conditions during project implementation. If the Bank is not satisfied that adequate capacity exists for carrying out EA, all Category A subprojects and, as appropriate, Category B subprojects—including any EA reports—are subject to prior review and approval by the Bank.

The World Bank Operational Policy (OP. 4.04): Natural Habitats

As per OP. 4.04, World Bank supports for the protection, maintenance, and rehabilitation of natural habitats and their functions in its economic and sector work, project financing, and policy dialogue. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. The Bank promotes and supports natural habitat conservation and improved land use by financing projects designed to integrate into national and regional development the conservation of natural habitats and the maintenance of ecological functions. Furthermore, the Bank promotes the rehabilitation of degraded natural habitats. The Bank does not support projects that, in the Bank's opinion, involve the significant conversion or degradation of critical natural habitats. Wherever feasible, Bank-financed projects are sited on lands already converted (excluding any lands that in the Bank's opinion were converted in anticipation of the project). The Bank does not support projects involving the significant conversion of natural habitats unless there are no feasible alternatives for the project and its siting, and comprehensive analysis demonstrates that overall benefits from the project substantially outweigh the environmental costs. If the environmental assessment indicates that a project would significantly convert or degrade natural habitats, the project includes mitigation measures acceptable to the Bank. Such mitigation measures include, as appropriate, minimizing habitat loss (e.g., strategic habitat retention and post-development restoration) and establishing and maintaining an ecologically similar protected area. The Bank accepts other forms of mitigation measures only when they are technically justified.

World Bank Operational Policy (OP 4.36): Forest

World Bank Operational Policy 4.36 aims to reduce deforestation, enhance the environmental contribution of forested areas, promote afforestation, reduce poverty, and encourage economic development. Combating deforestation and promoting sustainable forest conservation and management have been high on the international agenda for two decades. However, little has been achieved so far and the world's forests and forest dependent people continue to experience

unacceptably high rates of forest loss and degradation. The Bank have proposed revised approach to forestry issues, in recognition of the fact that forests play an increasingly important role in poverty alleviation, economic development, and for providing local as well as global environmental services. Success in establishing sustainable forest conservation and management practices depends not only on changing the behavior of all critical stakeholders, but also on a wide range of partnerships to accomplish what no country, government agency, donor, or interest group can do alone. Where forest restoration and plantation development are necessary, the Bank assists borrowers with forest restoration activities that maintain or enhance biodiversity and ecosystem functionality. The Bank also assists borrowers with the establishment and sustainable management of environmentally appropriate, socially beneficial, and economically viable forest plantations to help meet growing demands for forest goods and services.

Involuntary Resettlement (OP 4.12)

The overall objectives of the bank policy on the involuntary resettlement are;

- Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs.
- Where it is not feasible to avoid resettlement, resettlement activities should be conceived and executed as sustainable development programs, providing sufficient investment resources to enable the persons displaced by the project to share in project benefits. Displaced persons should be meaningfully consulted and should have opportunities to participate in planning and implementing resettlement programs.
- Displaced persons should be assisted in their efforts to improve their livelihoods and standards of living or at least to restore them, in real terms, to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher.

The policy covered the following impact;

This policy covers direct economic and social impacts that both result from Bank and or Bank assisted investment projects, and is caused by;

- (a) The involuntary taking of land resulting in
 - (i) Relocation or loss of shelter;
 - (ii) Loss of assets or access to assets; or

(iii) Loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or

To address these impacts the burrowers should prepare resettlement plan or resettlement policy framework that covers;

- (i) informed about their options and rights pertaining to resettlement;
- (ii) Consulted on, offered choices among, and provided with technically and economically feasible resettlement alternatives; and
- (iii) Provided prompt and effective compensation at full replacement cost for losses of assets affected by the project

Where necessary to achieve the objectives of the policy, the resettlement plan or resettlement policy framework also include measures to ensure that displaced persons are;(i) offered support after displacement, for a transition period, based on a reasonable estimate of the time likely to be needed to restore their livelihood and standards of living; and (ii) provided with development assistance in addition to compensation measures (iii) such as land preparation, credit facilities, training, or job opportunities.

Indigenous People (OP 4.10)

This policy contributes to the World Bank goal of poverty reduction and sustainable development by ensuring that the development process fully respects the dignity, human rights, economies, and cultures of Indigenous Peoples. For all projects that are proposed for Bank financing and affect Indigenous Peoples, the Bank requires the borrower to engage in a process of free, prior, and informed consultation. The Bank provides project financing only where free, prior, and informed consultation results in broad community support to the project by the affected Indigenous Peoples. Such Bank-financed projects include measures to (a) avoid potentially adverse effects on the Indigenous Peoples' communities; or (b) when avoidance is not feasible, minimize, mitigate, or compensate for such effects. Bank-financed projects are also designed to ensure that the Indigenous Peoples receive social and economic benefits that are culturally appropriate and gender and intergenerationally inclusive. The Bank recognizes that the identities and cultures of Indigenous Peoples are inextricably linked to the lands on which they live and the natural resources on which they depend. These distinct circumstances expose Indigenous Peoples to different types of risks and levels of impacts from development projects, including loss of identity, culture, and customary livelihoods, as well as exposure to disease. Gender and intergenerational issues among Indigenous Peoples also are complex. As social groups with

identities that are often distinct from dominant groups in their national societies, Indigenous Peoples are frequently among the most marginalized and vulnerable segments of the population. As a result, their economic, social, and legal status often limits their capacity to defend their interests in and rights to lands, territories, and other productive resources, and/or restricts their ability to participate in and benefit from development. At the same time, the Bank recognizes that Indigenous Peoples play a vital role in sustainable development and that their rights are increasingly being addressed under both domestic and international law.

On the basis of the social assessment and in consultation with the affected Indigenous Peoples' communities, the borrower prepares an Indigenous Peoples Plan (IPP) that sets out the measures through which the borrower will ensure that (a) Indigenous Peoples affected by the project receive culturally appropriate social and economic benefits; and (b) when potential adverse effects on Indigenous Peoples are identified, those adverse effects are avoided, minimized, mitigated, or compensated for. The IPP is prepared in a flexible and pragmatic manner, and its level of detail varies depending on the specific project and the nature of effects to be addressed. The borrower integrates the IPP into the project design. When Indigenous Peoples are the sole or the overwhelming majority of direct project beneficiaries, the elements of an IPP should be included in the overall project design, and a separate IPP is not required. In such cases, the Project Appraisal Document (PAD) includes a brief summary of how the project complies with the policy, in particular the IPP requirements.

5.4 Manuals/Guidelines/ Directives

5.4.1 Environmental and Social Management Framework (ESMF), 2064 BS (2007) with Addendum 2013(Revised)

The objective of ESMF is to frame guidelines and procedures to deal with environmental and social impacts associated with the implementation of this project. The framework presents the detailed account of environmental and social framework to deal with impacts and preparation of mitigation plans. The framework also describes the implementation arrangements including monitoring and evaluation mechanisms for implementing the mitigation measures.

5.4.2 National Environmental Impact Assessment Guidelines 2050 BS (1993 AD)

The objectives of the guideline are to assist in assessment of the impacts likely to be caused on the environment by implementation of the project; facilitate to optimize the benefit of development without degrading the environmental quality, natural resource base and cultural heritage of the society, help to discover the protective and preventive measures to remove the adverse impacts likely to be caused on the environment by the implementation of the project; facilitate to integrate the environmental

consideration in the project planning cycle; provide information to decision makers to determine whether or not the proposed project is to be implemented from an environmental perspective and what mode should be adopted while implementing the project.

5.4.3 Environmental Management Guidelines, GESU/DOR, 1999

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

5.4.4 Reference manual for Environmental and Social aspect of integrated Road Development

This manual provides guidance to integrate social and environmental considerations, including public involvement strategies, with technical road construction practices. It suggests process of addressing environmental and social issues alongside technical, financial and others. The manual recommends various environmental and social approaches, actions and strategies.

5.4.5 Public Work Directives, 2002

Public Works Directive (PWD) 2002 is designed to apply uniform procedures for public construction works including environmental procedural guidelines which are consistent with the World Bank's best practices. The PWD combine financial administration regulations (FAR) and other rules and regulations on technical, social, and environmental matters to provide a single source of procedures and reference documents for implementing public construction works. Their guidance applies to the procurement of works under large, medium and small contracts. As concerns decent work, several sections within the PWD mention application of labour laws. The PWD specifically mentions that in all cases, existing laws prevail over the directives and, as noted in more detail in this paper, some of these documents contain obligations for contractors.

5.4.6 Batawaran Nirdesika 2057 (2001)

The directive is focused in the practical implementation of the small rural infrastructure through the minimization of environmental impacts. This directive includes the simple methods of environmental management in different phases of project cycle.

5.5 Standards

5.5.1 National Standard on Noise Level 2069 BS

The threshold limit of noise for Leq in decibel as prescribed by The National Standard for Noise, 2069 B.S. has for different sectors in day and night are as follows;

Threshold limit of noise in different sectors

Sectors	Threshold limit of Noise Leq (dB)	
	Day	Night
Industry	75	70
Business	65	55
Rural residential area	45	40
Urban residential area	55	50
Mixed residential area	63	55
Peaceful area	50	40

Maximum threshold limit of noise for several machineries

SN.	Instrument	Maximum threshold limit (dB)
1	Water pump	65
2	Diesel generator	90
3	Loudspeaker, other entertainment instrument	70

5.5.2 National Ambient Air Quality Standard 2012 AD

The construction emissions fugitive and combustion shall not pollute the ambient air quality to exceed the following limits.

National ambient air quality standards for several pollutants

Parameters	Units	Averaging Time	Concentration in Ambient Air, maximum
TSP (Total Suspended Particulates)	$\mu\text{g}/\text{m}^3$	Annual	-
		24-hours*	230
PM ₁₀	$\mu\text{g}/\text{m}^3$	Annual	-
		24-hours*	120
Sulphur Dioxide	$\mu\text{g}/\text{m}^3$	Annual**	50
		24-hours*	70
Nitrogen Dioxide	$\mu\text{g}/\text{m}^3$	Annual	40
		24-hours*	80
Carbon Monoxide	$\mu\text{g}/\text{m}^3$	8 hours*	10,000
Lead	$\mu\text{g}/\text{m}^3$	Annual**	0.5
Benzene	$\mu\text{g}/\text{m}^3$	Annual**	5
PM _{2.5}	$\mu\text{g}/\text{m}^3$	8-hours*	40
Ozone	$\mu\text{g}/\text{m}^3$	8-hours*	157

5.5.3 Nepal Road Standard 2070 BS

Nepal Road Standards- 2027 (Second Revision 2070), applies to all *Strategic Roads* in rural areas being constructed within Nepal. Based on this standard, standard designs for roads and bridges including typical drawings were prepared, which are used till now.

5.5.4 Nepal Bridge Standard 2067 BS

Department of Roads (DoR) has formulated these standards with a view to establish a common procedure for design and construction of road bridges in Nepal.

5.5.5 National Diesel Generator Emission Standard, 2012

The MoPE introduced in October 2012 the National Diesel Generator Emission Standard (NDGES) for new and in-use generators with a capacity of 8 KW-560kW (under the 1997 Environmental Protection Act). The emissions limits are set for four major pollutants: CO, HC, NO_x and PM. The emission limit for

PM for new DG set less than 19kW is 0.80 g/kWh; for 19 to <37kW, the emission limit is 0.60 g/kWh; for 37 to <75, it is 0.40 g/kWh; for 75 to 130 kW, it is 0.30 g/kWh; and for 130 to <560 kW, it is 0.20 g/kWh.

5.5.6 Nepal Vehicle Mass Emission Standard 2056 BS

Nepal Vehicle Mass Emission Standard 2056 BS provides the insight to the emission standards for different categories vehicles on several criteria air pollutants. The pollutants considered by the standard are CO, HC, PM, and NO_x. In order to test the compliance with the standard five different tests on vehicles are performed. Those tests include; (i) verifying exhaust emission after a cold start, (ii) carbon monoxide emission at idling speed, (iii) verifying emission of crankcase gases, (iv) determination of evaporative emission, and (v) durability of pollution control devices.

5.6 International Conventions and Treaties

5.6.1 Convention on Wetlands of International Importance (Ramsar Convention), 1971

The convention on Wetlands of International Importance, called the Ramsar Convention, is the intergovernmental treaty that provides the framework for the conservation and wise use of wetlands and their resources. There are three pillars of the Convention under which the contracting parties commit to:

- Work towards the wise use of all their wetlands;
- Designate suitable wetlands for the list of Wetlands of International Importance (Ramsar list) and ensure their effective management;
- Cooperate internationally on trans-boundary wetlands, shared wetland systems and shared species.

CHAPTER 6: EXISTING ENVIRONMENTAL CONDITION

6.1 Physical Environment

6.1.1 Physiography and Geomorphology

The proposed site for the construction of Tila Khola Bridge is located at the boundary of Manma and Bharta VDCs of Kalikot district. The proposed bridge site area shows gentle slope on the left bank and steep slope on the right bank of the Tila River. The land around the bridge has steep slopes with unstable features rises to the top of Mahabharat hills in the u/s. The elevation at the proposed bridge location is 790m amsl. The average gradient of 9.5% is observed along the course of Tila Khola considering to confluence of Tila - Karnali to 1.5km d/s of the river at Jitegada Bazaar.

6.1.2 Geology

Regional Geology

The bridge site is geologically located in the rocks of the Dadeldhura Group, Western Nepal Himalaya. The Dadeldhura Group of the Higher Himalaya is geologically subdivided into the Kalikot Formation, Melmura Formation, Damgad Formation and Sallyanigad Formation in ascending order. The proposed bridge site is located in the rocks of the Kalikot Formation. The Kalikot Formation is comprised of gneiss and schist. Major geological structures like faults and the thrust (MCT) are far from the location of the bridge.

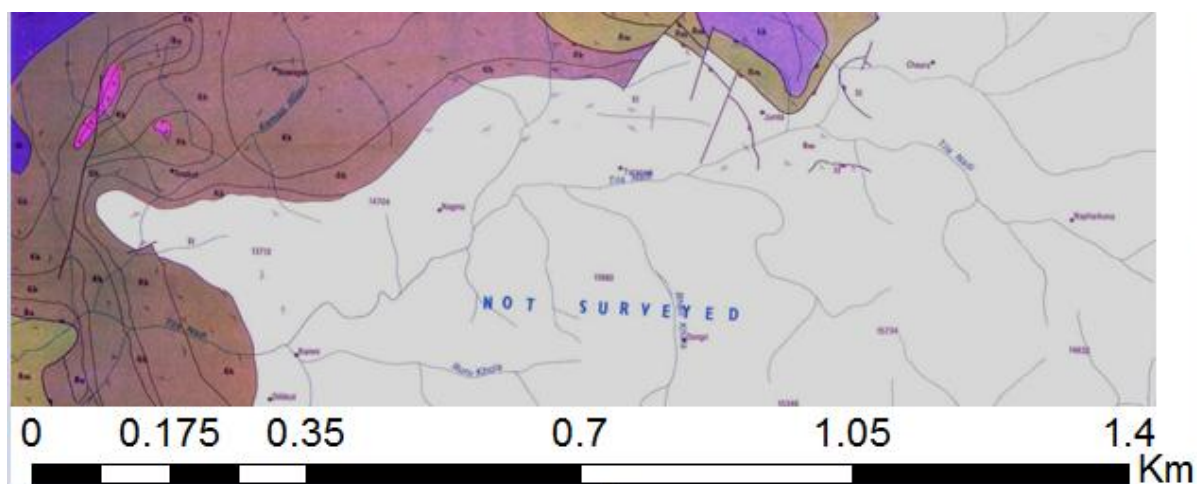


Figure 6.1: Regional Geological map of Tila River area.

Surface Geology

The proposed bridge site belongs to the Kalikot Formation. The Kalikot Formation is comprised of gneiss and schist. Around the bridge area gneiss is exposed on both banks whereas the alluvial and

colluvial deposits area seen on bedrocks of gneiss on both banks of the Tila River. Bedrocks are also exposed just below the proposed bridge site. But, superficially, the bridge site is composed of colluvial deposits on the upstream and downstream from existing bridge (Belly Bridge site). The colluvial deposits are composed boulder and cobble of gneiss and quartzite. Thickness of colluvial is more than 3 m on both banks whereas bedrocks exposed below colluvial and alluvial deposits. The bearing of the proposed bridge axis is 130-310 degrees. The flowing direction of the Tila Khola around the proposed bridge site is 030-120 degrees.

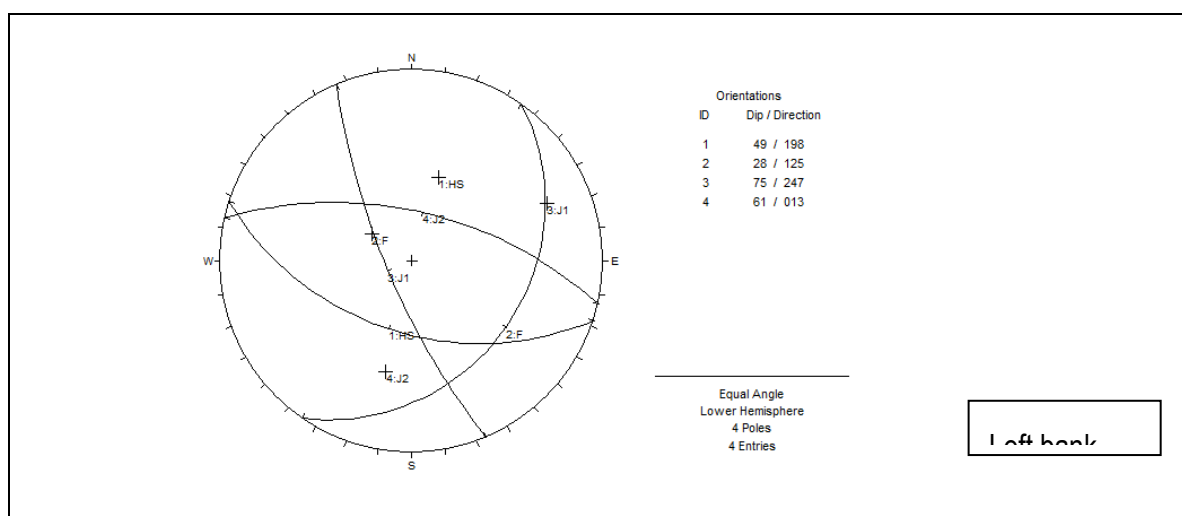
6.1.3 Soil

The surface soil of the bridge area consists of mainly alluvial soil deposits at riverbed. The alluvial deposits are mainly found in the riverbeds of the Tila River. The thicknesses of alluvial deposits are less than 1 m. The alluvial deposits are composed of boulders, cobbles, pebble and sands. Boulder, cobbles and pebbles are mainly granite, quartzite and gneiss from the Higher Himalaya (0.5 to 5 m in diameter). The nature of the surface soil is characterized by lack of calcareous cementing material so the surface soils are loose in nature.

6.1.4 Slope Stability

The slope stability condition is good even there are loose materials along the river banks. Both banks have no any geological instability area. Along the river bank bedrocks are exposed so there is no possibility of bank erosion because of presence hard rocks.

In general the slope stability is more or less good on the both banks whereas some wedges are very critical on both banks. Other wedges formed by the intersection of the joints seem to be stable.



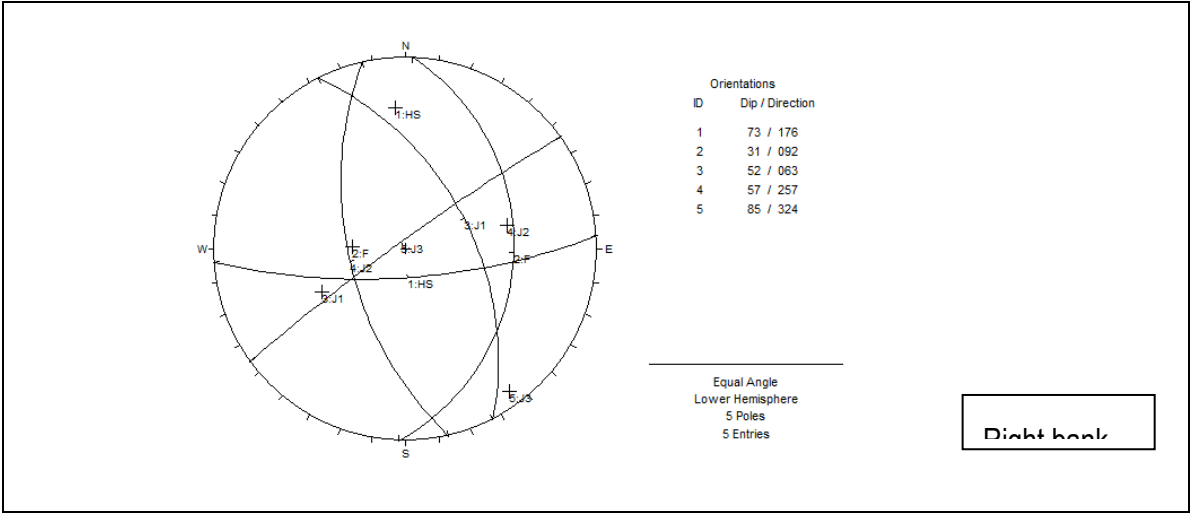


Figure 6.2: Stereographic Projection of the Proposed Bridge Site Area.

Table 6.1: Condition of the slope stability of the roack.

Location	HS and F	F and J1	F and J2	J1 and J2
Left Bank	Stable	Unstable	Stable	Stable
Right bank	Stable	Stable	Unstable	Unstable

HS-Hill slope, F-Foliation Plane, J-Joint

6.1.5 Seismological Study

The proposed area located far from the thrust and fault but presence of local thrust is located about 2 km periphery of the bridge site. So, the activity of the fault movement is considered as nominal. The analysis is basically made by deterministic evaluation of earthquake sources in the vicinity with the state of art consideration of attenuation for the Himalayan terrain. It should be acknowledged that the problems of seismo-tectonic events of Himalaya are not fully understood and the knowledge is increasing with more and more accumulation of research results and data analysis. The study has considered the latest results of seismo-tectonic study of the Himalaya and the vicinity. For comparison purpose, both deterministic and probabilistic assessments of seismic hazards have been considered.

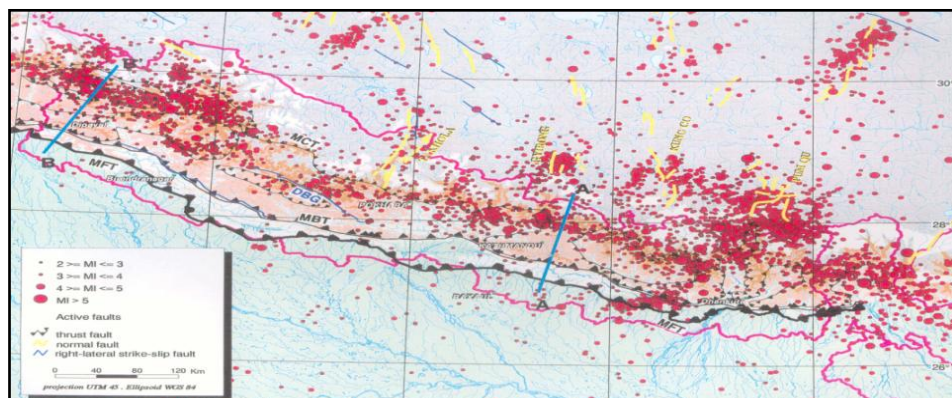


Figure 6.3: Epicenter of the Earthquake in Nepal Himalaya.

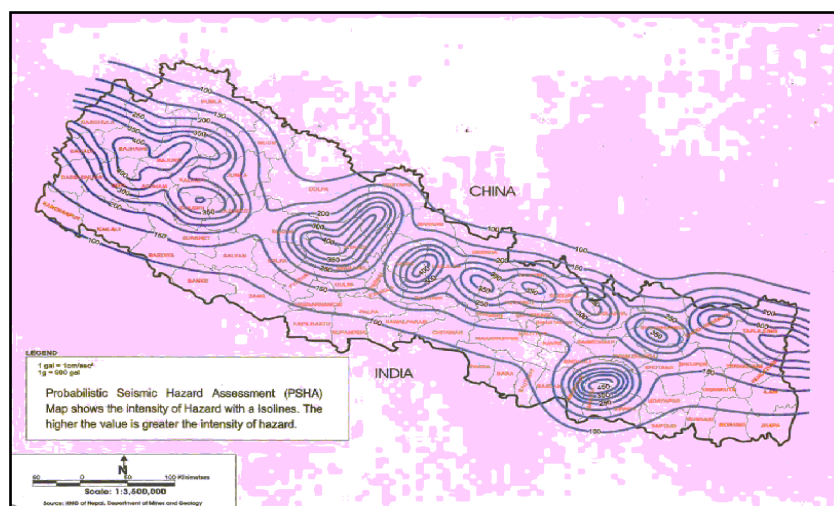


Figure 6.4: Seismic Hazards of the Nepal Himalaya.

For the minimum acceleration of 200 gal, reduction factor of 0.50 the calculated effective design seismic coefficient is approximately 0.10.

For the maximum acceleration of 250 gal (reduction factor of 0.50 the calculated effective design seismic coefficient is approximately 0.13. Hence, the design horizontal seismic coefficient ranges from 0.10 to 0.13 (calculated values). However, DoR standard superstructure has considered horizontal seismic coefficient as 0.27 and vertical as 0.035 as per IRC 6: 2014.

6.1.6 Climate

Sub-tropical climate is found along proposed project site. The maximum temperature around the project area during summer season exceeds 35°C, while the minimum temperature during winter season remains not less than 10°C. The average annual precipitation around the project area recorded is about 1868 mm.

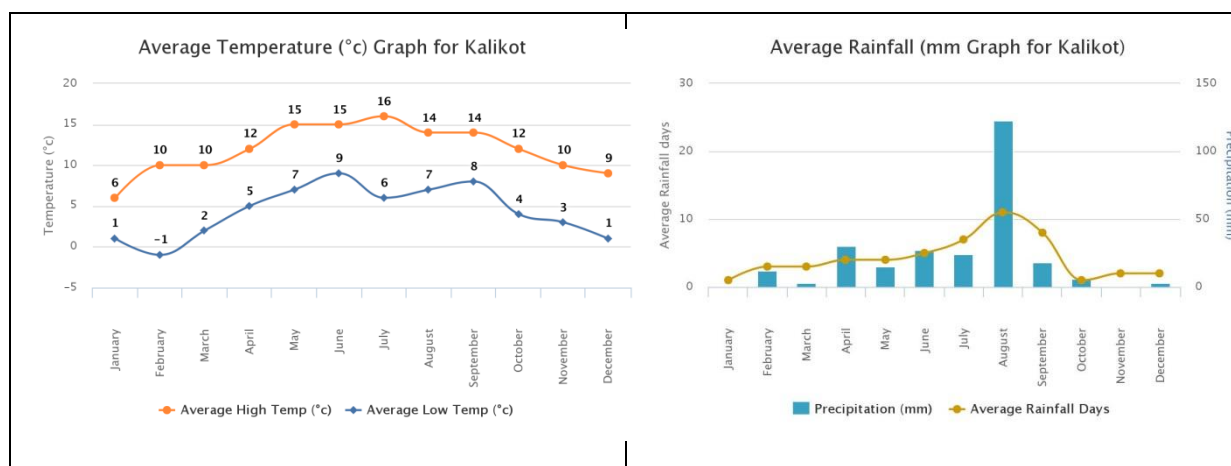


Figure 6.5: Figure showing the average temperature and average rainfall of the project area.

6.1.7 Drainage and Hydrology

Tila River is a perennial river originated from the Chaudhabis Glacier in High Mountain. It drains towards North- East to South- West with descends from the steepest slope. The river shows the complex dendritic pattern comprising of many rivers making confluence with it. The Tila River makes confluence with Karnali River at about 150 m downstream from the proposed bridge location. The length of the Tila River is 116.69 Km with the catchment area of 3325 sq. km. The river flows from the elevation of 6126 m to the lowest elevation of 765 m amsl. The drainage density of the Tila River is 0.0351 km⁻¹. The catchment of the Tila River is shown in the figure below:

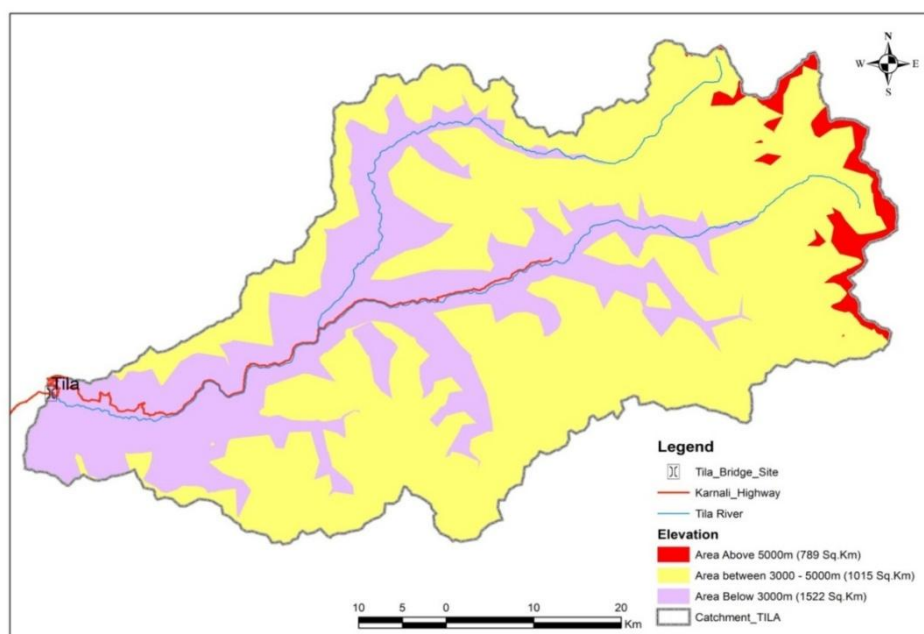


Figure 6.6: Catchment area delineation of Tila River.

6.1.8 Land use

The land use of the project area is characterized by the presence of forest and shrub land (40%), water body and river channel (18%), barren land and hill slopes (14%) and remaining agricultural lands. Since land around the proposed site are public, during the construction period, these can be used temporarily as campsites and stockpiling sites. The land use of the project area is shown in the figure below:

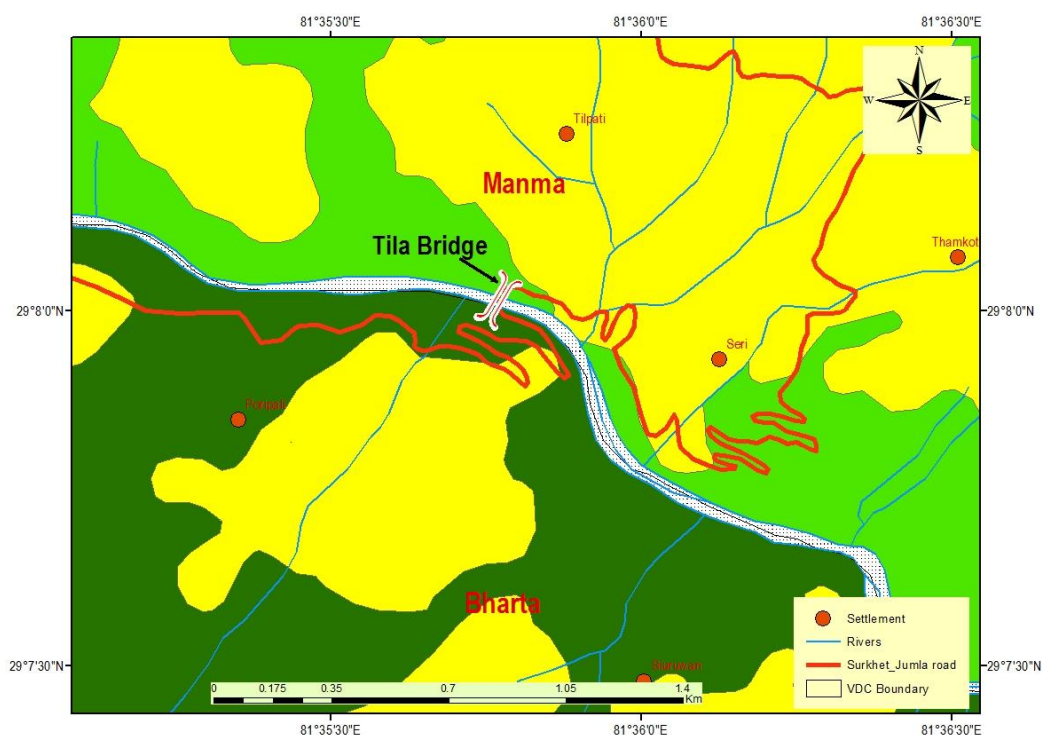


Figure 6.7: Land use around the proposed project location.

6.1.9 Public Structures

There are no public structures that are directly affected by the project.

6.1.10 Air Quality, Water Quality and Noise levels

There is not external source of air, noise and water contaminant. However, the movement of vehicles along the Surkhet-Jumla road contributes to air and noise pollution to some extent. Due to the quick dispersion of vehicular emission by wind and less number of vehicles playing through that road, accumulation of air pollutants will not occur.

6.2 Biological Environment

The immediate area near the proposed bridge is devoid of vegetation. The proposed bridge project does not require cutting of any tree species for the bridge construction. The biological environment found around the project area is discussed below:

6.2.1 Floral Diversity

Temperate forests are found around the project area. The tree species found around the forests of the project area includes Rohini (*Mallotus philippensis*), Simal (*Bombax ceiba*), Dhusure (*Colebrookea oppoaitiifolia*), Kaulo (*Persea odoratissima*), Sal (*Shorea robusta*), Siris (*Albizia procera*), etc. The other

shrub species found around the project area includes Amriso (*Thysanolaena maxima*), Kuro (*Bidens biternata*), Kariche (), Banmara (*Lantana camera*), etc.

6.2.2 Faunal Diversity

The forest around the project area is the habitat for many wild animals and birds. Some of the commonly found wild animals around the project area are Syal (*Canis aureus*), Dumsi (*Hystrix spp.*), Rato Bandar (*Maccaca mulata*), Leopard (*Panthera pardus*), Deer () etc. Likewise, the birds include spotted dove (*Streptopelia chinensis*), halesa (), Kalij (*Lophura leucomelanos*), tetra (*Francolinus spp.*), etc. Gohoro and some species of snakes are the commonly found reptiles around the project area.

6.2.3 Fish Diversity

The Tila River harbors many aquatic lives. The fishes like asala (*Schizothoraichthys spp.*), gadela and singhe are found in Tila River.

6.2.4 Protected species of Flora and Fauna

Some of the wild flora and fauna found around the project area are protected by GoN, and enlisted in IUCN red list and CITES Appendices. Those flora and fauna are enlisted in the table below:

Table 6.2: Conservation status of flora and fauna of the project area.

S.N	Local Name	Scientific Name	Categories		
			GoN	IUCN	CITES
Fauna					
1	Leopard	<i>Panthera pardus</i>	P	NT	I
2	Jackal	<i>Canis aureus</i>		LC	
Avifauna					
1	Kalij	<i>Lophura leucomelanos</i>		LC	I

IUCN Red List Categories: Endangered (EN), Vulnerable (VU), Near Threatened (NT), LC (Least Concern)

GoN Categories: P Protected by legislation

CITES Categories: I -Appendix I (are species that are threatened with extinction and are or may be affected by trade), II - Appendix II (re species that are not necessarily threatened

with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild), and III - Appendix III (are species that are listed after one member country has asked other CITES Parties for assistance in controlling trade in a species).

6.3 Socio-economic and Cultural Environment

6.3.1 Project Affected VDCs

The proposed Tila Khola Bridge lies at the boundary of the two VDCs namely Bharta and Manma of the Kalikot district. The socio-economic information of the project affected VDCs are given below:

a. Demography

The total population of the Bharta and Manma VDC of the Kalikot district is 7075 and 9094 with the total household of 1265 and 1696 respectively. In both the VDCs, the total male population is higher than that of the female population. Hence, the sex ratio of the Bharta and Manma VDCs is found to be 103.07 and 108.48 respectively. The average household size is found to be more or less similar. The average household size of the Bharta is found to be 5.59 and that of Manma is 5.36. The detail of the demographic characteristics of the affected VDCs is presented in the table below:

Table 6.3: Details of the demographic characteristics.

VDC	Household	Population			Average Household Size	Sex Ratio
		Total	Male	Female		
Manma	1,696	9,094	4,732	4,362	5.36	108.48
Bharta	1,265	7,075	3,591	3,484	5.59	103.07

Source: CBS, 2011.

b. Ethnic Composition

Brahmins are the dominant ethnic group of the Manma VDC of the Kalikot district. Likewise, Kami and Thakuri represent the second and third largest ethnic composition of the VDC. But in Bharta VDC, Thakuri is the largest ethnic group; Kami stands second while Brahmin is the third largest ethnic group. The detail of the ethnic composition of these two VDCs is tabulated below:

Table 6.4: The ethnic composition of the project affected VDCs.

VDC and cast	Total	Male	Female
Manma			

AllCaste	9094	4732	4362
Chhetree	897	491	406
Brahman-hill	2794	1439	1355
Kami	2425	1257	1168
Thakuri	1995	1035	960
Damai/Dholi	667	348	319
Others	316	162	154
Marta			
AllCaste	7075	3591	3484
Chhetree	503	244	259
Brahman- hill	1676	856	820
Magar	437	242	195
Kami	1778	901	877
Damai/Dholi	322	167	155
Thakuri	2222	1111	1111
Sanyasi/Dashnami	125	66	59
Others	12	4	8

Source: CBS, 2011

c. Sanitation and Drinking water facilities

The sanitation status of the VDCs is not so good. The sanitary status of the Manma VDC can be said satisfactory as 67% of the households have toilet facility in their household. But in Bharta VDC, the sanitation status is very poor as only 29% of the households have toilet facility. The detail of the sanitation facility available in these two VDCs is presented in table below:

Table 6.5: The sanitation status of the project affected VDCs.

VDC	Total Households	Households without toilet facility	Household with toilet facility of		Total facility not stated
			Flush toilet	Ordinary toilet	
Manma	1,696	564	422	685	25
Bharta	1,265	904	78	281	2

Source: CBS, 2011.

Tap water serves as the most commonly used source of drinking water in both the project affected VDCs. About 80% of the households in Manma VDC and 56 % of the households in Bharta VDC rely

on tap water system. Spout water is the second most used source of drinking water in both the VDCs. Larger proportion of households in Bharta VDC (38%) relies on spout water than in Manma VDC (17%). The details of the source of drinking water in project affected VDC are given in the table below.

Table 6.6: Source of drinking water in project affected VDCs.

VDC	Total Household	Main Source of Drinking Water						
		Tap/piped Water	Covered Well/Kuwa	Uncovered Well/Kuwa	Spout Water	River/stream	Others	Not Stated
Manma	1,696	1,360	4	7	295	1	4	25
Bharta	1,265	703	7	47	488	18	0	2

Source: CBS, 2011.

d. Energy usage

Firewood is the main source of energy for cooking in both the VDCs. About 83% of the households in Manma and 99% of the households in Bharta VDC rely on firewood for cooking. Likewise, about 14% of the households in Manma VDC rely on LPG for cooking purpose. The detail of the energy usage for cooking in both the VDCs is tabulated below:

Table 6.7: Source of energy for cooking in project affected VDCs.

VDC	Total Household	Fuel usually used for cooking						
		Wood /firewood	Kerosene	LP gas	Bio gas	Electricity	Others	Not Stated
Manma	1,696	1,413	0	241	1	1	15	25
Bharta	1,265	1,258	1	1	1	0	2	2

Source: CBS, 2011.

Being the districts headquarter, Manma has the electricity facility which is the major source of energy for lightning purpose. Likewise, solar is the second widely used source for lightning. Bharta has very minimal use of electricity. Solar contributes as the largely used source in Bharta VDC. The details of the source of fuel for lightning in project affected VDCs are given in table below:

Table 6.8: Source of energy for lightning in project affected VDCs.

VDC	Total Household	Fuel usually used for lighting					
		Electricity	Kerosene	Bio gas	Solar	Others	Not stated
Manma	1,696	740	13	2	255	661	25
Bharta	1,265	1	0	0	292	970	2

Source: CBS, 2011.

e. Education facilities

The literacy of the project affected VDCs are found to be satisfactory. More than half percentage of the people in both the VDCs is literate. About 65% of people in Manma and about 53% of the people in Bharta VDC are literate.

Table 6.9: Literacy Status of the project affected VDCs(Source: CBS, 2011).

VDC and sex	Population aged 5 years & above	Population Who are			Literacy not stated	Literacy rate
		Can read & write	Can read only	can't read & write		

Manma						
Both	7,709	5,018	348	2,325	18	65.09
Male	4,028	3,074	163	781	10	76.32
Female	3,681	1,944	185	1,544	8	52.81
Bharta						
Both	5,862	3,116	293	2,448	5	53.16
Male	2,967	1,875	149	940	3	63.2
Female	2,895	1,241	144	1,508	2	42.87

f. Communication facilities

Radio and mobile phones are the major widespread communication facilities available within the project affected VDCs. About 50% of the households have the facility of mobile phones and about 45% of the households have the radio in their houses in Manma VDC while in Bharta VDC mobile phones and radio are available in 33% and 36% of the households respectively. The detail of the communication facility is presented below:

Table 6.10: Communication facilities available in households of project affected VDCs.

Area	Total	Without any facilities	Household having facility of						
			Radio	TV	Cable TV	Computer	Internet	Telephone	Mobile Phone
Manma	1,696	495	751	313	37	42	16	53	877
Bharta	1,265	643	458	21	0	3	1	6	418

Source: CBS, 2011.

6.3.2 Project affected facilities

a. Demographic characteristics

The construction of bridge affects two households. Altogether, 9 family members will be affected in which the number of male is higher than female. The average family household size is 4.5. Both the affected households belong to the Thakuri ethnic group.

Table 6.11: Demographic characteristics of affected households.

Name of bridge	Affected HHs	Male	Female	Total	HHs size
Tila River	2	6	3	9	4.50

Source: Field survey, 2015.

b. Age distribution

Among the project affected population, majority (55%) are economically active and about 44% of the population are dependent which indicates that these age group populations are economically inactive and dependent for their livelihood.

Table 6.12: Age distribution of the project affected families.

Age Distribution	Population	%
Below 5 Years	0	0.00
6-15	4	44.44
16-60	5	55.56
Above 60 Years	0	0.00
Total	9	100.0

Source: Field survey, 2015.

c. Education and literacy status

There is one primary school located nearby the location and students have to travel about an hour for secondary and higher education. About 73% are literate and 33% are illiterate. The student's dropout rate seems increasing in higher education. About 10% populations have received informal education and can read and write only. Majority of the affected population, 26% are in primary level which decreased and 21% in class 6 to 10 and about 10% have passed SLC and intermediate, none of them are above. The table below shows the education level of the project affected families.

Table 6.13: Education status of the project affected families.

Education	No.	%
Illiterate	3	33.33
Literate	2	22.22
Class 1-5	4	44.44
Total	9	100.0

Source: Field survey, 2015.

d. Occupation of the project affected families

Of the total affected households about 33 percentages are engaged in business operating nearby bridge location while about 10% are engaged in services. The table below shows the occupational division of affected households.

Table 6.14: Occupation of the people of the affected families.

Occupation	No.	%
Student	4	44.44
Business	3	33.33
Housewife	1	11.11
Services	1	11.11
Total	9	100.0

Source: Field survey, 2015.

e. Food Sufficiency level

Food grain crisis in the project area is common because of the land fragmentation and low productivity of the land due to lack of plain land. Food grain is primarily supplied from agriculture production, which has high value in the area. People have been making their food requirements for only few months from their farm production, thus the alternate sources of income are adopted to obtain food grain requirements.

Both of the project affected households do not have enough food that sustains them for a year. One household has enough food for 3-6 month and the other HHs does not have agriculture production. This is the clear reflection of the food security problem in the region. Table below presents the food security status of the project affected households.

Table 6.15: Food sufficiency level of the project affected families.

S.N	Range of food sufficiency	Households	Percentage
1	No agriculture	1	50.00
2	3-6 Months	1	50.00

Total	2	100.00
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Source: Field survey, 2015.

f. Level of income

Local business is the major sources of income among the affected HHs. The range of income shows that both of houses have same range of income level. Both of the affected households earn NRs 200,001 to 300,000 per year.

g. Health facilities

District hospital is center for treatment for the project affected families. The treatment centers are not easily accessible to the people due to road access. Mostly people visit Nepalgunj for better treatment but minor cases are treated in village based service centers. Sub-health post located in one-hour travel is the nearest health facility received by the affected households.

h. Source of water

Local springs and tap water are the source of drinking water for the project affected families. Twenty four-hour water supply facility is available in the project affected families.

i. Toilet facility and defecation practice

Open defecation is highly prevailed in bridge construction site. Only one affected household has toilet facility. Rivers banks and open spaces are the regular locations for defecation those who have not toilet facility. During the group discussion among villagers, they told that even though we have toilet facility but we have not practice of proper defecate system. Those who have toilet also visit open space for defecation

j. Gender Situation

Gender relation primarily depends upon the existing socio cultural phenomena of society. Gender discrimination is very widespread in project districts. Women are far behind to receive the facilities and access in mainstreaming sector. The girl's enrolment in schools is very poor. The early marriage is prevalence in project districts. Women are mostly engaged in households and unproductive sector. Male partners enjoy outside households and have access to outer world.

CHAPTER 7: ENVIRONMENTAL IMPACTS

Several impacts are identified, predicted and evaluated considering the project activities on the physical, chemical, biological and socio-economic environmental condition of the project site. The impacts are both beneficial as well as adverse. The impacts are analyzed with quantified information of changes, alternation and losses based on the characteristics of existing condition and sensitivity of environmental aspects. The possible beneficial and adverse impacts from the project during its construction and operation stage are discussed below:

7.1 Beneficial Impacts

Construction Stage

- **Employment generation**

The construction of the bridge over the Tila Khola requires a number of skilled, semi-skilled and unskilled manpower. The project shall generate the employment opportunity to 50 workers, among them 30% will be skilled and unskilled whereas 70% will be unskilled. This will create employment opportunities to the people of affected villages which will result in enhanced income generation. *This impact will be high magnitude, local in scale and short term in duration.*

- **Enhancement of technical skills**

The unskilled manpower would get the chance to be involved in different construction work with the skilled people which will help to transfer construction skills to the unskilled ones. Thus, the unskilled people can get the experience from this project which can be beneficial for them in similar kinds of projects. *The impact will be high magnitude, local in scale and long term in duration.*

Operation Stage

- **Improved Mobility**

The existing bridge over the Tila Khola is a bailey bridge which is single lane. The load bearing capacity of the existing bridge is very low, due to which the heavy vehicles like Bull Dozers could not be transported through the bridge. Furthermore, construction of new permanent concrete bridge will facilitate the movement of relatively heavier vehicles directly to Kalikot, which will even contribute to the development of new avenue around the Karnali Region. *The impact will be high magnitude, regional in scale and long term in duration.*

- **Saves time**

Although the present number of vehicles running towards Kalikot and Jumla is very low, the construction of road network towards the neighboring districts from Kalikot and Jumla will obviously increase the number of vehicles, imposing pressure on existing infrastructure. At this situation construction of double lane bridge will be very useful as it will facilitate the dual movement of vehicles without any traffic congestion. Furthermore, current practices unloading the heavy vehicles (Bull Dozers) from the carrier, and crossing the river riskily by taking them through the river channel will come to the end. This will save the time of those carriers by at least 3 hours. *The impact will be of high magnitude, regional in scale and long term in duration.*

- **Reduced traffic congestion**

Numerous vehicles carrying the passengers as well as goods run over the bridge and the Karnali Highway. The movement of the numerous vehicles over the single lane Bailey bridge would create the problem of traffic congestion. Hence, the operation of 11 m PSC Girder Bridge would reduce the traffic congestion and enhance the smooth operation of the vehicles. *The impact will be of high magnitude, regional in scale and long term in duration.*

7.2 Adverse Impacts

7.2.1 Physical Environment

Construction Stage

- **Change in morphology, longitudinal profile/river bed and hydrological character of regime of river and inundation in the upstream section**

The construction of bridge does not require diverting the flow of river and the bridge construction will be carried out during the dry season when the water flow of the river is minimal. Likewise, the proposed bridge is single span and the abutment will be constructed at the bank of the river not disturbing the river channel. But the construction of the abutment of the bridge needs to narrow the river channel. *Hence, the impact will be low significance, site specific and short term in duration.*

- **Change in land use and loss of productive soil**

The construction camp and stockpiling of the construction materials need to acquire some land temporarily. About 0.16 ha of the land will be occupied for the construction camp and about 0.04 ha of the land will be required for the stockpiling of the construction materials. No private land is located near the bridge construction as the right of way (RoW) of 30 m (15m on either side of the center line) for this road was declared by Government of Nepal through a gazette notification. Hence, public land will be

acquired for the construction camp and stockpiling. Thus, there will also be no effect on productive soil. *Thus, the impact is low significance, site specific and short term in duration.*

- **Landslides, slope destabilization and soil erosion**

The construction of bridge does not require cutting the hill slopes but for the approach road construction requires cutting large area of hill slopes. The construction of the foundation and approach road for the proposed Tila Khola Bridge requires excavation of about 0.2 ha of land area. The hill slopes are very steep and fragile. Thus, use of heavy machineries like drillers, bull dozers, etc. could destabilize the slope triggering into landslides and soil erosion. *This impact is high significance, site specific and medium term in nature.*

- **Environmental issues associated with sand and gravel extraction**

There are three different locations recommended as quarry sites for the excavation of construction materials. Among them, two are the flood plain of Tila and Karnali Rivers where annual deposits are collected and used as construction materials, while the one is the hill slope along the road alignment which is an old alluvial deposit. The extraction of construction materials from the river flood plain is only sustainable when the materials deposited during the preceded year are used in the following year. Over extraction of the construction materials could result in bank cutting, river bank erosion and even landslides. Furthermore, quarrying over the hill slope is particularly vulnerable as it could trigger into large scale landslides.

This impact will be of medium magnitude, site-specific in nature and medium term in duration.

- **Spoil and construction waste disposal**

The excavation of soil for the foundation of the bridge and approach road will generate about 21,620 m³ of spoil. Out of the total spoil generated, about 15,000 m³ will be used for backfilling. Similarly, some amount of excavated materials will be even used for the river training works. Hence, only about 6,620 m³ of spoil have to be disposed. The random and improper disposal of spoil can be hazardous as the runoff during the rainy season would wash the materials causing water pollution in nearby water bodies and even resulting in several water borne diseases. *Hence, the impact will be medium significance, local and medium term in nature.*

- **Degradation of water quality**

The mishandling of chemicals and oils used in machineries if get contaminated with the river water, it could result the water pollution. Similarly, runoff during monsoon season would erode and transport the

earthen materials from the fresh cut hill slopes for approach road and foundation pit to the river. This would increase the turbidity and contribute the water pollution. *This impact is envisaged to be medium in magnitude, local in extent and medium term in duration.*

- **Approach road and related issues**

About 244 m approach road needs to be constructed for the construction of Tila Khola Bridge at the new location. For the construction of the approach road, hill slopes consisting of low to moderately weathered rocks needs to be cut. Mechanical activities around such rocky terrain are highly likely to cause instabilities around those slopes. *This impact is envisaged to be highly significant, site-specific and short term in duration.*

- **Road diversion and related issues**

The construction of Tila Khola Bridge does not involve the use of road diversion as the existing Bailey bridge serves as the diversion. *Thus, this issue is irrelevant for this project.*

- **Contamination of soil**

The transportation of the hazardous materials during the construction of bridge may be leaked into the ground which can contaminate the soil. Likewise, the waste fuels, grease and lubricants if not managed properly can also lead to land degradation. This can lead to impair growth of vegetation and affect the productivity of the nearby agricultural land. But the proposed bridge is located near the barren land. Hence, this impact will not have serious impact and tends to be localized, affecting only a narrow zone. *Hence, the impact will be low significance, site specific and long term in nature.*

- **Stockpiling of materials/issues related to stockpiling yard**

Materials like sand, gravel, rod, cement, chemicals required during construction are stockpiled. The leakage, mishandling and misuse of these materials could result in soil and water contamination. The impact will be severe in case of chemicals as chemicals released in either soil or water could severely impact terrestrial and aquatic life. However, proper management of stockpiling yard could easily manage this issue. *This impact will be low significance, site specific and short term in duration.*

- **Air and noise pollution**

The operation of machineries during the construction period for the excavation of river terraces in order to construct the foundation of the bridge will be the main source of air pollution, noise and vibration around the surrounding area. Similarly, the operation of crushers around the quarry areas also contribute to the problems associated with noise and vibration. Furthermore, the project vehicles

carrying construction materials will cause air, noise pollution and even vibration problems to the roadside houses. Generators are the only source of electricity around the project area and the operation of generators even contribute to the air and noise pollution. However, since the area is not over crowded and natural settings can easily disperse the air pollutants and absorb noise reducing the magnitude of their impact. *The impact is of low significance, site specific and short term in duration.*

- **Combustible and toxic material management**

Various combustible and toxic materials like petroleum products, oil, grease, etc. will be used during the construction period of the project. Mishandling of these materials can result in several environmental and health related threats like fire, air, soil and water pollution, etc. However, the use of such materials is very low and the chances of accidental release are very low. *Thus, this impact is considered low in magnitude, site specific in extent and short term in duration.*

- **Use of bitumen**

Bitumen is used to make the black top surface of the road. Bitumen heating is hazardous as different toxic chemicals like SO_x, NO_x, Polycyclic Aromatic Hydrocarbons (PAHs), Volatile Organic Compounds (VOCs), etc. These substances when inhaled could cause severe respiratory and skin related hazards. Moreover, long term exposure to such pollutants can result the cancer related to respiratory system. For this particular project the use of bitumen is very less and the heating place will be away from the settlement and even the bitumen will be heated whenever necessary. *Thus, this impact is envisaged to be direct, moderate magnitude, local in extent and short term in duration.*

- **Environmental issues associated with work camp**

The construction camps near the proposed bridge location will generate the domestic wastes such as food waste and other inorganic wastes. These solid wastes if dumped improperly can cause bad odor from the deterioration which increases the flies causing health hazards to the local people. But the solid waste generated will be minimal and these wastes will be dumped in environment friendly manner. *Thus, the impact is of low magnitude, site-specific and short-term in nature.*

- **Occupational health and Safety**

During the construction stage, different heavy machines and equipment would be operated which can pose the threat to the safety of the workers. Likewise, excavation, slope cutting etc. can cause the physical injury to the workers. Similarly, smoke and dust emission, noise generated during the operation of the machines and generators can also causes the occupational health impact to the workers. *The envisaged impact is moderate, site specific and medium in duration.*

- **Accidental risks**

The construction of Tila Khola Bridge will involve the extensive use of various mechanical instruments designed for different kind of activities, involving breaking rocks, digging for the foundation, earth removing, etc. There is always some degree of risks associated with the handling of those machineries. Besides, the pit that are dug for the erection of abutments are particularly risky during night time as people might fall down there, which could cause the death as well. *This impact will be medium in magnitude, site-specific in extent and medium term in duration.*

- **Impacts associated with the transportation of construction materials**

The proposed project is a point project and do not require significantly large amount of construction materials as in road, hydropower, etc. Construction materials like sand, gravel and stone will be sourced locally, while rod, cement, etc. should be transported from Surkhet. The major issues associated with the transportation of construction materials are the traffic congestion and air pollution. *This impact will be medium significance, local and short-term in nature.*

- **Impact associated with bridge safety during project construction**

During the construction period of the proposed bridge, external interventions like movement of vehicles, daily activities of local people, inappropriate river channeling, etc. could pose threat to the safe construction of the bridge. Since, the vehicular movement through the proposed bridge construction section is relatively low and activities of people around the construction are minimal. *This impact is envisaged to be medium in magnitude, site specific in extent and short-term in duration.*

Operation and Maintenance Stage

- **Reinstatement of environmental components (stockpiling yard, labor/contractors camp)**

Upon the completion of the project the project facilities like stockpiling yard, labor/contractors camp, etc. should be reinstated, otherwise they would cause the secondary environmental impacts like soil and water contamination, solid waste problem, etc. *This impact will be medium significance, local in extent and medium term in nature.*

- **Air pollution**

The operation of the bridge would create the easy access to the vehicles and there would be increase in number of vehicles transporting the goods and other materials as well as public vehicles. The increase in number of vehicles would increase the emission of smoke and gas from the vehicles which would increase the air pollution. *The impact is low, local and long term in nature.*

- **Noise and Vibration**

The increase in movement of the vehicles would create the noise and vibration. The vibration induced by the resonance of traffic noise can have a detrimental effect on structures near the road and bridge. *The impact is low, site-specific and long term in duration.*

- **Backwater Effect During Floods**

The operation of the bridge would not block the flow of the water as the foundation of the bridge would not be located at the river. Hence, the backwater effects would be insignificant during floods as the flow of water would not be obstructed by the operation of the bridge.

- **Embankment Erosion**

Since the construction of the bridge will be done as per the standard design approved by the DoR with the implementation of all the activities as per design (including river training works), the chances of river bank erosion is very low. *This impact will be insignificant during operation phase.*

- **Water pollution due to washing of vehicles nearby the river**

Since there is no possible motor way to river, there is no possibility of water pollution due to washing of vehicles nearby the river. *Hence, this impact is irrelevant for this project.*

- **River Channel Shifting**

The construction of the proposed bridge will include the river training works along with it, thus the chances of river channel shifting during the operation phase is very low. *This impact will be insignificant during operation phase.*

- **Stockpiling of materials during bridge maintenance**

The materials used for periodic maintenance during operation phase will be very low and the environmental impact from such activities will be of *low magnitude, site-specific and short term.*

- **Encroachment of DIZ area of bridge**

Upon the construction of bridge, the area round the DIZ will be occupied by the local people. Furthermore, this impact will remain as residual impact and cannot be mitigated.

7.2.2 Biological Environment

Construction Stage

- **Clearing of forestland habitat destruction and loss**

The project does not require the clearance of any trees and hence this impact is not relevant for this project

- **Impact on Aquatic Life**

There will be various mechanical activities along the bank of Tila River during the erection of abutments. During this period river channel has to be narrowed. The involvement of heavy machineries and intensive construction activities along the river channel hinder the activities of aquatic organisms, alongside the destruction of their natural habitat. Similarly, some members of construction crew would involve themselves in fishing activities in their spare time and this would enhance the intensity of fishing activities (as additional people are involved in fishing), causing the population of some fish species to decline. *This impact is envisaged to be medium magnitude, local and medium term in duration.*

- **Disturbance to wildlife and biodiversity**

Since the proposed site for the construction of Tila Khola Bridge is not a wildlife movement corridor and trees are not necessary to be felled, there is no direct primary impact of bridge construction on wildlife and biodiversity. On the other hand, if the construction crew cut the trees from the nearby forest to meet their cooking energy requirement, it would pose threats on the wildlife and biodiversity of the area. *This impact is envisaged to be low magnitude, local and medium term in duration.*

- **Damage to aquatic habitat, and barriers to fish/aquatic movement/migration**

During the construction period of the proposed Tila Khola Bridge, several mechanical works will be carried within and around the river channel. This would disturb the movement of fishes and other aquatic species. Similarly, construction of abutments will destroy all the aquatic plants around the construction site that grows along the bank of Tila River and aquatic organisms relying on those plants for food will get directly affected by such activities. *This impact is envisaged to be medium magnitude, local and medium term in duration*

Operation and Maintenance Stage

- **Barrier Effects on Aquatic animals due to piers and abutments**

As the abutment and foundation of the Tila Khola Bridge will be located at the bank of the Tila Khola and no pillars will be constructed within the river channel, there would be insignificant barrier effect on the movement of aquatic animals.

7.2.3 Socio-economic and Cultural Environment

Construction Stage

- **Social Conflicts**

For the construction of the Tila Khola Bridge, local people would be given high priority to work as a workforce. However, some specified workers would be sourced from other areas. Thus, their presence around the project area would cause dispute with local people. The situation would worsen if the people involved in dispute are drunk. *This impact is envisaged to be indirect in nature, medium in magnitude, site specific in extent and medium term in duration.*

- **Obstruction to social services and facilities**

During the construction phase, the existing Bailey bridge would be used as the diversion bridge. Hence, the construction of the bridge would not have obstruction in vehicular movement. Likewise, no other social services and facilities like, electric poles, drinking water supply, schools, etc. need to be displaced for the bridge construction. Besides, the area around the location of proposed bridge lacks the adequate supply of drinking water, and thus addition of workforce would pose stress on available water resources and even would result in conflict with the local people for drinking water. *This impact is envisaged to be low, site-specific and medium term in duration.*

- **Public grievance related to project construction**

The local people from both Manma and Bharta VDC of Kalikot district heartily welcome for the construction of the proposed project. However, some issues associated to environmental and social problems resulted during the project construction phase might arise and to address this provision for grievance redress mechanism have been included in the mitigation measures of the project. *This impact is envisaged to be medium magnitude, site-specific and medium term in duration.*

- **Loss of productive land**

Productive land will not be lost by the construction of the proposed project and thus this issue is irrelevant for this project.

- **Land and property acquisition, compensation, resettlement and rehabilitation**

The project will directly affect two private built structures belonging to two owners. The details of the structure that are affected by the project are presented in the table below:

Table 7.1: Detail of owners and type of structure affected by the project.

S.N	Structure Owner Name	Address	Kitta No	Distance from bridge (m)	Description of Structure	No of Storey	Present Use	Area in Sqft	Type of structure	Built Year	Remark
1	Govinda Malla	Bharta-8, Kalikot	Aalani	8	Stone, mud and Zinc Sheet roof but deteriorating structure	1	Mill but recently does not operating	300	Traditional	2,061	Gov. Land
2	Padam Bahadur Malla	Bharta-8, Kalikot	Aalani	8	Stone, mud and roof also mud & stone but deteriorating, empty structure	1	Empty	240	Traditional	2,061	Gov. Land

Source: Draft Resettlement Action Plan

Similarly, the detail of the land area affected by the project is presented in the table below:

Table 7.2: Detail of the land affected by the project.

S.N	Cod No.	Land Owner	VDCs	Ward No.	Sheet No.	Kitta No.	Total Area (m ²)	Affected Area	Position	Land Type	Remarks
1	30	Government of Nepal	Bharta-1	1	023-0847	1	448430	No required	No required	Public Land	Kalikot
2	31	Government of Nepal	Bharta-8	8	023-0847	1	3496590	No required	No required	Public Land	

Source: Draft Resettlement Action Plan

This impact is envisaged to be direct, high significant, site specific and medium term in nature.

- **Impact on vulnerable indigenous people and Dalits**

There is no association of project construction and vulnerable indigenous people and dalits, so this issue is not relevant.

- **Impact on religious, cultural and historical assets**

The project will not impact on any religious, cultural and historical sites.

- **Impact on landscape aesthetics**

During the construction stage of the proposed project the aesthetics of the landscape around the proposed project location would be hindered. *This impact will be medium significance, site-specific and medium term in duration.*

- **Impact on private and public properties**

The construction of the bridge will affect two private structures owned by two house owners. But both of the houses are empty with no one living there and encroachment has been the main issue here. None of the public structures are affected by the project. *This impact is envisaged to be medium in magnitude, site-specific in nature and medium term in nature.*

Operation and Maintenance Stage

- **Traffic accidents**

The vehicles will ultimately have greater speed over the concrete bridge compared to the former Bailey bridge and as a consequence there would be increased risk of traffic accidents. However, this impact is probabilistic only and is of less significance only.

- **Congestion around the adjoining areas of Bridge Abutment**

There is no presence of market near the existing bridge. There is no possibility of shifting the market near the proposed bridge location after the operation of the bridge as the bridge will be constructed in the area devoid of private and public land. Hence, the impact is insignificant.

CHAPTER 8: ALTERNATIVE ANALYSIS

The objectives of carrying alternative analysis for the proposed Tila Khola Bridge Project is to identify and recommend best technical, operational and resource options to ensure the minimized environmental and social damage during construction phase, recommend best available and practicable mitigation measures and signal the long term, sustainable operation of the project.

Following are the alternatives considered during the IEE study of the proposed project.

8.1 Location Alternatives

Basically, two alternatives are available for the construction of the proposed bridge. These two alternatives include (i) proposed location and (ii) existing Bailey bridge. These two alternatives are feasible from both technical and socio-economical perspectives. If new bridge is constructed by replacing the existing Bailey bridge, diversion needs to be constructed which has its own socio-environmental impacts and technical challenges. Thus, the proposed location is very suitable as the selection of this alternative does not require the construction of diversion road and is technically and economically feasible to undertake the construction activities. Furthermore, the environmental and social damage upon the approval of this alternative is not severe and can be mitigated by the implementation of mitigation measures proposed in the subsequent chapters.

8.2 Design and Construction Alternatives

The construction of the proposed bridge will involve the environmental friendly approach in which the extensive use of heavy machineries and explosives will be avoided. The locally available workforces will be given first priority in the construction related works. The environmentally sensitive (vulnerable to landslides) areas will first be stabilized considering the fragility of the mountainous areas. The design of the proposed bridge has been carried in such a way that the environmental impact due to bridge construction and the possible impact of environmental hazards on the bridge structures are either minimized or prevented through the application of river training works and other design measures.

8.3 Time Schedule Alternatives

The construction of the proposed bridge will be carried during dry period so that there would not be obstacle on construction activities due to rainfall. Furthermore, during the construction period the construction time and vehicular movement will be synchronized in such a way that both smooth vehicular movement and undisturbed construction activities can be carried out.

8.4 Resource Alternatives

The project will mainly rely on locally available resources to be used as construction materials. The excavated materials during the construction of the approach road will be used for the construction purpose as far as possible. The sand and gravel required for the construction of the proposed bridge will be extracted from the designed quarry site and the minimum environmental damage will be ensured during the extraction.

8.5 No Project Alternative

The existing Bailey bridge over the Tila River has been under operation for about a decade. The load bearing capacity of that bridge is not enough for the movement of heavy vehicles. Furthermore, Bailey bridges are not the long term crossing solution and thus there is no alternative to the construction of concrete bridge over the Tila River

CHAPTER 9: IMPACT MITIGATION MEASURES

This chapter presents the measures and actions proposed for augmenting the identified benefitted aspects of the project, as well as proposing a set of mitigation and precautionary measures to minimize or set off the potential adverse impacts. Four categories of environmental and social mitigation measures are generally identified:

- Preventive or Impact avoidance measures are usually implemented at the project planning and design stage, in order to eliminate or minimize from the onset all anticipated adverse impacts.
- Corrective or Reductive measures are those used to eliminate a source of impact or reduce its intensity to an optimal or acceptable extent.
- Compensatory measures seek to compensate for impacts that cannot be mitigated and for residual impacts of the project after implementation of mitigation measures.
- Enhancement or Benefit Augmentation measures are used to improve existing environmental or social conditions, which are not directly affected by the project. Such measures may be implemented outside the study area. To be efficient, these measures must be defined in cooperation with all stakeholders.

9.1 Beneficial Impact Augmentation Measures

9.1.1 Construction Stage

- **Employment Generation**

During the construction stage of the proposed project, local people will be given opportunities as laborer and among them poor, marginalized, women and dalits will be more emphasis. The contractor will have to source at least 80% of the total construction workers from the local area, and the workers will engage in works as per their skills and knowhow.

- **Enhancement of skills**

During the construction of the bridge, labors will be given training in bridge construction, and even get chance to understand some engineering structures and bioengineering works. They will also be provided with on-the-job training as a part of benefit augmentation measures. The skills they learned while being involved in the construction of Tila Khola Bridge can benefit them as they will be able to do construction related works in other projects too.

- **Increased environmental awareness in local people**

The project will organize environmental awareness program to aware the local people regarding the maintenance of good and harmonious environment around the bridge area. The awareness program will mainly highlight the following issues:

- Discuss the demerits of solid waste and sewage disposal around the bridge abutments and how they cause corrosion over metal and cement surface.
- Solid waste management technique at household level
- Discuss the demerits of extracting construction materials within the 500m premises of bridge.
- Other relevant environmental issues related to project.

9.1.2 Operation Stage

- **Improve mobility and reduce traffic congestion**

The construction of 11m wide concrete bridge will completely eradicate the traffic problems that occurred with the existing Bailey bridge. The project as a part of benefit enhancement measure will make a provision of plantation around the bridge location, and this will not only enhance the aesthetics of the area but also helps to prevent natural disasters. Furthermore, the project will install solar lamp along the approach road and the bridge and this will facilitate the local people to cross the bridge during night time also and even reduces the probability of accidents.

9.2 Adverse Impact Mitigation Measures

9.2.1 Construction Stage

1. Physical Environment

- **Change in morphology, longitudinal profile/river bed and hydrological character of regime of river and inundation in the upstream section**

During the construction of the proposed project, unnecessary scouring of the river bed will be avoided. As the proposed bridge is a single span bridge, river diversion will not be done and a very minimum disturbance on river channel will be made. Furthermore, the spoil generated during the excavation for the abutments will be disposed on a designated spoil disposal site and contamination with the river water will not be made. Since, the gradient of the Tila Khola is very high, the inundation of the upstream region is not possible. However, narrowing the channel during the construction period will have some effect on the upstream velocity of water and could even enhance the bank erosion. Thus, to mitigate this impact, river training work will be carried parallel to the bridge construction. The provision of river training work has been included in the project design.

- **Pollution of water resources**

Following mitigation measures will be adopted to minimize the impact on the Tila River water:

- ✓ Disposal of soil, sludge and other waste directly into water bodies will be avoided.
 - ✓ Prohibition of activities like washing – cloth, dish, etc. near water bodies that contribute to water pollution will be avoided.
 - ✓ Oils and chemicals used in construction vehicles and machineries will be handled properly to avoid the contamination with the water bodies.
 - ✓ Separate toilet facilities will be provided to the construction crew with proper septic tank facilities.
 - ✓ Liquid waste generated within the camp site will be disposed safely without releasing into the water bodies.
 - ✓ Accidental spillage of the oil, grease and other chemical substances will be captured immediately without allowing them to contaminate the water bodies.
- **Prevention of landslides, instabilities, and soil erosion**

The mitigation measures proposed for the prevention of landslides, instabilities and soil erosion due to approach road construction are as follows:

- ✓ Minimize cut slope activities in design as much as possible.
- ✓ Selection of cut and fill slope will be done at correct angle depending the soil type.
- ✓ The retaining structures proposed in the project design will be constructed.
- ✓ Approach road construction will be supplemented with the construction of properly designed side drain.
- ✓ Check dams and gabion structures will be constructed to check landslides and erosion.
- ✓ Re-vegetation of cut and fill slope or exposed are will be done as soon as possible by using species that are recommended in the “DoR Roadside Bio-engineering Reference Manual and Site Handbook, 2002”.
- ✓ Minimum damage of vegetation during construction will be ensured.
- ✓ Use of explosives will be avoided during the construction of the bridge and approach road.

▪ **Change in land use and loss of productive land**

The construction of the proposed Tila Khola Bridge and approach road will require only 2,783 m² of land belonging to various land use categories. The land use categories are existing road; river bank, river channel and barren hill slope. Thus, no significant land use change and loss of productive land will occur. However, the location of camp site and construction material stockpiling site could lead towards the loss of productive land temporarily. Thus, selection of such site will be located over the barren land which would not lead towards serious social and environmental impacts.

▪ **Mitigation of environmental and social damage associated with quarry site operation**

Following measures will be adopted to mitigate the environmental and social damage associated with quarry site operation

- ✓ Authority from the local stakeholders and authority office will be taken prior to the opening of quarry site.

- ✓ Unstable sites, erosion prone areas, dense forest, settlements, fertile farm land will be avoided for quarry operation.
- ✓ In case of river bank quarry, only the materials deposited during the previous year will be collected without disturbing the sedimentation cycle of the river.
- ✓ In case of quarrying over the hill slope, the hill slope will be stabilized by constructing slope protection structures once the quarrying requirements are fulfilled.

- **Mitigation of environmental issues associated with spoil disposal**

Following mitigation measures are proposed for the prevention of environmental issues associated with spoil disposal.

- ✓ Whenever possible, surplus spoil will be used to fill eroded gullies, quarries and borrow pits, depressed areas, etc.
- ✓ Remaining spoil will be disposed in the recommended spoil disposal site in a controlled manner.
- ✓ Disposal of spoil on fragile slopes, farmland, marshy land, forested areas, natural drainage path, canals and other infrastructures will be prohibited.
- ✓ A disposal site will be provided with proper drainage, vegetation and adequate protection against erosion.
- ✓ Vegetation plantation will be done over the spoil disposed surface to reclaim the area.

- **Mitigation of environmental issues associated with the mishandling of chemical substances**

Safety measures will be adopted while handling the hazardous chemicals like oil, grease, etc. Combustible substances like petrol, diesel, etc. will be stored separately in a safe container. Furthermore, the project will have the provision of fire extinguisher throughout the construction period.

- **Mitigation of environmental issues associated with material stockpiling**

The mitigation measures proposed for the minimization of environmental issues associated with material stockpiling are as follows:

- ✓ The land allocated for the storing of construction materials will be far from agricultural land and water bodies.
- ✓ The permission from local stakeholders will be taken before commencing the stockpiling of the construction materials.
- ✓ Construction materials should be covered with tarpaulin during stockpiling to prevent from rain water and dust emission generated from the stockpiling site.
- ✓ Construction materials will be further encircled with side barriers and covered to avoid mix up with deleterious materials.

- **Mitigation measures for air and noise pollution**

During the construction phase, the contractor will use the well-conditioned vehicles and machineries. The well-conditioned vehicles used for transporting the construction materials will generate less smoke that will minimize the air pollution. Likewise, the well-conditioned machineries will produce less noise. Similarly, alternative schedule will be adopted during the operation of vehicles and machineries so that there will not be disturbance on the livelihood of the local people.

- **Mitigation of soil, water and air pollution due to bitumen handling and heating**

The mitigation measures proposed for the minimization the effects of bitumen handling and heating are as follows:

- ✓ Proper handling of bitumen to avoid soil and water contamination.
- ✓ Bitumen heating site will be at least 200m away from the settlement.
- ✓ Unnecessary quantity of bitumen will not be heated.
- ✓ Occupational health and safety measures will be adopted while heating the bitumen.
- ✓ If bitumen is spread over the land accidentally and in improper place then it will be cleared immediately.
- ✓ Bitumen related work will not be carried out during rainy season.
- ✓ Bitumen will not be used discharged into the drain structure while overlaying on the sub-base material.

- **Mitigation for environmental pollution due to the release of solid and liquid waste from the work camp**

- **Following are the mitigation measures proposed for environmental pollution due to the release of solid and liquid waste from the work camp:**

- ✓ Solid waste will be managed following 3 R principle.
- ✓ Bio-degradable waste will be disposed in a separate pit away from the water bodies.

- ✓ Liquid waste will be disposed in a separate ditch and disinfectant will be continuously spread to avoid contamination.
- ✓ Separate sanitary toilet will be construction near the construction camp with the facility of septic tank.
- ✓ Provision of clean drinking water will be made at the construction camp.
- **Occupational health and safety**

To ensure the occupational health and safety of the construction workers following measures have been proposed.

- ✓ The workers will be provided with helmets, masks, muffs depending on the nature of the construction work.
- ✓ Drinking water facility and temporary pit latrine will be established at construction sites to control open defecation and pollution of water bodies by the workers.
- ✓ Workers will be provided with first aid and health facilities. There will be provision for group accidental insurance for the workers.
- ✓ First aid training will be provided to field staffs like observers, social mobilizers and supervisors.

2. Biological Environment

▪ Mitigation for disturbance to wildlife and biodiversity

The mitigation measures proposed for the disturbance to wildlife and biodiversity are discussed below:

- ✓ Construction activity does not require the cutting of tree.
- ✓ Illegal hunting and fishing during construction period by the construction workforce will be strictly controlled.
- ✓ Construction camp will be supplied with LPG and the use of fuel wood will be discouraged.
- ✓ Depending on the local conditions and logistic constraints, meat and fish for contractor's workforce should be supplied by the contractor by purchasing them from market in the area.
- ✓ Trading of animal skin, horns, bones, feathers, etc. will be fully controlled and supervised, and if anybody is found guilty, he/she will be informed to the authority.
- ✓ **Contractor will arrange/buy energy resource for bitumen heating from the authorized source.**

▪ Mitigation of impact on aquatic life

The mitigation of impact on aquatic life due to bridge construction is as follows:

- ✓ Minimum possible disturbance on the river system will be done during the construction stage.
- ✓ River flow will not be completely blocked during any time of construction.
- ✓ Spillage of toxic and hazardous chemicals on water bodies will be avoided.
- ✓ Disposal of solid and liquid waste on water bodies from the construction camp will be completely prohibited.
- ✓ Critical habitat of fishes and other aquatic life will not be disturbed.
- ✓ Construction workers will not be allowed to carry any kind of fishing related activities.

▪ Accidental risk

The mitigation measures proposed to reduce the accidental risk are as follows:

- ✓ Various warning sign post will be installed around the construction area.

- ✓ Local people and visitors will not be allowed to enter the working area.
- ✓ Emergency siren will be installed around the construction area.
- ✓ Provision of lighting facilities will be made during night time throughout the construction period.

3. Socio-economic and Cultural Environment

▪ Social Conflicts

There will be special code of conduct for all the construction crew and they have to strictly follow the code. As per the code the workers will not be allowed to involve in any kind of conflicts and any of the workers are found guilty, they will be punished as per the code.

▪ Obstruction of social services and facilities

As the existing Bailey bridge will serve as the diversion for the movement of vehicles, the existing vehicular movement will not be halted due to the construction of new bridge. Similarly, the project will make the provision of separate drinking water facilities to the camp site. Toilets will be constructed near the camp site so that there would not be pressure on public toilet due to the involvement of construction workers.

▪ Public grievance related to bridge construction

To address the public grievance related to bridge construction following measures have been proposed:

- ✓ Project will form, activate, and maintain Grievance Redress Mechanism around the project area.
- ✓ Activate and maintain Grievance Redress Mechanism in concerned Manager's Office, Resident Engineer's Office, and Contractor's Office.
- ✓ Inform local stakeholders of Grievance Redress Mechanism's existence.
- ✓ Inform local stakeholders about how they can lodge grievance against contractor's fault work for his ratification.

▪ Land and property acquisition, compensation, resettlement and rehabilitation

Project has prepared separate resettlement action plan (RAP) which will address the issue related to the land and property acquisition, compensation, resettlement and rehabilitation. The breakdown of cost for this issue sourced from draft RAP document is presented in the section 10.3.

▪ Impact on public and private properties

The project will not pose direct impact on the public structures, but two private structures will be directly affected by the project. In order to compensate, and rehabilitate the project affected families project have prepared separate resettlement plan.

9.2.2 Operation Stage

1. Physical Environment

▪ Air and noise pollution due to vehicular movement

This is a residual impact and can't be avoided. Thus, mitigation measures are not proposed for this impact

- **Mitigation of environmental issues due to stockpiling of construction materials during regular maintenance**

During the maintenance safe and appropriate site for the stockpiling of construction materials will be selected. The stockpiling will follow all the norms mentioned in the construction stage.

- **Mitigation of road accidents**

Project will install required delineators, safety signs, etc. as per the requirement. Similarly, sign boards at accident-prone spots and busy spots will be installed.

CHAPTER 10: ENVIRONMENTAL MANAGEMENT PLAN

The **Environmental Management Plan** has been formulated to guide for the implementation of environmental safeguard mechanism during pre-construction, construction and operation phase of the project. The plan will include the mechanism for the implementation of environmental mitigation measures, selection of monitoring parameters, monitoring schedule, indicators to ensure the best monitoring practices and the responsibilities of stakeholders of various levels in ensuring the environmental and social safeguard during the implementation of the project.

The stakeholders that are involved for the environmental and social safeguard during the construction and operation of the proposed Tila Khola Bridge are presented in table below.

Table 10.1: Institution and their role in EMP implementation.

Institution	Roles	Responsibilities	Remarks
Ministry of Population and Environment (MoPE)	Formulation and implementation of environmental plans, policies and programs at national level	✓ Providing technical and legal base for the formulation of environmental safeguard measures ✓ Providing guidance during evaluation and monitoring of environmental safeguard mechanism	
Ministry of Physical Infrastructure and Transport (MoPIT)	It is the concerned ministry and has the role of project execution	✓ Review and approval of Initial Environmental Examination (IEE) document ✓ Coordinate with project implementing bodies during the implementation of environmental safeguard mechanism and their monitoring	

Department of Road (DoR)	It is a department under MoPIT and has the role of project execution	✓ Responsibility for the implementation of the project alongside the environmental safeguard measures	
Road Sector Development Project (RSDP)	Foreign cooperation project under the DoR, which coordinates with donors to invest for the road projects in Nepal	✓ Coordination with the donor agencies to invest for the construction of the road ✓ Execution of the road projects	
Geo-Environment and Social Unit (GESU)	Unit under the DoR responsible for technical advice for IEE	✓ Review, comment, and forward ToR and IEE for the approval by the concerned ministry (MoPIT)	
World Bank	Role in decision making for the execution of the project	✓ Responsible for overseeing DoR's project design, implementation of mitigation measures in accordance with their grant/loan conditions including environmental and social safeguards	
Design Consultant	Project design, environmental assessment and social assessment	✓ Prepare a detail engineering design for the project ✓ Prepare IEE report and get approval from the concerned ministry ✓ Prepare resettlement plan for the affected households ✓ Prepare Environmental and Social Management Plan	

Supervision consultant	Role in monitoring the compliance of environmental mitigation measures during construction as guided by the EMP	✓ Oversee the overall implementation of the EMP, provide expertise knowledge, suggestions and recommendations when and where are necessary to minimize/avoid/prevent any adverse environmental damage	
Construction contractor	Role of complying environmental measures into the bridge construction work	✓ The contractor/s must implement all the mitigation measures described in EMP during construction period to mitigate all environmental impacts associated with the construction activities	

Follow flow chart shows the hierarchy of agencies responsible for EMP implementation. The MoPIT being the concerned ministry remains at the highest position of the order and the implementing contractor will work at the base level.

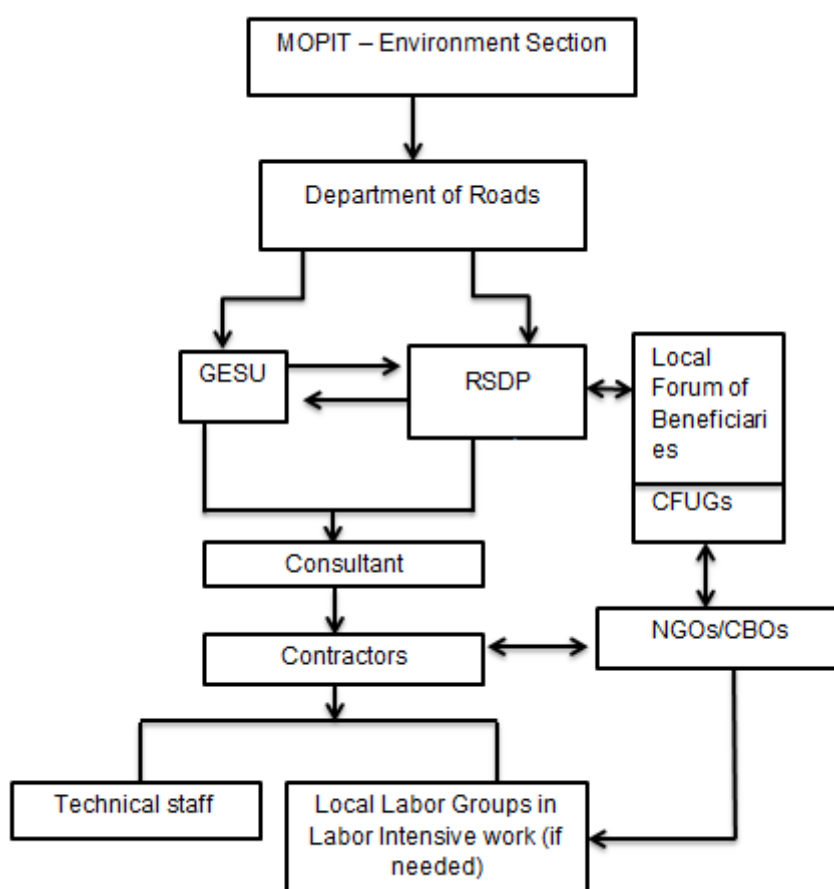


Figure 10.1: Agencies responsible for the implementation of EMP.

10.1 Environmental Monitoring and Reporting

Environmental monitoring is classified into baseline, impact and compliance monitoring depending on the stage of project for which environmental monitoring is carried out.

Baseline monitoring is done prior to the project implementation, in order to identify existing environmental condition. Baseline monitoring is in general carried for all physical, chemical, biological and socio-economic variables. For this particular project baseline monitoring will not be carried since environmental baseline incorporated in **Chapter 6** will cover all the environmental issues prior to the project implementation.

Impact monitoring is in general carried out during the project construction and post construction phases. This type of monitoring mainly focuses on the environmental impacts due to the construction of the project and their mitigation through the appropriate mitigation measures as proposed in the IEE document.

Compliance monitoring focuses on the compliance of technical and legal requirement as mandated in the IEE document. Furthermore, the compliance of standards, rules and regulations formulated by the DoR are also monitored as a part of compliance monitoring. The compliance monitoring is in general carried out during the construction stage of the project.

The specific monitoring indicators selected for this IEE document are presented in table 10.2.

Table 10.2: Specific monitoring indicators selected for the IEE document.

Monitoring Field	Parameters Selected for the Monitoring
Land use, erosion, landslides and waste management	▪ Area (ha) of land, forested and properties deformed (changed) ▪ Number, location and extent of slope failures ▪ Cause analysis for slope failure (natural or man-made) ▪ Nos and extent of gully erosions and pavement failures ▪ Nos of days and nature of traffic delays due to slides ▪ General condition of waste management site ▪ Drainage and erosion condition of the waste management site
Seismicity	▪ Nos and magnitude of local seismic activities and respective damage to structures
Water use and pollution status for both surface and sub-surface flows	▪ Nos and extent of water-logging around the construction sites ▪ Nos of irrigation canals, drinking water taps, etc. that lie within the project construction site ▪ Incidents and trends of waterborne diseases ▪ Blockage of waterways – extent and secondary impacts ▪ Water pollution incidents due to unsafe disposal of spoil ▪ Trend analysis for local fisheries ▪ Records of seasonal groundwater fluctuations ▪ Laboratory tests for river water quality
Air, noise and vibration in relation to traffic volume	▪ Point measurement of noise near the construction site ▪ Qualitative analysis of wind borne dust particles during the construction stage of the project ▪ Qualitative assessment of vibrations sensed around the nearby households of the project construction site
Bridge/Road safety	▪ Speed measurement at both sides of the bridge ▪ Nos and type of accidents recorded by the Traffic Police Office and local health

	service centres that occurred around the bridge ▪ Effectiveness of safety signs
Wildlife habitat disturbance and impacts on forest resources and its mitigation	▪ Nos and extent of accidents inflicting wildlife ▪ DFO records on illegal medicinal plant, wildlife exploitation and trade ▪ Nos, extents and causes of forest fires ▪ Observations and handling of invasive species ▪ Success/failure/effectiveness of roadside plantation
Socio-economic development around bridge location	▪ Demographic, economic and educational status ▪ Nos of HHs and extent of market expansion around the bridge ▪ Nos and extent of new business ▪ Nos and extent of new services and utilities

The monitoring task and reporting work shall be undertaken by the concerned bridge builders, supervising consultants and contractors; during the construction and post-construction period of the bridge as outlined in the EMP framework given below.

10.1.1 Pre-construction Phase Monitoring

The pre-construction phase monitoring shall mainly focus on the existing environmental baseline and evaluate its deviation from the baseline mentioned in IEE report. Furthermore, the pre-construction phase monitoring will emphasize on the evaluation of location for the campsite, material stockpiling site, and quarry site. Similarly, activities like land acquisition, site clearance, etc. will be monitored during the pre-construction phase.

10.1.2 Construction Phase Monitoring

The construction phase monitoring will mainly focus on the proper implementation of mitigation measures, compliances with the design standards and norms as mandated by the IEE report. The supervision consultants will carry the monitoring during the construction phase of the project and conduct the supervision on daily basis and prepare both weekly and monthly progress report.

a. Daily Supervision

Various activities in the construction period like cutting the hill slope for the construction of access road, excavation for the erection of abutments, daily management of spoils, etc. shall be inspected daily. The supervision consultant shall collect daily data and prepare the weekly progress to submit at the project office.

b. Weekly Supervision

In weekly inspection, the Supervising Consultant shall visit the site together with the Contractor to inspect all the works like retaining and breast wall constructions along the approach road, drain construction, quarry/borrow pits, spoil disposal site and disposal practice, etc.

If any activities show noncompliance with EMP then supervising consultants shall document defective works and suggest corrective measures in the weekly report. The supervising consultant shall provide a copy of the weekly report to the contractor and the project within 2 days of the inspection.

c. Monthly Supervision

The monthly inspection will include the field based review of work progress, their compliance with the measures mentioned in the EMP section of the IEE document. The deviation from the mandate of the EMP during construction will be immediately reported and the correction measures will be recommended. The supervising consultant shall prepare a monthly progress report and mention clearly the extent to which the mitigation measures are adopted the construction activities. The supervising consultant shall provide a copy of the monthly report to the project and the contractor within 4 days of the inspection of action.

10.1.3 Post-construction Phase

Supervising consultant shall undertake a post-construction certification inspection of each completed activities including the bridge, approach road, spoil management site, quarry site, camp site and material stockpiling site. If any of the mitigation measures as proposed by the EMP of the IEE are either not implemented or have defects, the monitoring consultant will immediately report to the project office and the contractor for its correction. If everything implemented are as per the mandate the project shall be approved for the operation.

10.1.4 Operation Phase

Environmental monitoring of the bridge during the operation phase shall focus on the key environmental issues identified during project design including river channel, condition of approach road, drainage, etc.

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

- ✓ River channel
- ✓ Condition of slope around the approach road
- ✓ Condition of spoil management site
- ✓ Drainage condition along the approach road

- ✓ Socio-economic condition around the bridge

The details of guideline for compliance and impact monitoring are presented in table 10.3 and 10.4.

Table 10.3: Compliance monitoring parameters with respective indicators.

Parameters	Verifiable Indicators	Verification Methods	Schedule	Responsible Implementing Agency	Responsible Monitoring Agency
Final location and design as per IEE/EMP recommendation	Incorporation of IEE/EMP recommendations into location and design selection and finalization	Site observation and verification	Preconstruction phase	Consultant	Proponent/RSDP, DoR
Site selection and preparation of construction logistics	Project's arrangement of material storage, and construction activities (e.g.: campsite, material stockpiling site, etc.)	Site inspection, general sketch and photographs	Beginning of construction phase	Technical consultant, contractor	Proponent (RSDP, DoR)
Use of local labour, particularly vulnerable groups and women	Number of local labours employed in project	Records of the local recruitment bodies who facilitate and coordinate the process for local people's employment, interview	Once a month for the entire construction period where labour work is contracted	Contractor	Proponent
Occupational Health and Safety Issues	Health and safety regulation, first aid and medical arrangements, provision of safety equipment and measures, sanitation of labour	Spot checks at camps and work sites, photos, accident records, causes	Once a month throughout the construction phase	Contractor	Proponent

Parameters	Verifiable Indicators	Verification Methods	Schedule	Responsible Implementing Agency	Responsible Monitoring Agency
Environmental protection measures, including pollution prevention, water and soil management, slope stabilization, cut and fill, spoil and waste management, environmental and socially critical sites, protection of fauna and flora	Arrangement specified in the code of practice and in manuals relating to environmental protection; records and observations on pollution, waste management, spoil disposal. Training programmes for labourers to prevent impacts on wildlife sensitive habitats, forests and fuel wood use.	Site inspection, discussion with project management, consultants, and local people. Quantifying site-specific impacts, photos, laboratory tests where required. Existing patrol, control and enforcement mechanisms, enforcement records.	Before and during construction period	Consultant (for baseline survey) Contractor	Proponent, consultant
Pressure on forest and wildlife	Use of firewood or fossil fuel by construction crew, events of hunting and poaching of wildlife	Inspection and interview	Regular by contractor, once a month by consultant	Contractor	Proponent, consultant
Air and noise pollution	Visual inspection and frequency of	Interview data, photographs, noise level	Regular by	Contractor	Proponent,

Parameters	Verifiable Indicators	Verification Methods	Schedule	Responsible Implementing Agency	Responsible Monitoring Agency
	air borne respiratory infection with the consultation with local people Noise level measured around the construction area	meter record	contractor, once a month during construction by consultant		consultant
Water pollution	Visual inspection, open defecation and waste disposal around water sources near construction sites and labour camp	Site inspection, interview	Regular by the contractor, once a month by the supervision consultant	Contractor	Proponent, consultant
Public health and accident risk	Health and safety regulations, first aid and medical arrangements, contingency plan, safety awareness programme. Provision of toilet and waste management facility to the construction crew	Spot checks at camps and work sites, photos, accident records from Traffic Police, Training records and materials, road signs	Once in two months by consultants	Contractor	Project

Parameters	Verifiable Indicators	Verification Methods	Schedule	Responsible Implementing Agency	Responsible Monitoring Agency
Adequate technical and environmental supervision	Adequate number of technicians mobilized regularly at site. Ability to implement labour based bridge construction concept	Check number and type of technicians available at site. Skill of work carried out. Discussion.	During construction by contractor. Once a month by consultant	Consultant	Proponent
Clean up and reinstatement of the construction site, camps, quarries and burrow pits	Decommissioned sites should not indicate any adverse and residual environmental impacts, and should be rehabilitated to the satisfaction of supervision consultant and land owners	Site observation, comparative photos, consultation with land owners	At the end of construction period	Contractor	Proponent

Table 10.4: Parameters selected for the impact monitoring.

Parameter	Verifiable Indicators	Verification Methods	Location	Schedule	Responsible Implementing Agency	Responsible Monitoring Agency
Slope Stability	Inclination, Slope failures,	Site observation,	Near steep	Continuously during	Technical consultant	Proponent,

Parameter	Verifiable Indicators	Verification Methods	Location	Schedule	Responsible Implementing Agency	Responsible Monitoring Agency
Erosion	causes; Drainage facilities such as catch drain, side drains and functionality of DC structures; Fresh gullies and erosion Success/failure of bio-engineering solutions	photos Discussion with people and technicians	slopes and at slide areas and sites where bio-engineering failed	construction and operation	Maintenance Division DoR	
Bio-engineering of Disturbed Slopes	Re-vegetation through bio-engineering application on disturbed slope Establishment of nursery	Site observation Inspection of nursery and its production rate; photos, measurements	Cut slop area, where vegetation is cleared; Nursery	During and at end of project construction	Contractor	Proponent, Consultant
Disposal of Spoils and Conservation wastes	Initiated erosion, affected aesthetic value, affected forest and agriculture, initiated land erosion by local blocked drainage, hazard to downhill slope residents and agricultural lands	Site observation and interviews, photos, geo-referencing sites	At specific locations where such sites occur	During construction	Contractor	Proponent, Consultant

Parameter	Verifiable Indicators	Verification Methods	Location	Schedule	Responsible Implementing Agency	Responsible Monitoring Agency
Quarrying of Conservation Materials	Initiated erosion, change in river regime, erosion by river systems, landslide due to quarrying, degradation of vegetation, water logging, waterborne diseases	Site observation, photos Records from local health centers	Quarry site areas	During construction	Contractor	Proponent, Consultant Health Posts
Disruption of Drainage System	Status of rehabilitation Service status of irrigation and water supply system, Operation and maintenance requirement	Observation and interviews, photos, fisheries data, wildlife records	Disrupted aquatic system, irrigation schemes	During construction	Contractor	Proponent, Consultant
Water Quality	Turbidity and general status of nearby water bodies Some physio-chemical properties like pH, DO, conductivity, other chemical parameters	Visual inspection, sampling and laboratory analysis of water quality parameter	Nearby water bodies	During Construction and operation	Contractor	Proponent, consultant
Air Quality	Atmospheric dust	Visual inspection	At construction sites and at	During construction and operation	Contractor	Proponent, consultant

Parameter	Verifiable Indicators	Verification Methods	Location	Schedule	Responsible Implementing Agency	Responsible Monitoring Agency
			sensitive spots (Schools, hospitals)			
Forest and vegetation	Numbers of trees, presence of group vegetation, signs of illicit logging and extraction of NTFPs	Observation, DFO record, photos, stakeholder interviews	In and around the construction sites, markets	During construction and operation	Contractor	Proponent, consultant
Harvest/ trade of Medicinal herbs	Sales of medicinal herbs increased	Observation, interview, photos	Project Areas and markets	During operation	Local stakeholders	DFO, local stakeholders
Wildlife	Wildlife hunting trapping and poaching by work force, Trade of Wildlife, Biological survey on selected biota	Interview with local people/DFO, Photos Observations	Forest areas at roadside	Throughout project	Contractor, LCF, DFO	Proponent, Consultant DOF
Change in Economy	Numbers of people employed by the project during construction Numbers of women in work	Records kept by the project management, discussion with people	Project Area	Twice a year during construction and operation	Contractor, Consultant,	Proponent

Parameter	Verifiable Indicators	Verification Methods	Location	Schedule	Responsible Implementing Agency	Responsible Monitoring Agency
	forces Changes in land use pattern					
Trade and Commerce	Number of shops increased or decreased, rental of houses and land spaces	Records, interview, observations, photos	Project Area	Throughout project	Consultant	Proponent, VDC
Industries	Establishment of industries in the vicinity of Project Area	Records and interview, photos	Project Areas/Zone of influence	Throughout project	Consultant	Proponent, VDC,
Occupational Safety and Hazard	Type of number of accident occurred during construction, Adequacy of occupational safety measured provided Compensation provided in case of fatal accidents or invalidity	Observation, photos, spot checks, Contractors and health centre records interview with laboures	Project Area	During construction	Contractor	Proponent, Consultant Health Authorities

10.2 Environmental Management Plan

The complete sets of environmental enhancement and mitigation measures have been formulated for the sustainable implementation of Tila Khola Bridge. The environmental management plan ensures the involvement of all the parties that are directly and indirectly associated with the construction of Tila Khola Bridge. The framework for the environmental management plan for beneficial impacts and adverse impacts are presented respectively on table 10.5 and 10.6.

Table 10.5: Framework for benefit enhancement measures.

Beneficial Environmental Impact	Affected Location	Benefit Augmentation Measure	Enhancement Cost	Responsible Agency	
				Implementing Agency	Supervising Agency
Employment Opportunities	Entire project area	Involvement of poor, dalit, women and ethnic minority people in the construction related works and providing life skill training for income generation activities	No additional cost required	Contractor	Supervision consultant/DoR
Enhancement of technical skills	-	Involvement of the local people in the project construction activities will serve to enhance the level of skills so that they can involve themselves in similar kind of activities in near future. Those involved as labour can learn the skill of Manson, painters, etc. Similarly, there is a provision of training for the project affected family	Cost for IRSDT for the project affected families is included in Resettlement Action Plan. Training to work force will be provided.	Contractor	Supervision consultant/DoR

Beneficial Environmental Impact	Affected Location	Benefit Augmentation Measure	Enhancement Cost	Responsible Agency	
				Implementing Agency	Supervising Agency
Enhancement of local economy	Project area	Priority to local product and services will be given	No additional cost	Contractor	Supervision consultant/DoR
Safe and upgraded transportation facilities	Entire project area	Construction of permanent bridge will ultimately serve as the benefit augmentation measure.	No additional cost	Contractor	Supervision consultant/DoR
Increase in Awareness and training	Project impact area	Sub-project will provide awareness trainings related to solid waste management, health and sanitation issue, and conservation of wildlife and biodiversity. For this a 3 day training program will be provided to the locals of the project impact area (both DIA and IIA) Training will be provided to the local regarding river training, protection of river and protection	30,000 (@10, 000 per day)-included in BoQ	Project Implementation agency (RSDP)	Supervision consultant/DoR

Beneficial Environmental Impact	Affected Location	Benefit Augmentation Measure	Enhancement Cost	Responsible Agency	
				Implementing Agency	Supervising Agency
		of embankment (bioengineering) etc.			
Reduced Traffic accidents and congestion	Entire project area	Unnecessary stoppage of vehicles will be reduced by placing no parking zone around the bridge axis. Similarly, the wide bridge will even help to minimize the traffic accidents	No additional Cost	Contractor	Supervision consultant/DoR

Table 10.6: Framework for adverse impact mitigation measures.

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
Physical Environment/Characteristics:							
Bridge Construction	Change in morphology, profile and water regime of river	- Project will not unnecessarily scour the river bed. - River diversion will be done whenever necessary. - Minimum disturbance will be done during the construction phase. - The spoils generated during the excavation will be disposed-off immediately.	Bridge construction area	During construction	No additional cost required	Contractor	Supervision consultant/DoR
Bridge construction, camp site operation, spoil	Pollution of water resources	Spoils generated during the excavation will be disposed-off safely in the designed spoil disposal site.	Bridge construction area, spoil disposal site	During construction and quarrying	No additional cost required	Contractor	Supervision constultant/DoR

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
disposal and quarry site operation		- Oils and chemicals used in construction vehicles and machineries will be handled properly to avoid the contamination with the water bodies. - Separate toilet facilities will be provided to the construction crew with proper septic tank facility. - Liquid waste generated within the camp site will be disposed safely without releasing into the water bodies. - Accidental spillage of the oil, grease and other chemicals substance will be captured immediately without allowing	and quarry site				

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
		them to get contaminate the water bodies					
Approach road construction	Landslides, slope destabilization and soil erosion	- The retaining structures proposed in the DPR will be constructed. - Approach road will be supplemented with the construction of properly designed side drain. - Check dams and gabions structures will be constructed to check landslides and erosion	Around the approach road	During construction	Included in project detail design	Contractor	Supervising consultant/DoR
Camp site operation	Loss of productive land	Camp site will be established on recommended barren land to avoid the loss the productive land	Around the camp site	During construction phase	No additional cost	Contractor	Supervising consultant/DoR

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
Operation of quarry site	Environmental and social damage associated with quarry site operation	- Authority from the local stakeholders and authority office will be taken prior to the opening of new quarry. - Unstable sites, erosion prone areas, dense forested areas, settlements, fertile farm land will be avoided for quarry operation - In case of river bank quarry, only the materials deposited during the previous year will be collected without disturbing the sedimentation cycle of the river. - In case of quarrying over the hill slope, the hill slope will be stabilized by	Around the quarry site	During quarrying	No additional cost	Contractor	Supervising consultant/DoR

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
		constructing the slope protection structures once the quarrying requirements are meet.					
Chemical handling	Environmental issues associated with the mishandling of chemical substances	• Proper safety measures will be adopted while handling the hazardous chemicals like oil, grease, etc. • Combustible chemicals like petrol, diesel, etc. will be stored separately in a safe container. • Project will have the provision of fire extinguisher throughout the construction period.	Around the construction site, and camp site	During construction period	Cost given in table 10.9.	Contractor/project	Supervision consultant/DoR
Construction materials	Environmental issues	• The land allocated for the storing of construction	Material	During construction	No additional	Contractor	Supervision

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
stockpiling	associated with the material stockpiling	materials will be far from agricultural land and water bodies. • The permission from the local stakeholders will be taken before commencing the stockpiling of the construction material. • Construction material should be covered with tarpaulin during stockpiling to prevent from rain water and dust emission generated from the stockpiling site. • Construction materials will be further encircled with side barriers and covered to avoid mix up with deleterious materials.	stockpiling site	period	cost		consultant/DoR

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
Spoil disposal	Environmental issues associated with spoil disposal	- Whenever possible, surplus spoil will be used to fill eroded gullies, quarries and borrow pits, depressed areas, etc. - Remaining spoil will be disposed in the recommended spoil disposal site in a controlled manner. - Disposal of spoil on fragile slopes, farmland, marshy land, forested areas, natural drainage path, canals and other infrastructures will be prohibited. - A disposal site will be provided with proper drainage, vegetation and adequate protection against	Spoil disposal area	During construction period	Cost given in table 10.9.	Contractor/CBOs/Project	Supervision consultant/DoR

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
		erosion. Vegetation plantation will be done over the spoil disposed surface to reclaim the area.					
Operation of project vehicles and machineries	Air and noise pollution	- Contractor will use the conditioned vehicles and machineries. - Alternative schedule will be adopted during the operation of the vehicles and machineries so that there will not be disturbance on the livelihood of the local people	Construction site and quarry site	During construction period	No additional cost	Contractor	Supervision consultant/DoR
Bitumen handling and heating	Soil, water and air pollution	- Proper handling of bitumen to avoid soil and water contamination. - Bitumen heating site	Approach road and bridge	During construction period	Included in project detail design	Contractor	Supervision consultant/DoR

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
		will be at least 200m away from the settlement. • Unnecessary quantity of bitumen will not be heated. • Occupational health and safety measures will be adopted while heating the bitumen • If bitumen is spread over the land accidentally and in improper place, then it will be cleared immediately. • Bitumen related work will not be carried out during rainy season. • Bitumen will not be used discharged into the drain structure while overlaying on the sub-base material.					

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
Work camp operation	Environmental pollution due to the release of solid and liquid waste from the work camp	• Solid waste will be managed following 3 R principle. • Bio-degradable waste will be disposed in a separate pit away from the water bodies. • Liquid waste will be disposed in a separate ditch and disinfectant will be continuously spread to avoid contamination. • Separate sanitary toilet will be construction near the construction camp with the facility of septic tank. • Provision of clean drinking water will be made at the	Labour camp	During construction period	No additional cost	Contractor	Supervision consultant/DoR

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
		construction camp					
Vehicular movement	Air and noise pollution	This is a residual impact and can't be avoided. Thus, mitigation measures are not proposed	Approach road and bridge	During operational period	No additional cost	-	-
Regular maintenance	Environmental issues due to stockpiling of construction materials during regular maintenance	Selection of safe and appropriate site for material stockpiling	Bridge	During operation period	No additional cost	DoR	DoR
Bridge construction	Occupation health and safety of	The workers will be provided with helmets, masks, muffs depending on the nature of the construction work.	Construction area	During Construction period	Included in project design	Contractor	Supervision consultant/DoR

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
	workers	- Drinking water facility and temporary pit latrine will be established at construction sites to control open defecation and pollution of water bodies by the workers. - Workers will be provided with first aid and health facilities. There will be provision for group accidental insurance for the workers. - First aid training will be provided to field staffs like observers, social mobilizers and supervisors.					
Bridge construction	Accidental Risk	Various warning sign post will be installed around the	Around construction	During construction period	Included in project design	Project/contractor	Supervision consultant/DoR

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
		construction area. - Local people and visitors will not be allowed to enter the working area. - Emergency siren will be installed around the construction area. - Provision of lighting facilities will be made during night time throughout the construction period.	area				
Operation of bridge	Road accident	- Project will install required delineators, safety signs, etc. as per the requirement. - Installation of sign boards at accident-prone spots and busy spots.	Around the project area	During operation stage	Included in detail design	Contractor	Supervision consultant/DoR
Biological Environment:							

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
Bridge construction	Disturbance to wildlife and biodiversity	- Construction activity does not require the cutting of tree. - Illegal hunting and fishing during construction period by the construction workforce will be strictly controlled. - Construction camp will be supplied with LPG and the use of fuel wood will be discouraged. - Depending on the local conditions and logistic constraints, meat and fish for contractor's workforce should be supplied by the contractor by purchasing them from market in the area.	Construction camp	During construction period	No additional cost	Consultant	Supervision consultant/DoR

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
		- Trading of animal skin, horns, bones, feathers, etc. will be fully controlled and supervised, and if anybody is found guilty, he/she will be informed to the authority. - Contractor will arrange/buy energy resource for bitumen heating from the authorized source					
Bridge construction	Impact on aquatic life	- Minimum possible disturbance on the river system will be done during the construction stage. - River flow will not be completely blocked during any time of construction. - Spillage of toxic and hazardous chemicals	Around construction site	During construction period	No additional cost	Contractor	Supervision consultant/DoR

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
		on water bodies will be avoided. • Disposal of solid and liquid waste on water bodies from the construction camp will be completely prohibited. • Critical habitat of fishes and other aquatic life will not be disturbed. • Construction workers will not be allowed to carry any kind of fishing related activities					
Socio-economic and Cultural Environment:							
Bridge construction	Social conflicts	• The labour should comply with the code of conduct set by the contractor		During construction period	Not applicable	Contractor	Supervision consultant/DoR

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
Bridge construction	Obstruction of social services and facilities	- Separate facilities of drinking water and other services will be made on camp site. - Construction schedule will be developed to facilitate the smooth movement of vehicles.	Around construction area	During construction period	No additional cost required	Contractor	Supervision consultant/DoR
Bridge construction	Impact on private and public properties	- The project will not have direct impact on the public structures; four private structures will be directly affected by the project. - Project has prepared a separate resettlement plan and based on the resettlement plan the compensation to the private properties will be made.	Around the construction area	During pre-construction stage	Included in resettlement cost	Project	Supervision consultant/DoR

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
Bridge construction	Public grievance related to bridge construction	- Project will form, activate, and maintain Grievance Redress Mechanism around the project area. - Activate and maintain Grievance Redress Mechanism in concerned Manager's Office, Resident Engineer's Office, and Contractor's Office. - Inform local stakeholders of Grievance Redress Mechanism's existence. - Inform local stakeholders about how they can lodge grievance against contractor's fault work for his	Around the construction area	During pre-construction and construction stage	No additional cost	Project/Contractor	Supervision consultant/project

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/Supervision
		ratification.					
Bridge construction	Land and property acquisition, compensation, resettlement and rehabilitation	Project has prepared a separate resettlement plan which address the issues related to the land and property acquisition, compensation, resettlement and rehabilitation	Around project area	During pre-construction stage	Cost included in resettlement plan	Project	Project/local stakeholders/local government authority

10.3 Cost for Execution of EMP

10.3.1 Details of Specific Cost

a. Land, properties acquisition, resettlement and rehabilitation cost

The project has already prepared Resettlement Action Plan (RAP) and has identified four households to be directly affected by the project. The specific cost estimated as mentioned in draft RAP is presented here. ***This cost will not be added in this report.***

Table 10.7: Cost associated with resettlement and rehabilitation.

1. Direct Cost			
A Compensation & Rehabilitation			
I. Estimated compensation for private structures (including dismantling cost)	Number	2	450,000
II. House displacement allowance	Number	2	40,000
III. Transportation allowance	Number	2	20,000
IV. Business displacement	Number	2	20,000
V. Support Allowance	Number	0	00,000
Grand Total			530,000

(Source: Draft RAP)

b. Cost of tree plantation

The project does not need to cut the trees. The tree plantation has been proposed to enhance the local aesthetics of the local area. Altogether 60 trees have been proposed to be planted in this report. Out of 60 trees, 30 of them will be planted along the approach road and 30 of them will be planted around the spoil management site. The cost estimate for the plantation of trees is presented below:

Table 10.8: Cost of tree plantation

Activities	Cost in Rs.	Remarks
Plantation of 60 saplings, including site preparation, pitting and mulching	6,000	Lump sum cost of NRs. 100/sapling (including cost for site preparation, pitting and mulching)
Replacement of 20 dead saplings at the rate of Rs. 70	1,400	Assuming 30% mortality

Tools	2,000	Lump sum
Tending and maintenance for 5 years	10,000	Lump sum
Sub-total	19,400	

c. Cost for awareness rising and mitigation measures

Items to be included as a safeguard to local environment-in bid document for the likely adverse impact associated with the proposed bridge construction and other as outlined in EMP require to be addressed and also ensure to being incorporated in BOQ.

Table 10.9: Cost for mitigation measures for physical and cultural environment.

Environmental Issues	Unit	Rate (Rs)	Amount (Rs)	Remarks
Camp site • Contractor Office/ Workshop • Labor camp	Lump Sum	600,000	600,000	Contractor will bear the cost of labor force site including land/house hire, fuel, drinking water supply, electricity etc.
Capacity Building • Pre-construction orientation to the senior level bridge engineer and mid-level bridge engineer • Training (work force)	• Lump sum Lump Sum	30,000 20,000	30,000 20,000	Senior level bridge engineer, mid-level bridge engineer, site supervisor and labor force

Safety gadget	18 months	5000	90,000	Project is planned to be completed in 24 months however, working period will be 18 months avoiding 3 monsoon months. Safety gadget will be provide to work force, visitors, supervision consultant.
Awareness Raising Program to the local	3 day	10,000	30,000	Training related to health and sanitation, biodiversity conservation will be provided to the people of Project DIA and IIA
Quarry, Rock break, river bed extraction site rehabilitation	Lump Sum	30,000	30,000	Reinstatement of quarry and river bed extraction site
Safe disposal of spoil including transportation and rehabilitation of site	1245	30	37350	The cost includes transportation of spoil to the designated site, and rehabilitation of the site

Relocation of Public Structures	NA	-	-	None of the public structures needs to be relocated by the project
Bitumen Heating (Safe storage, heating and handling and closure)	Lump Sum	20,000	20,000	
Construction of Berms and fencing of stockpiling materials	Lump Sum	10,000	10,000	Contractor will bear the cost for protecting the stockpiling materials
Fire Safety Gadget	6	4,000	24,000	
Sub-Total			891,350	

c. Cost of environmental monitoring

This report assumes that the supervision consultant will take all the responsibility for the environmental monitoring of the project and the cost of environmental monitoring are allocated according to that.

Table 10.10: Cost of environmental and social monitoring.

Specification	Man Month	Rate	Amount
Environmental Expert	3	100,000	300,000.00
Social Expert	2	80,000	160,000.00
Stationary and computer	Lump Sum		20,000.00
Printing and Photocopies	Lump Sum		50,000.00
Transportation	Lump Sum		150,000.00
Cost of Monitoring by GESU	Lump Sum		150,000.00
Cost of Monitoring by	Lump Sum		150,000.00

MoPIT			
		Sub-Total	980,000.00

10.3.2 Total Cost for EMP Implementation

The breakdown of the cost for the implementation of Environmental Management Plan is presented in table below:

Table 10.11: Total cost for implementation of EMP.

S.N.	Activities	Cost	Remarks
1	Mitigation measure under physical environment	8,91,350.00	
2	Tree Plantation	19,400.00	
3	Mitigation measure under socio-economic and cultural environment	30,000.00	
4	Environmental Monitoring	980,000.00	
Total Cost of EMP implementation		19,20,750.00	

10.4 Grievance Redress Mechanism

At project level a grievance redress mechanism will be established allow project affected persons (PAPs) to appeal any disagreeable decisions, practices and activities arising compensation for assets, and technical and general project-related disputes. As specified in ESMF the PAPs will be made fully aware of their rights and the procedures for doing so verbally and in writing during compensation, survey, and time of compensation.

There is potentiality of two types of grievances: grievances related to resettlement requirements, and grievances related to compensation or entitlement.

The PAPs will have access to both locally constructed grievances redress committees specified under ESMF i.e. Local Consultative Forum (LCF) and formal courts of appeal system. Under the latter system, every PAP can appeal to the court if they feel that they were not compensated appropriately. They may appeal to appellate court within 35 days of the public notice given to them.

Grievance recording register will be maintained at PIC office. Project affected people as well as local people can lodge their complaints at these offices related to assets acquisition and construction related activities. Special project grievance mechanisms such as on site provision of complain hearings allows

project affected persons to get fair treatment on time. In this sub project one LCF will be formed in bridge location site to handle initial grievances of the project-affected people. The PAPs will have unhindered access to the grievance redress office to forward and file them complains without being intimidated or being deterred by excessive bureaucratic hurdles. The provision of Local Community Liaison Assistant (LCLA) in the project implementation is good practices in this regard. LCLA can be mobilized in order to help PAPs to file the complaints to the concerned agency. APs will be exempted from all administrative fees incurred, pursuant to the grievance redressed procedures except for cases filed in court Proposed mechanism for grievance resolution is given below:

Box: 1 Stage of Grievance Mechanism

Stage1: Complaints of PAPs on any aspect of compensation, relocation, or unaddressed losses will be settled in first instance verbally or in written form in field based project office. The concerned personnel to settle the issues at local level can discuss the complaint in an informal meeting with the PAP. The community consultation, involvement of social and resettlement experts will be helpful in this regard. It will be the responsibility of the LCF and Project In-charge to resolve the issue within 15 days from the date of the complaint received.

Stage2: If no understanding or amicable solution reached or no response from the project office, the PAP can appeal to the CDC. While lodging the complaint, the PAP must produce documents to support this/her claim. The CDC will provide the decision within 15 days of registering the appeal.

Stage3: If the PAP is not satisfied with the decision of CDC or in absence of any response of its representatives within 25 days of the complaint the PAP in his/her last resort may submit the appeal to

10.5 Contractors Mitigation Plan

Contractors should carry Environmental Management Plan provided during the tender document. The Contractor shall follow the guidelines identified in the document. Environmental issues in general and contractor activities include. The contractor should submit the concise site specific EMP, for contract related aspects, adhering with the one with this EMP which will be submitted before commencement of project construction work. Contractor should submit a construction site for its job environmental program for environmental supervision engineers, management consultants and owners of the external environment review before the construction commences. In general, Environmental protection measures includes

10.5.1 Onsite Facilities

- **Hiring of Workforce**

- Priority should be given to local workforce for sub-project construction
- If possible, at least 33% women are to be employed
- Use of child labour should be strictly regulated
- Priority should be provided to Dalits, Janajatis and minorities
- The Contractor should publish notice informing the requirements of workforce (different job position) for construction purposes in VDC
- Construction staff should have employment contracts.
- The Contractor should provide the education and training of construction workers regarding construction technology, environmental protection and occupational health and safety.

- **Establishment of Construction Camp**

- Take prior consent from the concerned from the concerned authority i.e., VDC;
- Contractor should provide safe accommodation facilities;
- Men and women workers should be independent of having facilities such as toilet; bathrooms. Toilet should be marked indicating man and woman;
- At least 1 toilet for 10 workers should be provided;
- Sustained supply of water should be provided;
- Lighting facility should be established;
- The hygiene condition of kitchen should be well managed;
- Camp site should be established at least 10 m away from the drainage line;
- Construction camp should be provided with first aid treatment facilities;
- Provision of fire safety should be made within the labour camp.

10.5.2 Code of Conduct

Code of conduct emphasizing appropriate behavior, respect to local culture and norms, drug and alcohol abuse, gender respect etc., to be followed by workforce should be strictly implemented. Code of conduct includes but is not limited to the following actions.

- All workforce should abide by the existing national laws and regulation
- Gambling activities is prohibited
- Use of pornography materials is strictly prohibited
- Do not carry or bring dangerous goods and weapons
- Do not quarrel with co-workers
- Unnecessary connection to the locals is regulated
- Respect the local culture and traditions
- Do not act creating obstruction to regular activities of local people.

Notice board advising about the prohibited act as follows should be established within the project area

Prohibited acts
• Harm wildlife and livestock villagers adjacent areas; • Hunting and harassment of wildlife • Unnecessary picking and harm to plant • Fishing in the rivers • Buy meat of wildlife • Collection of wildlife body parts and plants • Affect or destroy objects of historic or architectural value; • Outdoor lighting of fire; • Working hours drinking; • Mechanical maintenance (oil and lubricant supply) outside the designated area; • Dumping outside the designated area; • Dangerous driving on local roads; • Impact on nearby residents; • Leakage of pollutants, such as: Oil, paints, lubricant • Littering of waste;

- Incineration;
- Involving in prostitution, gambling and other social violation
- Go outside without permission

Any contractor, office staff or other staff, if found in violation of the above rules, depending on its severity should be released verbal criticism to disciplinary labor contracts.

10.5.3 Health and Safety

Contractor should ensure all the health and safety complying with national and local safety regulations and other measures to avoid damage;

- Training on occupational health and safety measures should be provided to the workforce before the construction commences
- Fencing should be done on critical construction areas
- Unauthorized entry on construction site should be prohibited
- Construction camps should be equipped with fire extinguishers and other firefighting equipment;
- Adequate provision of personal protection equipment's (for example: goggles, protective gloves , protective masks, dust cover, helmet , ear protectors , helmets , etc.) , should be provided to the workforce
- Safety procedures, emergency plans and emergency contact information, etc. should express at the construction site Notice board;
- Warning signs on dangerous places should be placed.
- Contractor should take all reasonable measures to prevent risks and ensure that all construction sites and camps have been providing fire protection equipment;
- The Contractor should provide basic first aid services and emergency measures for the construction workers;

10.5.4 Storage of Fuel, Oil and Hazardous Substances

- Separate storage facility for paints, fuel, oil and hazardous substances should be established;
- Unauthorized entry to the site should be prohibited;
- Machineries and equipment should be maintained in the designated site;
- The maintenance site should be at least 100 m away from the water sources;
- The leakage of oil, paints, lubricants should be immediately recovered and safely disposed of;

- Provision of fire extinguisher and fire safety should be made on the storage facility.

10.5.5 Waste Water Management

- The liquid and semi liquid waste should be collected and safely disposed of in designated site by constructing septic tanks;
- Runoff from construction site should be trapped through appropriate temporary drainage and guide it to the disposal areas;
- The disposal areas should be covered after the work completed;
- Do not perform the construction activities on monsoon season and heavy rain condition.

10.5.6 Solid waste Management

- Construction camp and construction sites should be facilitated with litter bins and haphazard littering should be regulated;
- Designate separate waste disposal site for waste disposal-and disposed based on bio degradable and non-degradable;
- Facilitate recycling of waste for its safe disposal;
- Reclaim the waste disposal site after the work ceases.

10.5.7 Noise Management

- Construction works should be done during the day time;
- Site staff, visitors and construction workers must be equipped with proper hearing measures to avoid the effect of noise;
- Supervision engineer must carry out regular site inspections to ensure compliance with occupational health and safety.

10.5.8 Air Pollution Abatement

- Regular spraying of water nearby the construction activities during dusty condition should be done;
- Bitumen heating facility should be established at least 100 m away from the settlements;
- Regular maintenance of vehicles and equipment should be done;
- Face mask and other protective equipment should be provided to the work force to comply with occupational health and safety

10.5.9 Material Stockpiling

- Material stockpiling should be done on designated site at least 10 m away from the drainage lines and on the surface having less than 10° slopes.
- Stockpiling sites should be devoid of vegetation, shrubs;
- Materials should be covered with tarpaulin to avoid dispersion and scattering of materials;
- Unauthorized entry to the stockpiling site should be regulated.
- Stockpiling site should be rehabilitated after the work completed.

10.5.10 Spoil Disposal

- Spoil should be disposed of in designated spoil disposal sites;
- Take prior consent from the concerned authority before using the land;
- Spoil should be minimized through its use as backfilling materials and grading of approach road;
- Spoil disposal sites should have rehabilitated and planted after the work completed.

10.5.11 Quarry Site and River Bed Extraction

- Agreement should be done with the concerned body (VDC/DDC), local stakeholders and CFUGs before the using it;
- Restrict it to small area;
- Avoid cutting of trees and removal of vegetation;
- Acquire the materials only in required quantity;
- Located away from 200 m away from the settlement;
- No rock materials should be littered nearby agricultural land;
- No rock materials causing disturbance to public services and utilities.

CHAPTER 11: CONCLUSION AND RECOMMENDATION

The construction of Tila Khola Bridge results in a substantial beneficial impacts. Lacking of permanent concrete bridge has caused several problems in the smooth operation of vehicles. In case of Tila Khola Bridge the environmental impact of bridge construction is very low and can be easily mitigated through the mitigation measures proposed in chapter 9. Removal of trees is not required during the construction of the proposed bridge and no any public structures fall within the construction area. Once of the significant environmental issue during the construction of the approach road is the excavation of stable hill slope for approach road construction which would require immediate mitigation measures to prevent the future hazards associated with the excavation.

Largely the impacts due to the construction of proposed bridge are site-specific in nature and can be mitigated immediately during the construction period without much environmental damage and reversible impact. There are several residual impacts like future accidental risk, development of settlement around the bridge area, air and noise pollution due to the movement of vehicles, etc. for which mitigation measures could not be proposed at this stage.

Given the above conclusion; the Initial Environmental Examination (IEE) document recommends for the implementation of Environmental Management Plan included herewith the IEE document for the mitigation of adverse environmental impacts, enhancement of beneficial impact and sustainable operation of the proposed bridge.

Annexes

Annex A: Approved Terms of Reference



Government of Nepal
Ministry of Physical Infrastructure and Transport
DEPARTMENT OF ROADS
Road Sector Development Project
Foreign Cooperation Branch
Babarmahal, Kathmandu

Consulting Services
for
**Feasibility Study and Detail Design for Construction of New Bridges and
Maintenance of Existing Bridges**
Contract No.: RSDP/Cons/Bridge/01



Terms of Reference
for
Initial Environmental Examination (IEE)
Of
Tila Bridge (Surkhet-Jumla Road)

Submitted to:
Ministry of Physical Infrastructure and Transportation (MoPIT)
Singha Durbar, Kathmandu

Submitted By:
Geo-Environmental and Social Unit (GESU)
Department of Roads
Chakupat, Patandhoka, Lalitpur



Prepared By:

January, 2016



M/s Kunhwa Engineering & Consulting Co. Ltd., Korea

in association in the form of sub consultancy with



ERMC (P) Ltd., Nepal
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ToR for IEE of Tila Bridge

Acronyms and Abbreviations

amsl	above mean sea-level
CBS:	Central Bureau of Statistics
CBOs:	Community Based Organizations
DDC:	District Development Committee
DHM:	Department of Hydrology and Meteorology
DoR:	Department of Roads
EMAP:	Environmental Management Action Plan
EPA:	Environment Protection Rules
EPR:	Environment Protection Act
GESU:	Geo-environmental and Social Unit
GI:	Galvanised Iron
GIS:	Geographic Information System
IEE:	Initial Environmental Examination
MoPIT:	Ministry of Physical Infrastructures and Transport
NGO:	Non-Governmental Organization
RCC:	Reinforced Cement Concrete
RSDP:	Road Sector Development Project
SRN:	Strategic Road Network
TOR:	Terms of Reference



ToR for IEE of Tila Bridge

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ToR for IEE of Tila Bridge

CHAPTER-1: NAME AND ADDRESS OF THE PROPONENT**1.1 Name and Address of Institution Preparing the Report**

The name and address of the institution preparing the Term of Reference (ToR) for Initial Environmental Examination (IEE) of Tila Bridge (Surkhet-Jumla Road) is as follows:

Geo-Environmental and Social Unit (GESU)
Department of Roads (DoR)
Ministry of Physical Planning and Transport
Chakupat, Lalitpur

The name and address of the implementing agency for the proposed project is;

Road Sector Development Project (RSDP)
Foreign Cooperation Branch
Department of Roads
Sanogaucharan, Kathmandu

On behalf of RSDP, Kunhwa Engineering and Consultancy Co., Ltd., Korea in association in the form of sub consultancy with Environment and Resource Management Consultant (ERMC) Pvt. Ltd., has been assigned for Feasibility Study and Detail Design for construction of new bridges and maintenance of existing bridges (Contract No. RSDP/Cons/Bridge/01) and accordingly the consultants has prepared Terms of Reference (TOR) for Initial Environmental Examination (IEE) as per task A 402 assigned for Consultants. The name and address of the consultants preparing this report is as follows;

Kunhwa Engineering and Consultancy Co., Ltd., Korea

In association with

Environment & Resource Management Consultant (ERMC) Pvt. Ltd.

Mid-Baneshwor, Kathmandu, Nepal

P. O. Box: 12419, Kathmandu

Tel.: 977-01-4483064, 4465863, Fax: 977-01-4479361

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CHAPTER-2: GENERAL INTRODUCTION OF THE PROPOSAL

2.1 Background

One of the main objectives of the Road Sector Development Project (RSDP) is up-grading of about 700 km dry season roads to the sealed pavement connecting in 8 districts headquarters namely Darchula, Baitadi, Dailekh, Jumla, Humla and Jajarkot including improvement of existing intermediate lane to double lane carriageway of the Narayanghat-Mugling Road (N-M Road).

In order to maximize the benefit from all season sealed roads in above 8 districts and from the proposed improvement to a double lane carriageway of N-M road, the Government intends to apply a portion of proceeds to engage International Consultant to undertake design services of construction of new bridges including river training works and approach roads, major and minor maintenance of the existing bridges and provision of traffic safety elements on all bridges. The study will be basis for construction and or maintenance from financing from Government or with the assistance from IDA or other bilateral or multilateral development institutions. For this purpose 18 bridges from Narayanghat-Mungling Road, 2 bridges from Shitalpati-Musikot Road, 3 bridges from SKMTSD Road, 15 bridges from Surkhet-Jumla Road and 13 bridges from Chhinchu-Jajarkot Road.

In this regard, construction of Tila Bridge was proposed along the chainage of 141+360 along Surkhet-Jumla Road. The proposed bridge is of PSC Girder type with length of 56.2 m and single span of 55m. This Terms of Reference for Initial Environment Examination (IEE) has been prepared so as to incorporate environment and social safeguard measures in the design for new construction of Tila Bridge.

2.2 Objectives of Terms of Reference (ToR)

The general objectives of the ToR are as follows;

- To list and delineate the specific activities to be performed during IEE study
- To provide the technical guidance in order to accomplish the work within the time frame.
- To list the major issues and impact to be address during IEE study

2.3 Objectives of IEE

The objectives of IEE are as follows:

- Identify and predict the major environmental issues that may arise as a result of proposed works and their likely impact on bio-physical, socio-economic and cultural environment of the project area.
- Identify easily implementable mitigation measures for the negative environmental and social issues and suggest remedial plans in case of residual impacts if any identified.
- Recommend practical and site specific environmental mitigation and enhancement measures, prepare and implement Environmental Monitoring Action Plan (EMAP) for the project.



2.4 Rationality of IEE

As per Environment Protection Rules (EPR) 1997, construction of a major bridge requires an IEE and its subsequent approval from its concerned ministry (Clause-4 of Road Sector, Schedule-1 Pertaining to Rule-3 of EPR). National Bridge Standard 2010 classifies a bridge as a major bridge when its span is more than 25 m long or the total length of the bridge is more than 50 m. Proposed Tila Bridge has length of 56.2 m and a single span of 55 m, and falls under major bridge category and therefore, the proposed construction work requires IEE. Therefore, this ToR is prepared in accordance with the Rule-5 and Schedule-3 of EPR 1997.

2.5 Relevancy of the Proposal

Surkhet-Jumla Road is the lifeline of common people for transportation of people and goods in Karnali region of the country. The road has also provided accessibility to people for various facilities and services including education, health, business etc. Currently a Bailey bridge is in operation in Tila River, which acts as an entry point to the headquarters of Kalikot and Jumla district. Government has been investing a huge amount to upgrade the Surkhet-Jumla Road into all season's road. In this regard, alternative to temporary Bailey bridge is necessary and construct permanent bridge type. Therefore, a PSC Girder has been proposed over Tila River in order to transform the existing road into all season's road.

2.6 Description of the Proposal

2.6.1 Project Area

The proposed bridge is located on Tila River which separates Manma and Bharta VDCs of Kalikot district, located at Karnali zone of Mid-Western Development Region of the country. Geographically, the proposed bridge is located at an elevation of 780 m amsl with latitude of $29^{\circ} 8' 0.46''\text{N}$ and longitude of $81^{\circ} 35' 39.89''\text{E}$. The land use of the project is characterized by the presence of few scattered settlements forest and shrub land (40%), water body and river channel (18%), barren land and hill slopes (14%) and remaining agricultural lands (28%). The land around the bridge has steep slopes with unstable features rises to the top of Mahabharat hills in the u/s. The average gradient of 9.5% is observed along the course of Tila Khola considering u/s (300 m from the proposed bridge location) and d/s to confluence of Tila - Karnali to 1.5 km d/s of the river



ToR for IEE of Tila Bridge

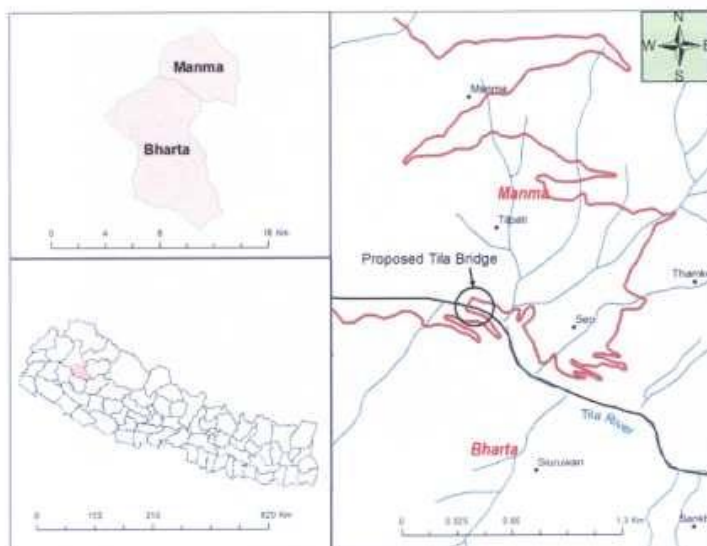


Figure 2-1: Location Map of the Proposed Project

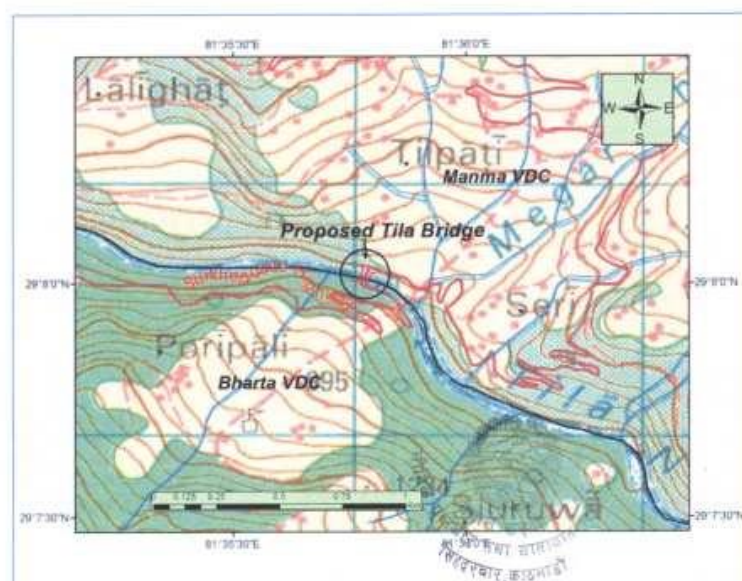


Figure 2-2: Topographical Map Showing Location of the proposed bridge

ToR for IEE of Tila Bridge



Figure 2-3: Google location of the project area

2.6.2 Salient Features

The salient features of the proposed bridge are presented in the Table (2-1)

Table 2-1: Salient Features of the Project

Name of the Proposed Project	Tila Bridge
Project Jobs	Construction of new bridge
Type of the proposed Bridge	PSC Girder
Project Location	
Zone	Karnali
District	Kalikot
VDC	Bharta and Manma
River	Tila River
Road	Surkhet-Jumla (Karnali Highway H013)
Origin and destination of the Road	Surkhet, Jumla
Chainage of the Bridge Site	141+360
Geographical Location	
Easting	558015.9
Northing	32223586
Classification of the Road	Highway
Type of the road surface	Bituminous
Terrain/ Geology	Hilly
Information on Structure	
Total length of the bridge	56.20 m
Span Arrangement	1X55.0 m
Total width of the bridge	11.00 m
Width of Carriageway	7.50 m
Footpath(s)	1.50 m
Kerbs	0.35 m
Types of Superstructure	Four girders PSC bridge



ToR for IEE of Tila Bridge

Types of bearings	Pot cum PTFE
Types of Abutments	Rectangular RCC with Return wall
Design Data	
Live load	IRC class 70R, Class A
Net bearing Capacity of soil	500 kN/m ²
Design discharge	4047 m ³ /sec
Linear waterway	45.00 m
Grade of Concrete	
In superstructure	M 35
In substructure	M 25
In foundation	M 25
Grade and quantity of reinforcing steel	
TMT having characteristic strength of 500 N/mm ²	

Source: Draft Design Report of Tila Bridge, 2015

2.6.3 Impact Area Delineation

Based on the environmental impacts likely to be resulting from the implementation of the project, the project-impact areas are classified as in Table 2-2.

Table 2-2: Project Impact Area Delineation

Direct Impact Areas	Project implementation site, the adjacent land plots, built up structures, houses and property within 500 m from the project site
Indirect Impact Areas	Beyond 500 m away within the adjoining wards of the project implementation site.
Zone of Influence	Influence area will encompass the proposed bridge location as well as off-site and/or ancillary works such as burrow pits, quarry sites, river diversion, approach road, camp site, material stockpiling yard and also includes direct and indirect impact area of the project and project implementation VDCs i.e., Bharta and Manma VDCs



CHAPTER-3: PROCEDURES TO BE ADOPTED WHILE PREPARING THE REPORT

The IEE approach, methodology and procedure generally follow the provisions of the EPA and EPR. In this connection, following approach and methodology will be adopted during the IEE report preparation.

3.1 Desk Study and Literature Review

Available useful data and information from various sources pertaining with the project's IEE study will be collected and reviewed. Such sources of information included existing laws, rules, guidelines and manuals, IEE reports of similar projects, Environment and Social Management framework published by DoR, GESU. Detailed Engineering Survey and design of the Tila Bridge Project will be reviewed to determine the nature and scope of activities of the project. Similarly, pertinent sources of secondary information will be identified, collected and reviewed to build acquaintance with the environmental settings of the project area under physical, biological and socio-economic and cultural domains of the environment. These sources included publications of DDC Kalikot, CBS, NGOs, INGOs, CBOs and other governmental and non-governmental organizations and various research papers. Data on rainfall and other meteorological conditions will also acquire from DHM.

Map Reading: Preliminary acquaintance with the general environmental setting of the project area will be built by reading maps of different types like topographical maps, geological maps and Google maps. Similarly, geographical boundary of the impact area will be defined and delineated on the topographical map.

Checklists and Questionnaire: Based on the desk study, project specific checklists will be prepared for focus group discussion, key informant survey and data collection on physical, biological, socio-economic, and cultural baseline data of the project area. Similarly, structured questionnaires will be prepared to aid collection of socio-economic data and other relevant information.

3.2 Field Study

The team of multidisciplinary experts (IEE study team) shall be deputed to carry out the field study to collect the baseline information on physical, biological and socioeconomic and cultural environment. Data related to land use stability, site specific observation of air and noise quality and physiographic condition of the project area shall be collected through field study. The data on biological environment shall be collected through the sampling and field survey. To gather information on socio-economic and cultural environment of the project impact areas shall be collected through household's survey using questionnaire and checklist. Interaction and consultation meetings with the people of project impact area will be conducted during field visits.

3.3 Collection of Environmental Baseline Data/Information

The following table presents a synopsis for the baseline information to be collected and the methods to be adopted for the collection of such baseline information of the project area.

ToR for IEE of Tila Bridge

Table 3-1: Baseline Data Collection Methodology

Data Requirement	Methods/ Tools
Physical Environment	
Physiology, Topography, Land use type and land use classification,	Remote Sensing and GIS (QGIS Brighton 2.6.1) analysis on the topographical maps published from the Department of Survey, Google image.
Hydrology - drainage network and drainage density	Remote Sensing and GIS (QGIS Brighton 2.6.1) analysis on the topographical maps published from the Department of Survey, Google image.
Geology – rock types and rock classification, seismicity, stability	Field Investigation / Direct Observation, Analysis of geological map as published by Department of Mine and Geology.
Soil Type and soil condition*	Field observation, soil analysis
Sound / Noise conditions*	Field observation, available secondary information
Weather and Climate conditions – Temperature, precipitation, climatic and bio-climatic classifications	Secondary information from Department of Hydrology and Meteorology (DHM), other published literatures.
Type, volume and source of construction material requirement	Secondary information from project engineers, feasibility / detail design reports
Information on burrow sites / tipping sites / stockpiling sites, camp sites etc.	Direct field observation / Interaction with project engineers, local stakeholders.
Traffic conditions	Direct observation, information from the stakeholders, traffic data from feasibility report
Chemical Environment	
Air Quality	Direct Field Observation and available secondary information
Water Quality	Direct observations for observatory parameters and available secondary information
Biological Environment	
Vegetation analysis	Field enumeration / survey
Faunal Environment	Key Informant Interview (KII)
Aquatic Animals	Field Sampling of Macro-invertebrates/Macrophytes, Visual Observation/ Key informant Survey, past literatures for Fishes
Socio-economic and Cultural Environment	
Demographic, Economic, and social services and facilities	Secondary Information from CBS, District Development Committee (DDC), and Primary information of the projects direct impact area and indirect impact area will be collected through structured questionnaire survey
Cultural sites and cultural activities, historical sites, foot trails etc.	Key informant survey, Direct observation of cultural and historical sites.

ToR for IEE of Tila Bridge

Data Requirement	Methods/ Tools
------------------	----------------

Note: * laboratory/ instrumental analysis is preferable but due to budgetary and time limitation, visual observation shall be carried out.

3.4 Data Analysis

The experts of the relevant field will analyze primary and secondary information qualitatively and quantitatively. Physical, chemical, biological, socio-economic, and cultural information will be assembled and tabulated. The information will be crosschecked and analyzed by the respective experts. The data will be processed using computer-based spreadsheets (Excel) and SPSS and will be presented in tabular and pictorial forms.

3.5 Impact Identification/ Prediction and Evaluation

The environmental impacts as a result of interaction between project activities and baseline condition will be identified in terms of beneficial and adverse impacts, type (direct/indirect/cumulative), and magnitude of severity, extent, duration and reversibility/irreversibility during project construction as well as in operation stage works. The methods adopted to identify the impacts may be through checklist, matrix, network or overlaying methods by using GIS software application.

The environmental impacts shall be evaluated as per the National EIA Guidelines (1993), based on the magnitude, extent and duration of the impact. Similarly, experts' judgment and experience from similar projects shall be used for the quantification of the impacts. For the impact evaluation, the matrix method with numerical ranking shall be used for the quantitative ranking of the predicted impacts. Significance of the identified and predicted impacts will be evaluated using the numerical values as proposed in the National EIA Guideline 1993, use of regulated list of species, discussion among the study team members, consultation with experts, and consideration of national policies, laws and local customs. The environmental impacts identified during the preparation of TOR are categorically listed in **Chapter-7**

3.6 Public Involvement

The local people in project area, concerned government organizations, local NGOs, CBOs, etc will be consulted during IEE study. In accordance with the Rule (7.1) of Environment Protection Rules, 1997, a 15-day public notice will be published in a **national daily newspaper**. Furthermore, the copies of public notice will be pasted at public places of project area and their evidences (Muchulka) will be collected.

The following organizations will be consulted during the preparation of the draft IEE:

Central Level Agency: Road Sector Development Project (RSDP) of Department of Roads (DoR), Ministry of Physical Infrastructures and Transport, Geo-environmental and Social Unit (GESU).

Local Level Agency: DDC Kalikot, Non-governmental Organizations, Community Based Organizations

Recommendation Letters: The recommendation letters from project affected VDCs (Bharta and Manma) of Kalikot district will be collected for the environmental clearance and implementation of the project.

CHAPTER-4: POLICIES, LAWS, RULES AND MANUALS TO BE TAKEN INTO ACCOUNT WHILE PREPARING THE REPORT

Relevant legal measures including the constitution, acts and regulations, policies and plans, manuals and guidelines, standards and conventions will be reviewed during the course of IEE study. Such relevant legal measures are listed in the following sub-sections. Any such measures, not listed here, if found to be relevant for the environmental safeguard of the project, will also be reviewed and presented in the IEE report.

4.1 Constitution

- Constitution of Nepal, 2072 BS (2015 AD)

4.2 Acts and Regulations

- Environment Protection Act, 2053 BS (1997 AD)
- Environment Protection Rules, 2054 BS (1997 AD)
- Solid Waste Management Act, 2068 BS (2011 AD)
- Solid Waste Management Regulation 2070 (2013 AD)
- Labor Act 2048 BS (1992 AD)
- Local Self-Governance Act 2055 BS (1998 AD)
- Public Road Act, 2031 (1974)
- Forest Act, 2049 (1993)
- Forest Rules 2051 (1995)
- Aquatic Animal Protection Act 2017 (1961)
- National Foundation for the Development of Indigenous Nationalities Act, 2002
- Land Acquisition Act 2034 (1977)
- Child Labor Act 2056 BS (2001 AD)

4.3 Policies and Plans

- National Transport Policy 2058 BS (2001 AD)
- Nepal Environmental Policy and Action Plan, 2049 BS (1993 AD)
- Three Years Interim Plan 2070/71-2072/73

4.4 Manuals/Guidelines/ Directives

- Environmental and Social Management Framework (ESMF) DoR2064 BS(2007) with Addendum for Bridge 2013(Revised for Bridge)
- National Environmental Impact Assessment Guidelines 2050 BS (1993 AD)
- Bridge Inspection Manual, 2005
- Bridge Construction Manual, 2005.

4.5 Standards

- National Standard about Noise Level 2069 BS
- National Ambient Air Quality Standard 2012 AD



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- Nepal Road Standard 2070 BS
- Nepal Bridge Standard 2067 BS

4.6 International Conventions and Treaties

- Convention on Wetlands of International Importance (Ramsar Convention), 1971.



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CHAPTER-5: RESOURCE REQUIREMENT FOR THE STUDY**5.1 Time Requirement**

The IEE study is estimated to be completed in two months (8 Weeks) after approval of ToR. The time schedule for the IEE study is presented in table 5-1.

Table 5-1: Estimated Time Required for IEE Study

S.N.	Activities	Weeks							
		1	2	3	4	5	6	7	8
1	Desk Study and Literature Review	■							
2	Public notice publication		■	■					
3	Field study and Consultation/Interaction with community			■					
4	Data Analysis and interpretation				■	■			
5	Draft report preparation						■		
6	Comments on draft report							■	
7	Final Report preparation and Submission								■

5.2 Human Resource Requirement

Following team of experts (with their input time in days) will be collectively responsible for the overall completion of IEE study and its subsequent report preparation, including presentation to MoPIT and incorporation of comments.

- Team Leader (IEE) / Environment Expert (30 days)
- Socio-economic Expert (10 days)
- Civil / Bridge Design Engineer/ (7 days)
- Geologist (7 days)



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CHAPTER-6: DELETED



CHAPTER-7: SPECIFIC IMPACTS OF THE IMPLEMENTATION OF THE PROPOSAL ON THE ENVIRONMENT

Impacts will be identified, predicted and evaluated by considering the projects activities on the physical, chemical, biological and socio-economic environmental condition of the project site. Impacts will be analysed with quantified information of likely changes, alteration, and losses and are assessed based on characteristics of existing condition and sensitivity of environmental aspects. Impacts that are not identified at present level, if identified during course of IEE study, will be promptly considered for and included in the IEE report. The project activities that will be responsible for the impacts in the project area and their likely impacts are categorically listed in the following sections.

7.1 Project Activities

7.1.1 Pre-construction Phase

- Regulatory Permissions (including those related to labour)
- Plant sites-location layout and facilities
- Land and/or Property acquisition
- Preparation of Environmental Management Plan including:
 - Work site safety management (including traffic safety and management; worker safety issues and public safety aspects, including training sessions offered to labours and report of any incidents/accidents affecting workers or the public, their root causes and measures to be taken to address the root cause and prevent future incidents).
 - Occupational health and safety plan
 - First aid and Emergency response arrangements
 - Quarry area management plan (including identification)
 - Other material source management plan
 - Water use and source management plan
 - Labour (Number and Facilities)
 - Material Storage/Stockpiling (including management of toxic/hazardous materials) area management plan
 - Machinery, Equipment and vehicle maintenance plan
 - Pollution management (air, water, noise and soil) (including dust control) plan
 - Drainage (temporary and permanent) management plan
 - Fragile slope management and erosion and silt control plan
 - Spoil management plan (including identification of disposal areas and rehabilitation)
 - Preparation of measures to prevent damage to flora and fauna
 - Monitoring of water quality and any impact on aquatic wildlife downstream of construction sites
 - Preparation of Compliance and Impact Monitoring Plan
 - Public utilities/facilities (including issues related to disruption to access or services, damage to common property resources and their rehabilitation and relocation plan).
 - Grievance received during reporting period and proposed measures to respond to resolve them. (Grievance Redress Mechanism).

7.1.2 Construction Phase

- Site clearance, including demolishing of public and private structures, vegetation removal

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- Transportation of Construction Materials
- Operation of Construction Machines / Equipment's (Operation of rolling machine, asphalt/concrete Plant, Hot mix Plant etc.)
- Land Clearance and Land Preparation
- Excavation, Fresh Cut, Dredging and Drilling
- Quarry site construction and operation
- Blasting, Work on Quarry rock break up
- River Diversion / River training
- Material Stockpiling
- Operation of Power Generators
- Camp (labors and Contractor) site operation
- Spoil Disposal
- Waste Generation and Disposal
- Concrete Mixing
- Erection of Piers and Abutments
- Handling of petroleum and acid
- Vehicular Operation during bridge construction
- Use of fuels (fossil/biomass) for construction activities
- Use of Fuels for camp operation

7.1.3 Operation Phase

- Regular/Periodic maintenance of the project (Bridge)

Environmental Issues/Impacts likely to be resulting from the Implementation of the Project are summarized in the following sections

7.2 Beneficial Impacts/Issues**7.2.1 Construction Stage**

- Employment Generation
- Enhancement of technical skills
- Public awareness

7.2.2 Operation Stage

- Improved Mobility
- Reduce cost

7.3 Adverse Impacts/Issues**7.3.1 Pre-Construction Phase**

- Land Acquisition
- Psychological fear due to loss of land and property
- Public grievances related to loss of land and property



7.3.2 Construction Stage

7.3.2.1 Physical Environment

- Change in morphology, longitudinal profile/river bed and hydrological character of regime of river and inundation in the upstream section
- Change in land use and loss of productive soil
- Landslides, slope destabilization and soil erosion
- Management and operation of quarries and borrow pits
- Spoil and construction waste disposal
- Water flow diversion
- Pollution of water resources
- Change in river regime
- Approach road and related issues
- Road diversion and related issue
- Contamination of soil
- Stockpiling of materials/issues related to stockpiling yard
- Air and noise pollution
- Combustible and toxic material management.
- Use of bitumen
- Work Camp location and management

7.3.2.2 Biological Environment

- Clearing of forest, and habitat destruction and loss
- Impact on Aquatic Life
- Disturbance to wildlife and biodiversity
- Damage to aquatic habitat, and barriers to fish/aquatic movement/migration

7.3.2.3 Socio-economic and Cultural Environment

- Occupational health and Safety of workers
- Influx of workforce (Construction Crews) into the project areas.
- Social Conflicts
- Obstruction to social services and facilities
- Accidental risks
- Impact on private and public properties
- Public grievance related to project construction
- Loss of productive land
- Land and property acquisition, compensation, resettlement and rehabilitation
- Disruption of community structure and livelihood
- Conflict in or with nearby host communities
- Damage of community infrastructures
- Impact on vulnerable indigenous people and Dalits
- Occupational health and safety of workers
- Impact on religious, cultural and historical assets



- Impact on landscape aesthetics

7.3.3 Operation & Maintenance Stage

7.3.3.1 Physical Environment

- Air pollution
- Noise and Vibration
- Backwater Effect During Floods
- Riverbank Erosion
- Water pollution due to washing of vehicles nearby the river
- River Channel Shifting
- Stockpiling of materials during bridge maintenance

7.3.3.2 Biological Environment

- Barrier Effects on Aquatic animals due to piers and abutments.

7.3.3.3 Socio-economic and Cultural Environment

- Congestion around the adjoining areas of Bridge Abutment



CHAPTER-8: ALTERNATIVES FOR IMPLEMENTATION OF THE PROPOSAL

The study will consider different project alternatives for the selection of the best option to achieve the sustainability of the proposed development works. Following will be the significant alternatives to be considered during the study.

8.1 No Project Alternative

The IEE study shall compare and examine the alternative of not implementing the project and its implication. The alternative analysis will be basically evaluated from two perspectives: i) whether the project goals could be met without having implemented the project and ii) Alternative of not implementing the project and its environmental implications.

8.2 Alternative Design

Alternative designs for the Tila Bridge will be examined and analysed to select most appropriate design of the proposed project so that the bridge caters best of its services to the project area. In doing so, environmental consideration and safety point of view will be given due considered and accordingly analysed.

8.3 Alternative Sites

Alternative sites for the bridge will be considered and studied in the process so as to avoid significant environmental impacts.

8.4 Alternative to Technology, Construction Method, Time Period, and Raw Materials

The study will analyse different technology, procedures of operation, time - schedule and raw materials to be used to select the best alternative among them. The technological alternatives will include fully mechanized, semi-mechanized, labour-intensive, labour-based etc. process of proposal implementation.

Procedures of construction will be assessed in terms of round the year construction and seasonal construction of the bridge; Alternative resources required for the proposed works, cement, steel, gabion boulders, gravel, earth, sand, bioengineering sapling will be assessed.

8.5 Other Matters

The study will also consider the conditions if the desired objectives of the project could be effectively met with the alternatives of the bridge project. Any other alternative matters with its environmental implication, if identified during later stages of project development, will also be analysed and presented.



CHAPTER-9: MATTERS CONCERNING THE PREVENTION OF THE IMPACTS OF THE IMPLEMENTATION OF THE PROPOSAL ON THE ENVIRONMENT

The IEE report will present the mitigation measures for all the identified significant impacts and incorporate them in the report. Site-specific benefit augmentation and mitigation measures will be proposed to optimize the benefits expected from the sub-project and minimize/mitigate avoid or control of proposal's adverse impacts. The benefit augmentation and mitigation measures will be selected based upon appropriateness and cost analysis and these will be suggested for pre-construction, construction and operation and maintenance phase of the project. Mitigation measures with cost will be proposed for the impacts on physical, biological, socio-economic and cultural, chemical environment. The IEE report will propose the organizational structures and agencies to be consulted while implementing the mitigation programs. For this purpose, every statutory requirement shall be strictly followed.

In general, the following area will be covered while preparing mitigation and enhancement measures.

- ✓ Protective measures
- ✓ Compensatory measures
- ✓ Rehabilitation Measures
- ✓ Enhancement Measures

IEE report will also present the Environmental Management plan for the likely impacts resulting from the project implementation. The plan include activity, impacts, mitigation and enhancement measures, organization responsible for the implementation of the mitigation measures and monitoring activities, schedules, cost and mode of co-ordination with the line agencies, and local people. The EMP will also identify the human resources require of the monitoring and mitigation works, quantify the man-month schedule and develop an action plan for all identified measures. The plan shall also consist of monitoring procedure especially the mechanism for compliance monitoring by spelling out the responsibilities of each concerned stakeholders.



CHAPTER-10: MATTERS TO BE MONITORED WHILE IMPLEMENTING THE PROPOSAL

To monitor the impacts of the proposed project on physical, biological, socio-economic and cultural resources of the area, an environmental monitoring plan shall be formulated. This chapter describes the monitoring parameters (what should be monitored), monitoring schedule (when monitoring should begin), location (where monitoring will occur), methods (which methods should be employed), responsible agency for monitoring and cost of monitoring.

The monitoring plan will include the following aspects;

- Baseline, compliance and impact monitoring in terms of the physical, biological, Socio-economic and cultural environment.
- Baseline and impact monitoring shall include parameters, indicators, methods, schedules and locations, while compliance monitoring shall include parameters, indicators, methods and schedules.
- Compliance and impact monitoring shall be categorized in terms of construction and operation phases;
- Agency responsible for monitoring to be consulted, if required, during monitoring activities.



*ToR for IEE of Tila Bridge***CHAPTER-11: OTHER NECESSARY MATTERS**

The report shall include all cited information, reference lists, maps, graphs, photographs, tables and charts, graphs, and questionnaires used during the IEE study as per the EPR 97. The IEE Report will be prepared based on Schedule-5 (pertaining to Rule 7) of the EPR '97.



Annexes



Annex A: Checklists for Environmental Baseline



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Annex A1. Checklist for Physical and Chemical Environment**A. Topography/Physiography**

- Study of Topographic maps/ other available maps and identify the ground topographic characteristics of land covered by the proposed bridge project
- Verify the topographic characteristics of the land in the field
- Soil Type

B. Climate and Hydro-Meteorology

- Study of published data regarding temperature, and precipitation
- Hydrological analysis, flow duration curve, flood frequency analysis.

C. Air Quality

- Collect any data on air quality of the area from previous literature
- Investigate on the air polluting activities of the area (traffic, biomass burning, industries, other anthropogenic activities)

D. Erosion and land Stability

- Identification of erosion prone area in the vicinity of bridge site
- Investigate the erosion features and potentials of the TilaKhola and its tributaries

E. Land Use

- Investigate on the land use of the Project Blocks from the topo-maps, and other available land use maps
- Investigate the land use affected by the project structures and subsidiary facilities
- Investigate on the land use potentials of the proposed project area

Annex A2-BE: Check List for Biological Environment**A. Vegetation Analysis**

- **Wood Stock:** The vegetation lying within the directly affected area (areas required for construction and placement of spoils or other infrastructure facilities), particularly tree species shall be inventoried, for trees above 10 cm DBH for wood stock.
- **Wildlife** around the project area
- **Aquatic Life:** Number and types of macrophytes, and macro-invertebrates and aquatic vertebrates

Annex A2-SCE: Check List for Socio-economic and Cultural Environment

- Demography, economy and social services information of project area from CBS, DDC etc. will be collected to prepare. (Secondary Information) will be collected. Likewise primary socio-economic and cultural information data information of project affected areas (Directly affected area and indirectly affected area) using structured questionnaire and checklist. IEE Report will consider following socio-economic and cultural characteristics of the project impact areas.
 - Demographic Characteristics
 - Caste and Ethnicity
 - Religion and culture
 - Occupation/Income Sources
 - Settlements and housing patterns
 - Migration Pattern
 - Public Health and Sanitation
 - Drinking Water Supply



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- Education and literacy status
- Infrastructural Facilities
- Energy Use
- Personal Transportation
- River Crossing facilities
- Availability of Health care and educational facilities
- Business and Industries
- Religious, Cultural, Historical and Archaeological sites
- Non-governmental organization and Activities
- Government service facilities
- Perception of people about the project



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Annex A 2: Checklist for Identifying Project's Ancillary Structures and their Environmental Features

Bridge Name:

Bridge Location:

1. Camp Site:

- Location from the Bridge Axis:
- Available Area:.....
- Land Ownership:.....
- Other Environmental features (Water Bodies, forest, Nearby settlements etc) from the camp site:.....

2. Material Stockpiling Areas

- Location from the Bridge Axis:
- Available Area:.....
- Land Ownership:.....
- Other Environmental features (Water Bodies, forest, Nearby settlements etc.) from the stockpiling area):.....

3. Quarry Site

- Location from the Bridge axis:
- Distance:.....
- GPS location:.....
- Type and Volume of available quarry materials:.....
- Surrounding Environmental Features (Water Bodies, forest, Nearby settlements etc.):.....
- Potential Unstable areas around quarry sites:.....
- Foundation Excavation Site Conditions:
- Bed Rock (.....), Soil/Rock Mix (.....), others (Specify)(.....)
- Foundation Excavation Need: Trees Removal (Yes/No)
- Quantity of foundation excavation works (m^3):.....
- Quantity of Materials to be disposed (m^3):
- Site of Surplus materials safe Disposal:.....

4. Spoil/Waste Disposal Site.....

- Location from the bridge axis:.....
- Nearby Environmental Features:.....

5. Hazardous Material Yard

- Location from the nearby settlements:.....
- Nearby environmental Features:.....

6. Methods of Disposal to be practiced:



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- Tipping following by levelling.....
- Simply side cast.....
- Side cast with toe wall etc.....

7. Availability of Public utilities in project impact areas

Public utilities	Location from the project area (U/S and D/S) (Specify the distance from the project location)	Number of User's Households
Water Supply System		
Irrigation canal		
Electricity Poles		
Schools		
Temples/Stupa/Churches/Mosque		
Chautari		
Cremation sites		
Embankment Structures		
Cross Drainage Structures		
Other social features (Specify)		

8. Relocation Common Property Resources (CPR)

- Electricity Poles.....
- Water supply system.....
- Irrigation pipe.....
- Chautari.....
- Others Specify.....

9. Existing Water Use (Within project Impact Areas).....

10. Existing Land Use (Within project Impact Areas).....

11. Nearby Natural Hazards

- Type
- Nature.....
- Dimension.....

12. Other Environmental Issues Associated With River Banks



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Annex A3: Questionnaire for Household Survey



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घरघूरी सर्वेक्षण प्रश्नावली

१. आधारभूत विवरण:

क्र.सं.	प्रश्न	उत्तर
१.१	प्रश्नावली नं.	
१.२	अन्तरवार्ताको मिति	
१.३	जिल्ला	
१.४	गाविस	
१.५	वडा नं.	
१.६	गाउँ / वस्तीको नाम	
१.७	उत्तरदाताको नाम	
१.८	उत्तरदाताको लिंग	पुरुष महिला
१.९	घरमूलीको नाम	
१.१०	घरमूलीको लिंग	पुरुष महिला
१.११	जात / जाती : (उपयुक्त एक मात्र उत्तरमा गोलो लगाउनुहोस्)	बाहुन क्षेत्री ठकुरी जनजाती दलित अन्य -खुलाउनुहोस्).....
१.१२	धर्म : (उपयुक्त एक मात्र उत्तरमा गोलो लगाउनुहोस्)	हिन्दु बौद्ध मुस्लिम क्रिश्चियन अन्य -खुलाउनुहोस्).....
१.१३	परिवारको प्रकार (उपयुक्त एक मात्र उत्तरमा गोलो लगाउनुहोस्)	एकात्मक परिवार संयुक्त परिवार विस्तारीत परिवार 

२. घरघूरी विवरण

२.१ पारिवारिक विवरण

क्र.सं.	घरपरिवारका सदस्यहरूको घरमूलीसंगको नाता	लिंग		उमेर (पूरा भएको उमेर)	शिक्षा (५ वर्ष माथि)	पेशा (१४ वर्ष भन्दा माथि)	हाल घरमा भएको / नभएको	
		पु.	म.				भएको	नभएको
१.		१	२				१	२
२.		१	२				१	२
३.		१	२				१	२

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४.		१	२				१	२
५.		१	२				१	२
६.		१	२				१	२
७.		१	२				१	२
८.		१	२				१	२
९.		१	२				१	२
१०.		१	२				१	२
११.		१	२				१	२
१२.		१	२				१	२
१३.		१	२				१	२
१४.		१	२				१	२
१५.		१	२				१	२
१६.		१	२				१	२
१७.		१	२				१	२
१८.		१	२				१	२
१९.		१	२				१	२
२०.		१	२				१	२

संकेतहरू :

१. घरमूलिसंगको नाता: घरमूलि -१, श्रीमती -२, श्रीमान- ३, छोरी- ४ छोरा -५, बुहारी -६, बुबा -७, आमा- ८, नाती - ९, नातीनी -१०, बहिनी- ११, दाई- १२, भाउजु -१३, भाई -१४, भाई बुहारी -१५, नातेदार (पुरुष)- १६, नातेदार (महिला)- १७, अन्य -१८

२. वैवाहिक अवस्था: अविवाहित -१, विवाहित -२, सम्बन्ध विच्छेद/छुट्टै बसेको -३, विधवा/विदुर -४

३. शिक्षा: निरक्षर -१, साक्षर - २, प्राथमिक -३, निम्न माध्यमिक -४, माध्यमिक- ५, प्रवेशिका/ उच्च माध्यमिक -६, उच्च माध्यमिक भन्दा माथि- ७

४. पेशा: कृषक- १, नोकरी/पेन्सन -२, व्यापार -३, ज्यालदारी (कृषि/ गैर कृषि) -४, वैदेशिक रोजगार- ५, विधार्थी -६, गृहिणी- ७, अपाङ्ग -८, अन्य -९

३. बसाई सराई

क्र.सं	प्रश्न	उत्तर
३.१	तपाईंका परिवार (पूखा) कहिले देखि यस ठाउँमा बस्दै आउनुभएको हो ?	दुई पुस्ता भन्दा अधिवाट (५० वर्ष) एक पुस्ता भन्दा अधिवाट (२५ वर्ष) तल्लो (१० वर्ष भन्दा कम)
३.२	यदि तपाईं बसाई सरैर आउनुभएको हो भने कृपया तपाईंको पूखाको ठाउँ तोकनुहोस् ?	जिल्लाको भुर्को गा.वि.सहर छिमेकी जिल्ला अन्य जिल्ला
३.३	के तपाईंको परिवारका कुनै सदस्य कामको सिलसिलामा बसाई सन् भएको छ?	छ

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									छैन
३.४	यदि छ भने बताउनुहोस्।	कामको लागि स्थान/ठाउँ						के बसाई सराई वार्षिक चलन हो?	
	क्रम संख्या	जानेको संख्या लिइ		जिल्ला भित्र	जोडिएको जिल्ला	अर्को जिल्ला	भारत	विदेश	हो
		पुरुष	महिला						ले
									लेइन

४. परिवारमा विरामी

क.सं	प्रश्न	उत्तर
३.७.१	गएका १२ महिनामा तपाईंको कुनै सदस्य विरामी हुनु भएको थियो?	थियो १ थिएन २

४.१ यदि थियो भने, परिवारका सदस्य कस्ता रोगबाट विरामी भएका थिए र कुन समयमा ? कृपया खुलाउनुहोस्।

क.सं	रोगको नाम	विरामी सदस्य संख्या		मौसम (कृपया टिक लगाउनुहोस्)		
		पुरुष	महिला	वर्षा (आषाढ-असोज)	हिउँद (कार्तिक-फागुन)	गर्मी (चैत-जेठ)
१.	ज्वरो					
२.	सामान्य रुघा /खोकी					
३.	मलेरिया					
४.	भाडापखला					
५.	जन्डीस					
६.	टाइफाइड					
७.	निमोनिया					
८.	मुटु सम्बन्धि					
९.	अन्य(खुलाउनुहोस्)					
१०.	अन्य(खुलाउनुहोस्)					
११.	अन्य(खुलाउनुहोस्)					
१२.	अन्य(खुलाउनुहोस्)					

४. शौचालय सुविधा

क.सं	प्रश्न	उत्तर
१.	के तपाईं बसी राखेको घरमा शौचालय सुविधा छ ?	छ छैन.....
२.	यदि छ भने, तपाईंको घरमा कस्तो प्रकारको शौचालय सुविधा छ ?	खाल्डे चर्पी / कच्चा चर्पी पक्का चर्पी

५. खानेपानीको सुविधा

ToR for IEE of Tila Bridge

क.सं	श्रोतहरु	प्रयोग गरेका मुख्य तिनवटा श्रोतहरु		प्रयोगका आधारमा प्राथमिकिकरण गर्नु होस्
		छ	छैन	
१.	धारा (निजी धारा)	१	२	
२.	धारा (सामूहिक)	१	२	
३.	कवा / मूल / दुहेरीधारा	१	२	
४.	अन्य । खुला उनुहोस्।.....			

६. आयोजना सम्बन्धि

६.१ तपाईंलाई यस आयोजना बारे जानकारी छ ?

☐☐

६.२ यदि छ भने कुन माध्यमबाट याहा पाउनु भयो ?

६.३ यस आयोजना बनाउँदा तपाईंलाई कुन प्रकारको हानी नोक्सानी पुग्यो ?

- जग्गाको क्षती
- भौतिक संरचनामा क्षती

६.४ यस आयोजनाले यस क्षेत्रको भौतिक, जैविक, सामाजिक, आर्थिक तथा सांस्कृतिक वातावरणमा के कस्तो असर पर्ने देख्नुहुन्छ ?

६.५ यस आयोजनाले यस क्षेत्रमा रहेको के कस्तो सार्वजनिक तथा भौतिक संरचनामा असर गर्छ ?

६.६ यो आयोजनाले यस क्षेत्रमा रहेको मठ, मन्दिर, तथा अन्य सांस्कृतिक सम्पदाहरुमा असर पुग्यो भने देख्नु हुन्छ ?

६.७ यो आयोजनाले के कस्तो फाइदा पुग्यो भने देख्नु हुन्छ ?

६.१ आयोजना बारे तपाईंको राय सुन्नुहोस् के के छ ?



ToR for IEE of Tila Bridge

Annex B: Photographs



ToR for IEE of Tila Bridge



EXISTING TILA BRIDGE



HOUSES AT THE ROW OF THE ROAD



TILA RIVER



EXISTING TILA BRIDGE



INSTABILITIES ALONG THE ROAD



LANDUSE AROUND THE PROJECT LOCATION

महाराष्ट्र शासन
पर्यावरण विभाग
मुंबई

S. No.	Comments and Suggestion	Response		
		Changes made	Incorporated Section and page number	Remarks
	Environmental Aspects			
1.	Follow the Schedule-3 as per EPR, 1997	Chapter 6 has been mentioned as Deleted		The report has been prepared as per EPR, 1997.
2.	Clearly mention the area delineation	Impact area delineation has been clearly mentioned and DIA/IIA and Influence area	Section 2.6.3 (pg. 6)	
3.	Submit the clear topo map including delineation area if possible color map	Clear topographical map has been presented	Figure 2-2 (pg. 4)	
4.	Revisit the objective of ToR	The unnecessary objectives has been omitted	Section 2.2 (pg. 2)	
5.	Clearly mention the Indirect and Zone of Influence area	Project's Direct impact area, and Zone of Influence has been presented	Section 2.6.3 (pg.6)	
6.	Mention the methodology of identification, prediction and evaluation (physical/biological)	Identification, prediction and evaluation of impacts will be done as per National EIA Guidelines (1993),	Section 3.5 (pg. 9)	
7.	Add aquatic expert in study team (short term)			Aquatic expert has not been assigned for the proposed project. So the Environment Expert will conduct the necessary study regarding

S. No.	Comments and Suggestion	Response		
		Changes made	Incorporated Section and page number	Remarks
				terrestrial and aquatic ecology.
8.	Physical and cultural Activity/Issue Prepare environmental component checklist: Quarry/Burrow pit, Safe disposal Plan/Site, Crusher, Contractor/Labor camps, Construction material yard, public utilities (Water supply system, Irrigation canal, (upstream and downstream), cross drainage/Culverts etc), water sources, Watershed area, Bridge support structure, Drainage, Hazardous material yard, Embankment structures and Cultural Issues: (Temple, Stupa, Cremation), Relocation of common property resources (CPR), Electricity Poles, Water supply system, Irrigation pipe) etc. Add construction Activities/Issues: Fresh cut and excavation, Construction of quarry site, Disruption in natural water flow due to construction, Construction camps (labor/contractor camps), Blasting, Blasting, Work on Quarry rock break up, possible use of use of rolling machine, operation of asphalt concrete plant/hot mix plant, storage handling and	All the suggested activities/issues has been added in the respective sections	Section (7.1), (7.2) and (7.3) Pg. 14-17.	

S. No.	Comments and Suggestion	Response		
		Changes made	Incorporated Section and page number	Remarks
	distribution of Bitumen, storage handling of chemicals toxic and non toxic, influx of labour into the construction site, influx of labor into the construction area, Influx of construction crew into the construction field, Labor camp ne, of fuels for bitumen heating, operation crusher plant, influx of heavy machinery work etc. Mention the activity/issues of diversion access/approach road Operation Phase activity issues: Follow the ESMF, 2007, (Addendum 2013) such as reinstatement of environmental activities/Issues. Biological Aspect: Wildlife movement area, Add enhancement Issues..... Awareness program, Grievance related to environment issues.			
9.	Add the bridge related manuals: Bridge inspection manuals, 2005, Bridge maintenance manuals, 2005	Added as per suggestions	Section 4.4 (pg.10)	
Social Aspect				
1	Table of contents should be as per EPA/EPR, 1997 and re-arrange the cover page	Chapter 6 has been mentioned as deleted (Made as per EPR format)	Chapter 6 (pg. 13)	
2	Re-format/re-arrange chapter-one and include correct	Changed as per suggestion	Section 1.1 (pg. 1)	

S. No.	Comments and Suggestion	Response		
		Changes made	Incorporated Section and page number	Remarks
	proponent address			
3	Revisit project/background and remove unrelated objective of IEE	Changed as per suggestion	Section 2.1 & 2.2 (pg. 2)	
4	Please mention the percentage (%) of agricultural land in page 3	% of land use category in project impact area has been mentioned	Section 2.6.1 (pg. 3)	
5	Re-arrange the project area delineation and give the source of table no 2.1 (Salient features)		Section 2.6.2 (table 2-1) (pg. 6) for salient feature source and section 2.6.3 (pg. 6)	
6	Revisit the heading: Impact identifications prediction and Evaluations-Scoring of Insignificant Score=40 page 10	Revisited	Section 3.5 (pg 9).	
7	Include GESU in your Consulted Agency Page 11	Included as per suggestion	Section 3.6 (pg. 9)	
8	Revisit the work schedule as accordance to your contract paper with date and month	Revisited as per suggestion	Table 5.1 (pg. 12)	
9	Include pre-construction issues and more relevant issues/Impact	Included as per suggestion. More relevant issues and activities has been added	Section 7.1 & 7.2 & 7.3 (pg. 14, 15, 16 and 17)	



Annex B: Public Notice



लोकप्रिय राष्ट्रिय दैनिक

राजधानी

काठमाडौं, धरान र बुटवलबाट एकैसाथ प्रकाशित

वर्ष १५, अंक २२६, काठमाडौं मंगलबार २३ चैत २०७२, नेपाल संवत् १९३६ | www.rajdhani.com.np | Email: rajdhaninews@gmail.com | RAJDHANI Nepali National Daily | Kathmandu, Tuesday 5 April 2016



नेपाल सरकार
भैतिक पूर्वाधार तथा यातायात मन्त्रालय
सडक विभाग
योजना तथा डिजाइन माहाशाखा
भू-वातावरण तथा सामाजिक शाखा

प्रारम्भिक वातावरणीय परिक्षण सम्बन्धि सार्वजनिक सूचना
(प्रथम पटक प्रकाशित मिति: २०७२/१२/२३)

प्रस्तावको नाम: तिला पुल
विश्व बैंकको सहयोगमा नेपाल सरकार, भैतिक पूर्वाधार तथा यातायात मन्त्रालय, सडक विभाग अन्तर्गत सडक क्षेत्र विकास आयोजनाले सुर्खेत-जुम्ला सडक खण्डमा पर्ने तिला नदी माथि निर्माण गर्न प्रस्ताव गरेको ५५.२० मी. लम्बाई (१X५५मी. स्पान) तथा ११ मी. चौडाई भएको पक्की पुल, वातावरण संरक्षण नियमावली, २०५४ को अनुसूची १ मा परेको हुनाले उक्त प्रस्ताव कार्यान्वयन गर्नु अघि वातावरण संरक्षण ऐन, २०५३ र वातावरण संरक्षण नियमावली, २०५४ अनुसार प्रारम्भिक वातावरणीय परिक्षण प्रतिवेदन तयार गरी स्विकृत गराउनु पर्ने नियममा व्यवस्था भएको छ। उक्त प्रतिवेदन तयारीको क्रममा हेर्नु पर्ने निम्न क्षेत्र सँग सम्बन्धित वातावरणीय सवालहरु बारेमा प्रस्ताव कार्यान्वयन हुने क्षेत्रको गाँऊ विकास समिति, जिल्ला विकास समिति तथा त्यस क्षेत्रका विद्यालय, अस्पताल, स्वास्थ्य चौकी तथा सरोकारवाला व्यक्ति वा संघ संस्थाले आ-आफ्नै राय सुझाव दिन हुनको लागि सोहि नियमावलीको नियम ७ (२) अनुसार यो सार्वजनिक सूचना प्रकाशन गरिएको छ।

जिल्लाको नाम: कालिकोट
प्रभाव पर्ने सक्ने गा.वि.स.को नाम: भर्ता र मान्म गा.वि.स.हरु
क्षेत्रहरु: (१) भौतिक वातावरण (२) जैविक वातावरण
(३) सामाजिक तथा आर्थिक क्रियाकलापहरु (४) साँस्कृतिक वातावरण

उक्त प्रस्ताव कार्यान्वयन बाट प्रभाव पर्ने सक्ने गा.वि.स., नगरपालिका, जिल्ला विकास समिति तथा त्यस क्षेत्रका विद्यालय, अस्पताल, स्वास्थ्य चौकी तथा सरोकारवाला व्यक्ति वा संघ संस्थाले यो सूचना राजधानी दैनिकमा पहिलो पटक प्रकाशन भएको मितिले पन्ध्र (१५) दिन भित्र निम्न ठेगानामा आई पुग्ने गरी राय सुझाव उपलब्ध गराई दिनु हुन हार्दिक अनुरोध गरिन्छ। सो राय सुझावको प्रतिलिपि सम्बन्धित मन्त्रालयलाई समेत दिन सकिने छ।

राय सुझाव पठाउने ठेगाना: भू-वातावरण तथा सामाजिक शाखा, सडक विभाग पाटन, ललितपुर, नेपाल टेलिफोन नं.: ९७७-०१-५२६०६९६ फ्याक्स नं.: ९७७-०१-५५२९१०६ इमेल: gesunit@dor.gov.np	परामर्शदाता: Kunhwa Engineering and Consultancy Co., Ltd, Korea In association in the form of sub consultancy with ERMC (P) Ltd., Nepal १२६/२३, पुजा प्रतिष्ठान मार्ग, मध्य-बानेश्वर, काठमाडौं फोन नं.: ०१-४४७१८८४, फ्याक्स नं.: ०१-४४७९३६१ पोष्ट बक्स नं.: १२४१९, काठमाडौं इमेल: safe@ermc.wlink.com.np
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Annex C: Deeds of Inquiry (Muchulka)


संघीय मामिला तथा स्थानीय विकास मन्त्रालय
सूचना मैत्री
गाँउ विकास समितिको कार्यालय
मान्म-खाँडापक्र, कालिकोट

पत्र संख्या:- ८०१००२२
 चलानी नं:- ६९९

मिति:- २०६२/१२/२८

विषय:- सूचना दैल गरिएको बारे।

श्री...सडक विभाग भु. वतावरण तथा
 सामाजिक शाखा

प्रकृत विषयमा तिला नदी निर्माण -
 खताप गरिएको तिला पुलको IEE गर्ने
 काममा सुरेन्द्रकावालाको साथ सुभातको-
 लागे मिति २०६२/१२/२८ गते रजद्वानी
 पत्रिका प्रकाशित सूचनाको दाय प्रति
 यल गा.वि.उ.को सूचना पाएपछि दैल गरिएको
 को व्यङ्ग्य मानकारी गराउदछ।


 गणेशप्रसाद रिजाल
 गा.वि.स. अध्यक्ष



नेपाल सरकार
सङ्घीय मामिला तथा स्थानीय विकास मन्त्रालय

नमुना गाँउ विकास समितिको कार्यालय

भर्ता, कालीकोट

पत्र संख्या: ००२१००६६

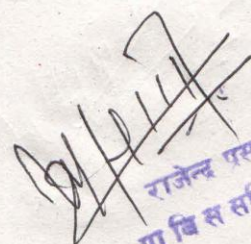
चलानी नं.: १६४

मिति: ००२/१२/२६

विषय:- सुचना राखे गरिएको बारे

श्री सङ्घीय मामिला तथा स्थानीय विकास मन्त्रालय,
सामाजिक शाखा,

प्रति सम्बन्धित तिली नदी जिम्मा प्रस्ताव
गरिएको तिली नदी को IEE गर्ने काममा सहकार्य गर्ने
को साथ सम्बन्धित डा. लाली मिश्र ००६११२१२६ गते
राजधानी केन्द्रमा प्रकाशित सुचनाको दावा गरिएको
यस गाठबिच्छेदको सुचना पछि राखे गरिएको व्यहोरा
जानकारी गराइन्छ।


राजेन्द्र प्रसाद पोखरेल
गा बि स सचिव एवं अध्यक्ष

प्रारम्भिक वातावरणीय परिक्षण सम्बन्धि सूचना टाँसको मुचुल्का

आज मिति २०७२/१२/२७ गते ^{शानेवाटो} विहिवारको दिन यस ^{शानेवाटो} गा.वि.स./न.पा. वडा नं. ८ स्थित ^{तिला पुल} भन्ने ठाउँमा ^{तिला} पुलको प्रारम्भिक वातावरणीय परिक्षण गर्ने क्रममा सम्पूर्ण सरोकारवालाहरूलाई प्रस्तावित पुल निर्माण गर्दा त्यस क्षेत्रको भौतिक, जैविक, आर्थिक सामाजिक तथा साँस्कृतिक वातावरणमा पर्ने असर तथा ति असरहरू न्यूनीकरण गर्न अवलम्बन गर्न सकिने सम्भावित उपयुक्त वारे आफ्ना राय सुझावहरू पठाउन आवहान गर्दै मिति २०७२/१२/१८ को राष्ट्रिय दैनिक राजधानीमा प्रकाशित १५ दिने सार्वजनिक सूचनाको छाँया प्रति हामी निम्न सरोकारवालाहरूको उपस्थितीमा टाँस गरिएको व्यहोरा सही हो भनि यो मुचुल्कामा हस्ताक्षर गर्दछौं ।

क्र.स.	नाम/थर	ठेगाना	पेशा	हस्ताक्षर
१	तिला विष्ट	शानेवाटो, बालु - ७	विद्यार्थी	तिला
२	रिसमा विष्ट	" "	"	रिसमा
३	पविता विष्ट	" "	"	पविता
४	दुध कुला विष्ट	" "	कृषी	दुधकुला
५	रमेश वि.कु.	मान्द्र - २	कृषी	रमेश
६				
७				
८				
९				
१०				

प्रारम्भिक वातावरणीय परिक्षण सम्बन्धि सूचना टाँसको मुचुल्का

आज मिति २०७२/१२/३७ गते बिहानको दिन यस शता गा.वि.स. न.पा. वडा नं. ८ स्थित सैती हाट भन्ने ठाउँमा तिला पुलको प्रारम्भिक वातावरणीय परिक्षण गर्ने क्रममा सम्पूर्ण सरोकारवालाहरूलाई प्रस्तावित पुल निर्माण गर्दा त्यस क्षेत्रको भौतिक, जैविक, आर्थिक सामाजिक तथा सांस्कृतिक वातावरणमा पर्ने असर तथा ति असरहरू न्यूनीकरण गर्न अवलम्बन गर्न सकिने सम्भावित उपयहरू बारे आफ्ना राय सुभावेहरू पठाउन आवहान गर्दै मिति २०७२/१२/३७ को राष्ट्रिय दैनिक राजधानिमा प्रकाशित १५ दिने सार्वजनिक सूचनाको छाँया प्रति हामी निम्न सरोकारवालाहरूको उपस्थितीमा टाँस गरिएको व्यहोरा सही हो भनि यो मुचुल्कामा हस्ताक्षर गर्दछौं।

क्र.स.	नाम/थर	ठेगाना	पेशा	हस्ताक्षर
१	लक मल्ल	शता - ८	व्यवसाय	
२	नवित तिमिल्सिना			
३	नरेन्द्र आचार्य	" "	सुपरीभाइ	
४	सुभाष साही	" ३	व्यापार	
५	कुमल मल्ल	८	" "	
६	बैरा साह	३	" "	
७	सान्नी मल्ल	८	" "	सान्नी
८				
९				
१०				

Annex D: Recommendation Letter



नेपाल सरकार
सङ्घीय मामिला तथा स्थानीय विकास मन्त्रालय
नमुना गाँउ विकास समितिको कार्यालय
भर्ता, कालीकोट

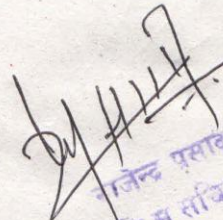
पत्र संख्या: ०६२१०६३
चलानी नं. २६५

मिति २०७२.१२.२५

विषय:- सिमान्ति गाउँपालिका वार्ड

श्री १५५५ विमान भु-वाला वार्ड तथा
सामाजिक कार्य

उपरोक्त सम्बन्धमा कलेडोर भित्रको को
भर्ता र मान्म गोविन्द जो विमानमा भर वार्ड
तिला फल निर्माण गर्दा त्यस क्षेत्रको भौतिक, शैक्षिक
र आर्थिक सामाजिक वातावरणमा न्युन. चेहि हुने
गर्ने निर्माण गर्दा र हुन गपडा चेहि हुने, फल रूपमा
न्युन हुने गर्ने, गरी आयोजना वातावरण गर्नु
सिमान्ति गाउँपालिका।


राजिन्द्र प्रसाद पौडरेल
गा वि स तयिय एवं अध्यक्ष



नेपाल सरकार

फोन/फ्याक्स:-०८०-४४००२६

संघीय मामिला तथा स्थानीय विकास मन्त्रालय

सूचना मैत्री

गाउँ विकास समितिको कार्यालय

मन्थली-१, काठमाडौं

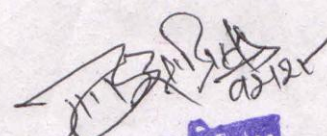
पत्र संख्या:-०६१०६२
चलानी नं:-६९८

मिति:-२०६२/१२/२८

विषय:- सिफारिस गरिएको बारे ।

श्री. सडक विभाग, भू-वातावरण तथा
सामाजिक शाखा

प्रस्तुत विषयमा कालिकोट जिल्लाको अर्ना र मान्म गा.वि.स.को सिमाना भएर बग्ने तिला पुल निर्माण गर्दा त्यस क्षेत्रको भौतिक, जैविक र आर्थिक सामाजिक वातावरणमा न्यून हानी हुने गरी निर्माण गर्न र हुन गएको हानीहरू पूर्ण रूपमा न्यूनीकरण गरी आयोजना कार्यन्वयन गर्न सिफारिस गरिन्छ ।


राजेशप्रसाद रिजाल
गा.वि.स. अध्यक्ष

Annex E: Minutes of Public Consultation

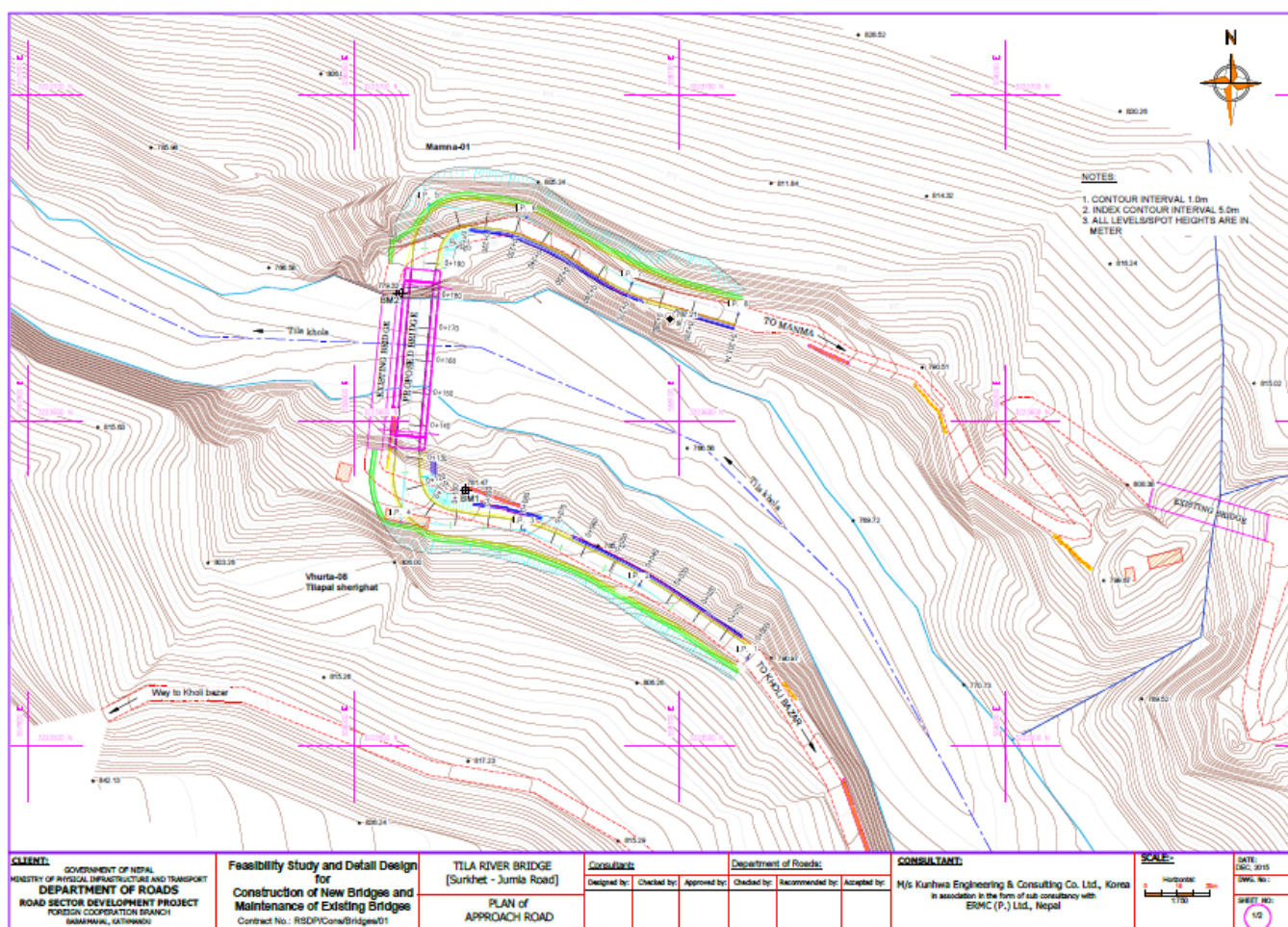
આજ મિતિ ૨૦૦૨/૧૨/૨૭ ગતે શનિવારનો દિન મના ગાવેલ.
વડા નં. રહેલું સ્થિત પ્રસ્તાવિત તિલા પુલનો પ્રારંભિક
વાતાવરણીય પરિદાનનો ક્રમમાં પુલ નિર્માણને થસ
ક્ષેત્રમાં પર્ત સવને વાતાવરણીય અસર ૨ તિનકા ન્યુનિકલે-
શન ઉપાયદર સમ્બન્ધમાં નિમ્ન લિલિત સરોકારવાલાદરસંગ
રાય, સુખાવ તથા ગુનાસાદર સમ્બન્ધમાં કલ્પલ ગારિયો।

ક્ર.સં.	નામ	ઠેગાના	પૈશા	દસ્તાસર
૧	લંક મલ્લ	મર્ત ૮	બાપા	મર્ત
૨	કુમલ વ મલ્લ	મર્ત ૮	બાપા	મર્ત
૩	ચતન વ મલ્લ	મર્ત ૮	બાપા	મર્ત
૪	મર્તિ લિનિલસેના	મર્ત ૮	બાપા	મર્ત
૫	પ્રજાશા શાદી	મર્ત ૮	બાપા	મર્ત
૬	બિરાજ ચેલો	મર્ત ૮	બાપા	મર્ત
૬	નર્મ શાદી	મર્ત ૮	મર્ત	મર્ત

મેલાકો નિર્ણયદર

- (૧) પાંદરો લગાચતકા સમસ્યાદર નિયંત્રણ ગર્ત વૃક્ષરોપણ ગર્ત પર્ત।
- (૨) પુલ નિર્માણ ગર્ત ક્રમમાં દેશવને વાતાવરણીય અસરદર પૂર્ણ સ્વપમાં નિયંત્રણ ગર્ત પર્ત।

Annex F: Maps and Layout



Annex G: Sample Questionnaire

घरधुरी सर्वेक्षण प्रश्नावली

१. आधारभूत विवरण:

क.सं.	प्रश्न	उत्तर
१.१	प्रश्नावली नं.	०३
१.२	अन्तरवार्ताको मिति	२०७२/१२/२७
१.३	जिल्ला	काभ्रे Kalikot
१.४	गाविस	Bharla
१.५	बडा नं.	८
१.६	गाउँ / वस्तीको नाम	Seri Ghat
१.७	उत्तरदाताको नाम	Kamal Malla
१.८	उत्तरदाताको लिंग	पुरुष ☒ महिला ☐
१.९	घरमूलीको नाम	Kamal Malla
१.१०	घरमूलीको लिंग	पुरुष ☒ महिला ☐
१.११	जात / जाती (उपयुक्त एक मात्र उत्तरमा गोलो लगाउनुहोस्)	बाहुन ☐ क्षेत्री ☐ ठकुरी ☒ जनजाती ☐ दलित ☐ अन्य -खुला उनुहोस्) ☐
१.१२	धर्म (उपयुक्त एक मात्र उत्तरमा गोलो लगाउनुहोस्)	हिन्दु ☒ बौद्ध ☐ मुस्लिम ☐ क्रिश्चियन ☐ अन्य -खुला उनुहोस्) ☐
१.१३	परिवारको प्रकार (उपयुक्त एक मात्र उत्तरमा गोलो लगाउनुहोस्)	एकात्मक परिवार ☒ संयुक्त परिवार ☐ विस्तारित परिवार ☐

२. घरधुरी विवरण

२.१ पारिवारिक विवरण

क.सं.	घरपरिवारका सदस्यहरुको घरमूलीसंगको नाता	लिंग	उमेर (पूरा भएको उमेर)	शिक्षा (५ वर्ष माथि)	पेशा (१४ वर्ष भन्दा माथि)	हाल घरमा भएको / नभएको
-------	--	------	-----------------------------	----------------------------	---------------------------------	-----------------------------

		पु.	म.				भएको	नभएको
१.	आमा	१	२	curry	२२	३	१	२
२.	छोरी - ३	१	३	student	१२	६	१	२
३.	छोरी - ३	१	३	student	१६	२	१	२
४.	श्रीमती - ३	१	३	housewife	३०	२	१	२
५.	छोरी	१	२	student	६	६	१	२
६.	छोरी	१	२	student	६	६	१	२
७.	श्रीमती	१	२	housewife	२६	२	१	२
८.		१	२				१	२
९.		१	२				१	२
१०.		१	२				१	२
११.		१	२				१	२
१२.		१	२				१	२
१३.		१	२				१	२
१४.		१	२				१	२
१५.		१	२				१	२
१६.		१	२				१	२
१७.		१	२				१	२
१८.		१	२				१	२
१९.		१	२				१	२
२०.		१	२				१	२

संकेतहरू

१. घरमूलिसंगको नाता: घरमूलि -१, श्रीमती -२, श्रीमान- ३, छोरी- ४ छोरा -५, बुहारी -६, बुबा -७, आमा- ८, नाती - ९, नातीनी -१०, बहिनी- ११, दाई- १२, भाउजू -१३, भाई -१४, भाई बुहारी -१५, नातेदार (पुरुष)- १६, नातेदार (महिला)- १७, अन्य -१८

२. वैवाहिक अवस्था: अविवाहित -१, विवाहित -२, सम्बन्ध विच्छेद छुट्टै बसेको -३, विधवा/विदुर -४

३. शिक्षा: निरक्षर -१, साक्षर - २, प्राथमिक -३, निम्न माध्यमिक -४, माध्यमिक- ५, प्रवेशिका/ उच्च माध्यमिक -६, उच्च माध्यमिक भन्दा माथि- ७

४. पेशा: कृषक- १, नोकरी पेन्सन -२, व्यापार -३, ज्यालदारी (कोष/ गैर कोष) -४, वैदेशिक रोजगार- ५, विद्यार्थी - ६, गृहिणी- ७, अपाङ्ग -८, अन्य -९

३. बसाई सराई

क.स	प्रश्न	उत्तर
३.१	तपाईंका परिवार (पूछा) कहिले देखि यस ठाउँमा बस्दै आउनुभएको हो ?	दुई पुस्ता भन्दा अघिबाट (५० वर्ष) एक पुस्ता भन्दा अघिबाट २५ वर्ष

		हालसालै १० वर्ष भन्दा कम							
३.२	यदि तपाईं बसाई सरर आउनुभएको हो भने कृपया तपाईंको पुर्खाको ठाउँ तोकनुहोस् ?	जिल्लाको अर्को गा वि सहर छिमेकी जिल्ला अन्य जिल्ला							
३.३	के तपाईंको परिवारका कुनै सदस्य कामको सिलसिलामा बसाई सर्नु भएको छ ?	छ छैन							
३.४	यदि छ भने बताउनुहोस्	कामको लागि स्थान/ठाउँ							के बसाई सराई बापिक चलन हो ?
	कम संख्या	जानेको संख्या लिइ		जिल्ला भित्र	जोडिएको जिल्ला	अर्को जिल्ला	भारत	विदेश	हो
		पुरुष	महिला						
		१			कोशी		✓		✓

४. परिवारमा विरामी

क.सं.	प्रश्न	उत्तर
४.१	गएका १२ महिनामा तपाईंको कुनै सदस्य विरामी हुनु भएको थियो ?	थियो थिएन

४.१ यदि थियो भने, परिवारका सदस्य कस्ता रोगबाट विरामी भएका थिए र कुन समयमा ? कृपया खुलाउनुहोस्।

क.सं.	रोगको नाम	विरामी सदस्य संख्या		मौसम (कृपया टिक लगाउनुहोस्)		
		पुरुष	महिला	वर्षा (आषाढ-असोज)	हिउँद (कार्तिक-फागुन)	गर्मी (चैत-जेठ)
१	ज्वरो	१	२		✓	✓
२	सामान्य रुघा खोकी	४	३		✓	
३	मलेरिया					
४	भाडापखला	४	३			✓
५	जन्डीस					
६	टाइफाइड	१			✓	

क्र.सं	रोगको नाम	विरामी सदस्य संख्या		मौसम (कप्या टिक लगाउनुहोस्)		
		पुरुष	महिला	बर्षा (आपाइ-असोज)	हिउँद (कार्तिक-फागुन)	गर्मी(चैत-जेठ)
७	निमोनिया					
८	मुटु सम्बन्धि					
९	अन्य(खुलाउनुहोस्) मानिएको	१				
१०	अन्य(खुलाउनुहोस्)					
११	अन्य(खुलाउनुहोस्)					
१२	अन्य(खुलाउनुहोस्)					

४. शौचालय सुविधा

क्र.सं	प्रश्न	उत्तर
१	के तपाईं बसी गएको घरमा शौचालय सुविधा छ ?	छैन ☒ छ ☐
२	यदि छ भने, तपाईंको घरमा कस्तो प्रकारको शौचालय सुविधा छ ?	खान्दे चर्पी / कच्चा चर्पी पक्का चर्पी

५. खानेपानीको सुविधा

क्र.सं	श्रोतहरु	प्रयोग गरेका मुख्य तिनवटा श्रोतहरु		प्रयोगका आधारमा प्राथमिकिकरण गर्नु होस्
		छ	छैन	
१	धारा (निजी धारा)	१	२	
२	धारा (सामूहिक)	१	२	
३	कुवा / भुस / ढुङ्गाधारा	१	२	
४	अन्य (खुलाउनुहोस्) - पहाडबाट			

संगतार्य-

६. आयोजना सम्बन्धि

६.१ तपाईंलाई यस आयोजना बारे जानकारी छ ?



६.२ यदि छ भने कुन माध्यमबाट थाहा पाउनु भयो ?

घरको तालु जाई थाहा भएको

६.३ यस आयोजना बनाउँदा तपाईंलाई कुन प्रकारको हानी नोक्सानी पुर्याउँछ ?

☒ जग्गाको क्षती

घरको क्षती

☒ भौतिक संरचनामा क्षती

६.४ यस आयोजनाले यस क्षेत्रको भौतिक, जैविक, सामाजिक, आर्थिक तथा सांस्कृतिक वातावरणमा के कस्तो असर गर्ने देख्नुहुन्छ ?

- बाढ पारेको (slasting गर्दा)

६.५ यस आयोजनाले यस क्षेत्रमा रहेको के कस्तो सांस्कृतिक तथा भौतिक सम्पत्तिलाई असर गर्छ ?

६.५

६.६ यो आयोजनाले यस क्षेत्रमा रहेको मठ, मान्दर तथा अन्य सांस्कृतिक सम्पदाहरूमा असर पुऱ्याउने देखिन्छ ?

अझै रोगी छैन, भन्ने परेको छैन।

६.७ यो आयोजनाले के कस्तो फाइदा पुऱ्याउने देखिन्छ ?

पाल्पात र विकासको लागि

६.९ आयोजना बारे तपाईंको राय सुन्नाहरू के के छन् ?

- निरन्तरताको काम।

- ठेकाको लिईएको

- local employment

- स्थानीयले ठेका पाए हुनेछो ।

Annex H: Approval Letter of ToR



नेपाल सरकार
भौतिक पूर्वाधार तथा यातायात मन्त्रालय
सडक विभाग
योजना तथा डिजाइन महाशाखा
भू-वातावरण तथा सामाजिक शाखा

फ्याक्स: ४४२९९०६

फोन नं.: ४२९०६९६

हाल: पाटन, ललितपुर

ई-मेल: gesunit@dor.gov.npवेब साइट: www.dor.gov.np

मिति: २०७२/१०/०८

चलानी नं.: १९२/२.२.२/०७२/७३

श्री वैदेशिक महाशाखा
बबर महल, काठमाडौं।

विषय: Tila Bridge(Surkhet-Jumla Road) को IEE को ToR स्वीकृत भएको सम्बन्धमा।

उपरोक्त सम्बन्धमा त्यस महाशाखा अर्न्तगत Tila Bridge(Surkhet-Jumla Road) को IEE को ToR भौतिक पूर्वाधार तथा यातायात मन्त्रालयको प.सं.०७२/०७३/२३ ख.नं. ४९९ मिति २०७२/०९/२८ को पत्रानुसार नेपाल सरकार। सचिवालयको मिति २०७२/०९/२४ को निर्णयानुसार शर्त सहित स्वीकृत भएको व्यहोरा अनुरोध गरिन्छ।

संलग्न: १. भौतिक पूर्वाधार तथा यातायात मन्त्रालयको पत्र छुट्याप्रति - १ भान

२. स्वीकृत ToR - १ प्रति।

Vikram
विजय कुमार महता
इकाई प्रमुख
विजय कुमार महता
इकाई प्रमुख/सि.डि.ई.
भू-वातावरण तथा सामाजिक शाखा

बोधार्थ: (आवश्यक कार्यायको लागि।)

श्री M/S Kunhwa Engineering and Consulting Co. Ltd Korea in association in the form of Sub Consultancy with ERM Co Pvt. Ltd., Nepal
Baneshwor, Kathmandu। संलग्न: १. भौतिक पूर्वाधार तथा यातायात मन्त्रालयको पत्र छुट्याप्रति - १ भान
२. स्वीकृत ToR - १ प्रति।


नेपाल सरकार
भौतिक पूर्वाधार तथा यातायात मन्त्रालय
 (वातावरण रोजगार सामाजिक शाखा)


एम ई ई ०३३: ०७२/०७३/२३
 न नं २९९

URL: www.mop.gov.np
 Email: info@mop.gov.np
 फोन नं ८२९८८८
 ८२९९९९
 ८२९९९९
 फ्याक्स नं ८२९९९९
 सिंहदरबार, काठमाडौं
 नेपाल

मिति: २०७२/०७/२८

३४८ ०७२/०७/२८

विषय: प्रारम्भिक वातावरणीय परीक्षण (IEE) को कार्यसूची स्वीकृति भएको सम्बन्धमा।

श्री सडक विभाग,
 भू-वातावरण तथा सामाजिक शाखा,
 पुल्चोक, ललितपुर।



उपरोक्त सम्बन्धमा भू-वातावरण तथा सामाजिक शाखा, सडक विभाग प्रस्तावक रहेको Tila Bridge (Surkhet-Jumla Road), Kalikot को प्रारम्भिक वातावरणीय परीक्षण (IEE) को कार्यसूची नेपाल सरकार (सचिवस्तर) को मिति २०७२/०७/२४ को निर्णयानुसार कार्यसूचीमा उल्लेख गरिएका Issue/Impacts का अलावा प्रतिवेदन तयारीका समयमा अन्य Issue/Impacts देखा परेमा सो पनि समावेश गर्नुपर्ने शर्तमा स्वीकृत भएको ब्याजीरा अनुरोध छ।

२१/७/२०७२
 (शोभा भण्डारी)
 समाजशास्त्री

२१/७/२०७२

Annex I: Photographs



Existing Bailey bridge over Tila River



Private structures around the Bridge location



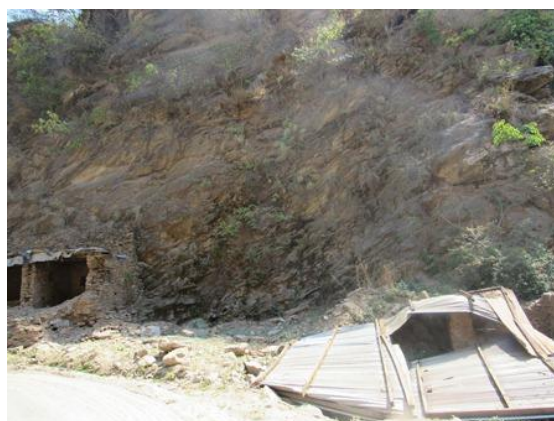
Pasting public notice



Local people observing the Public notice



Interaction with the local people



Hill slope that needs to be excavated for approach road

Annex J: Comment Incorporation Matrix

Comment Incorporation Matrix (Tila)

Comments	Incorporated Section	Remarks
Rewrite the cover page (remove the topmost and middle portion)	The cover page has been changed.	
Replace the term Sija with Tila in page i (2.0 and 3.0), page ii (6.0), page iii (9.0) in Nepali executive summary.	The term Sija has been replaced by Tila in Nepali Executive Summary.	
Mention the phone number and e-mail address of proponent in both nepali and English executive summary and chapter 1.	The phone number and number and e-mail address of proponent in both nepali and English executive summary and chapter 1 has been mentioned.	
Correct all the typo errors in Nepali executive summary	They have been corrected.	
Make uniformity in both nepali and English executive summary in first paragraph of existing environmental condition and second paragraph of environmental mitigation and EMP section	Both English and Nepali executive summary are made uniform	
Make sure whether access road is component of this project or not. If yes, then mention the impacts and its mitigation measures relating access road. There is not uniformity on the languages regarding no. of trees need to be cut and its plantation on 1:25 ratio throughout the report as the cost for the plantation has already been separated, similarly	The access road is the component of the project and its impacts and mitigation measures has been proposed. Section 7.2.1, page 44. Section 9.2.1, page 56.	The project does not need to clear the trees. The plantation is mainly done to protect the aesthetic of the area. No public

regarding the public structures that is going to be affected etc. and its compensation. So, revisit the impact and mitigation chapter regarding access road.		structures are affected by the project.
Make uniformity regarding the length of access road in both English and nepali executive summary (304m), page 9 (253m) and page 42 (300m). add the length of access road in salient features.		The length of approach road has been made uniform in the whole report.
If access road is not complete then write down a statement mentioning that	Project can be accessed through Surkhet – Jumla road which is clearly mentioned in the name of road in salient feature table 2.1.	
Make uniformity in the length of span of bridge throughout the report (pg 2 (1*45m), pg. 3 (40m), pg.6 (no. of span 1*50m)	Page 2, 3 and 6.	The span of the bridge has been made uniform
In salient features add RoW of access road, depth of foundation, traffic volume, access road, unit of total project cost. Revisit the geographical location in salient features.	The unit of total project cost in salient features has been added.	The geographical location in Salient features has been revisited.
Mention the types of land use by the project in both text and table.	Section 3.3.1. Table 3.2, Page 7	The types of land use have been mentioned.
The activities that have to be undertaken for the construction of bridge should be addressed	Activities are presented in section 3.3.7	

It would be better to include required man days for the project construction, their facilities i.e, drinking water, toilets, OHS. Mention the amount of construction materials needed for the project (both in text and table)	The man days for project construction is included in section 3.3.7 3 rd bullet, page 9. Amount of construction materials required are presented in section 3.3.2	
Mention the time schedule for the completion of the project	The time schedule is included in figure 4.1, page 14.	
In page 8 clarify the term quarry site in table 3.2, 2 nd row as the whole table gives the explanation of quarry sites for the project	Table 3.3, page 8.	The term quarry site in table has been changed.
It would be better to mention whether the design of bridge is earthquake resistant or not.	It has been mentioned in Section 2.4, page 3.	
Study team members are missing Source of map is missing (pg. 27, 28 and 29) Unit of land area in table 7.2 is missing	The unit of land area in table 7.2 is added. Page 47.	
Include a map showing location of quarry site camp site, stockpiling site, spoil management site and crusher plant		
In page 11, replace the term physiology by physiography	It has been replaced.	
In chapter 5, the review should be done in systematic way i.e., constitution, plan, policy, act, regulation, manual, guideline, standard, convention and so on.	The review has been done in systematic way.	

Remove the date from the constitution of Nepal	It has been removed.	
In same chapter, standard of generator and vehicle emission is missing	Section 5.5.5 and 5.5.6, page 27	It has been added.
Revisit the spelling of Bailey bridge in page 27	It has been revisited.	
Revisit pg 32 in public structure section (confirm about the 2 structures going to be damaged due to upgrading of access road)	The two structures are privately owned.	
In same page revisit biological environment (confirm about the cutting of trees)		The project does not need to cut the trees.
Correct the date of CBS as 2011 in every table of social baseline information (pg. 34, 35, 36, 37)	Page 36-39.	It has been corrected.
In page 41, shift the term cultural environment towards socio-economic environment	The term cultural environment has been shifted towards socio-economic environment	
In same page, the topic and content of last line of loss of productive soil contradict with each other	It has been made compatible.	
In page 42, remove the second paragraph of Env. Issues associated with sand and gravel extraction	It has been removed.	
Revisit pg 46, clearing of forest and habitat destruction and loss (confirm	The project does not need to cut the trees.	

about the no. of trees need to be cut)		
Encroachment can be one of the social impact	This issue is addressed in last bullet of page number 67.	
In page 61, correct the name of MoPE as Ministry of Population and Environment, the monitoring part of the project should be added in the responsibility of MoPIT in same page	Table 10.1, page 63.	The name of MoPE has been corrected and the monitoring part of project has also been added in responsibility of MoPIT.
It would be better to add the heading on each page of matrix of both monitoring and EMP	Table 10.3, 10.4, 10.5 and 10.6 Page 69-93.	The heading on each page of both monitoring and EMP has been added.

Comment Incorporation Matrix (Tila)

Comments	Incorporated Section	Remarks
Include project layout map in an original colored topographical map distinctly showing road alignment, affected VDCs and their boundaries, location of camp sites, quarry sites, disposal sites, batching aggregate crushing and storage facilities.		
The baseline information, Impact Identification, Mitigation Measures, Mitigation Cost, and Monitoring Chapter shall be compatible to each other	The baseline information, Impact Identification, Mitigation Measures, Mitigation Cost, and	

	Monitoring Chapter are compatible to each other	
The information provided on the main IEE report and approved ToR is different, (salient features, length, maximum discharge, chainage, VDCs, name of river, longitude and Latitude etc.). The executive summary in English and Nepali should be matched and Nepali summary has too many mistakes.	Nepali and English executive summary are matching.	
Add total project cost with unit in salient features and revisit on it. Change the format of the cover page and date.	The total project cost has been added in table 3.1, page 8.	The format of the cover page and date have been changed.
Revisit on the climate. Provide the land requirement in hectare than m ³ . Clear deed of inquiry and recommendation letters should be attached.	The land requirement is mentioned in hectare. Table 3.2, page 8. Clear deed of inquiry and recommendation letters are attached in Annex C and D	
Methodology chapter should be elaborated and specific. What are the specific tools used for the (related) data collection? Don't write the various tools used.	Specific tools used are mentioned in Table 4.2, page 14-15.	The methodology chapter is elaborated and specific.
What are the construction activities, constructive planning and methods? Mention the resources required (specific materials) for the Project Implementation and list the quantity source and capacity of quarry site.	The construction activities, constructive planning and methods has been discussed in section 3.3.7, page 10. Resources required are	

	listed in section 3.3.2, page number 9. Capacity of quarry site mentioned in table 3.4, page number 10 and 11.	
Also provide clear information about the land with its type and owner. Add more information about the approach road.	The information about land and its owner is mentioned in table 7.1 and 7.2, page 53-54.	
Provide annex number in the text too. The numbering of the annex is also incorrect. It is ethnic composition not the ethnicity. The referred table in the text is also incorrect.	Annex numbering has been corrected. The caste and ethnicity is changed into ethnic composition. The referred table in the text has been incorrect.	
The component of socio-economic heading is written in physical environment. The topic on gender issues is not complete and specific.	Topic on gender issues has been made complete in page 54 section J	This is the suggestion from GESU
The objectives should be written in serial. DDC profile of Surkhet is provided. Review and correct the date of different acts and policies. The name of Ministry of Population and Environment is Mistake.	The DDC of Surkhet is not written in Report. The date of different acts and policies has been reviewed and corrected. The name of MoPE has been corrected.	

The map should have clear information with scale and legends. Write literacy status, Impact, Identification and Prediction in right way.	All the maps are made clear with scale and legends. Literacy status, Impact, Identification and Prediction has been written in right way.	
Don't break down the table in two pages. Remove the date from the constitution. Provide all abbreviations and acronyms. The page no. is mistake. Give more attention on formatting of the report (1., 2...)	The table has not been broken in two pages. All the abbreviations have been provided. Page no. is corrected.	
The whole report is mismatched with incorrect information. So revise the whole report with specific information	The whole report has been revised.	
Correct spelling and grammatical errors throughout the report. Please review and check the approved ToR.	The spelling and grammatical errors have been corrected. The approved ToR has been reviewed and checked.	