

Initial Environmental Examination of Sija Khola Bridge (Surkhet- Jumla Road)



Submitted By:

Geo-Environmental and Social Unit
Department of Roads
Chakupat, Lalitpur

Submitted to:

Ministry of Physical
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Tel.: 977-1-447-1884

December, 2016

सिजा खोला पुल प्रारम्भिक वातावरणीय परिक्षण कार्यकारी सारांश

१.० प्रस्ताव

प्रस्तावित सिजा खोला पुल सुर्खेत-जुम्ला सडक खण्ड अन्तर्गत कालिकोट जिल्लाको फोडमहादेव र जुम्ला जिल्लाको रारालिही गा.वि.स.को सिमाना हुँदै बग्ने सिजा खोलामा पर्दछ । प्रस्तावित आयोजना क्षेत्र समुद्री सतहबाट २०४० मी. मा पर्दछ । यस आयोजनाले दुइ जिल्लालाई मात्र जोड्ने नभई जुम्ला हुँदै सडक निर्माण प्रस्ताव गरिएको मुगु र डोल्पा लगायतका कर्णाली क्षेत्रका जिल्लाहरूलाई जोड्ने काम गर्दछ । यस सिजा खोला पुल निर्माणको प्रस्तावकको नाम र ठेगाना निम्न अनुसार रहेको छ ।

भू-वातावरण तथा समाजिक शाखा,

सडक विभाग,

चाकुपाट, ललितपुर

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

सडक क्षेत्र विकास आयोजना,

सडक विभाग,

सानो गौचरन, काठमाडौं

२.० प्रस्तावको विवरण

प्रस्तावित सिजा खोला पुलको कुल लम्बाई ४१.२० मी.को हुनेछ भने यसको चौडाई ११ मी. को हुनेछ । पक्की ढलान गरेर निर्माण गरिने उक्त पुलको दूया-बाँया थप १४० मी. सडक सुधार गर्नु पर्ने देखिन्छ । भौगर्भिक रुपमा २९°१२'८.३४१" उत्तर अक्षांश र ८१°५४'४३.०३" पूर्व देशान्तरमा अवस्थित उक्त आयोजना निर्माणका लागि कुल छ करोड साठी लाख उनान् नब्बे हजार तिन सय सत्ताइस रुपैया उनान् नब्बे पैसा रहेको छ ।

३.० प्रस्तावको सान्दर्भिकता

वातावरण संरक्षण नियमावली, २०५४ को अनुसूची १ को नियम ३ अनुसार कुनै पनि ठूला 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 ठूला पुल भित्र पर्दछन् । प्रस्तावित सिजा 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 ।

४.० प्रारम्भिक वातावरणीय परिक्षणको उद्देश्य

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

५.० 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 रुपमा २०७२ साल चैत महिनामा स्थलतग सर्वेक्षण गर्ने, आवश्यक सूचनाहरू संकलन गर्ने र स्थानीय समुदाय र सरोकारवालाहरूसँग समूहगत छलफल, परामर्श गर्ने कार्य गरियो । स्थलगत अध्ययन अर्थात

सरोकारवालाहरूको जानकारीको लागि राष्ट्रिय दैनिक राजधानिमा मिति २०७२ साल चैत २० गते सार्वजनिक सूचना प्रकाशित गरियो ।

६.० विद्यमान वातावरणीय अवस्था

प्रस्तावित क्षेत्र मध्यपश्चिमाञ्चल विकास क्षेत्रको हिमाली भेगमा पर्दछ । जुम्ला र कालिकोट जिल्लाको सिमानामा पर्ने यस पुल सिजा र टिला नदीको दोभान भन्दा १९० मी. माथि सिजा नदीमा पर्दछ । उक्त पुल निर्माण क्षेत्र वरपर मुख्य गरी खोलाले बगाएर ल्याएको ढुङ्गा, माटो प्रसस्त रूपमा देख्न सकिन्छ । खोलाको सतह र हाल विद्यमान सडक विच करिब ३० 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 नरहेको देखिन्छ । जाडो याममा हिँउ पर्ने उक्त क्षेत्रमा सरदर १८६८ मीमी वर्षात हुने गर्दछ । उक्त क्षेत्रमा भूकम्पको दृष्टिले मध्ययम किसिमको जोखिम रहेको पाइन्छ । खेती योग्य जमिनको बाहुल्यता रहेको आयोजना कार्यान्वयन क्षेत्र नजिकै शिव मन्दिर र सार्वजनिक धारा रहेको छ ।

गोब्रे सल्ला, गुँरास, देवदार, बाँझ, लागयतका हिमाली 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 बढुलिएको तथ्याङ्क अनुसार आयोजना क्षेत्र वरपर कस्तुरी मृग, घोरल, स्याल, बँदेल, लंगुर, रातो बाँदर, आदी जस्ता वन्य जन्तुहरू पाइन्छ । चरहरूको सन्दर्भमा आयोजना क्षेत्र वरपर सानो तिरतिरे हाँस, डाँफे, कालिज, च्याखुरा, हिमाली गिद्ध, आदी प्रजातिका चराहरू पाइन्छ । सिजा नदीमा पाइने माछाहरूमा चुच्चे असला, बुच्चे असला, तिते, धामी, आदी पर्दछन् ।

जतिय हिसाबले क्षेत्री, ब्रमण, ठकुरी र दलित जातिको बासेबास 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 प्रायेण हुने गर्दछ । सञ्चारको विषयमा उक्त क्षेत्रमा हाल नेपाल दुरसञ्चारको सि.डी.एम.ए फोन मात्र प्रयोगमा आएको पाइन्छ ।

आयोजना निर्माणबाट ३ परिवारका चारवटा घरहरू र एक परिवारको जग्गा पर्ने जाने देखिन्छ । आयोजना प्रभावित चार घर मध्य २ घर क्षेत्री जातिको र २ घर ठकुरी जातिको रहेको छ । आयोजना प्रभावित घरधुरीहरूमा ५२.६३% वयस्कहरू रहेका छन् । शिक्षका दृष्टिले आयोजना प्रभावित परिवारका सदस्यहरूको अधिकतम शिक्षा प्रमाणपत्र तह रहेको छ । व्यापार र बैदेशिक रोजगारी आयोजना प्रभावित परिवारको मुख्य अयश्रोत हो र त्यस बापत वार्षिक २००,००० देखि ३००,००० आम्दानी हुने गर्दछ । आयोजना प्रभावित घरहरूमा शौचालय प्रयोगको अवस्था निकै कमजोर रहेको छ र हाल समेत खुल्ला ठाँउमा चर्पी बस्ने चलन विद्यमान छ । आयोजना क्षेत्र वरपरनै लैङ्गीक भेदभाव विद्यमान छ र विकासको पहुचका हिसाबले महिलाहरू निकै पछि रहेका छन् ।

७.० वातावरणीय प्रभावहरू

आयोजना कार्यान्वयन हुँदा आयोजना क्षेत्रको वातावरणमा सकारात्मक र नकारात्मक दुवै खाले प्रभाव 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 वढ्न 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 रूपमा 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 ।

८.० वातावरणीय प्रभाव न्यूनिकरण तथा वातावरणीय व्यवस्थापन योजना

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

यसै गरी यस प्रतिवेदनमा वृक्ष रोपणको समेत प्रावधान राखिएको छ । जसमा ८० वटा विभिन्न जातका स्थानिय विरुवाहरू ढुङ्गा माटो व्यवस्थापन गर्न छुट्याइएको स्थान, पुलको दाँया-बाँयाका सडकहरू र मन्दिर क्षेत्र वरपर रोप्ने गरी प्रस्ताव गरिएको छ । आयोजना सँग सम्बन्धित कमदारहरूले स्थानिय जैविक विविधतामा प्रतिकूल प्रभाव नपार्न 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 सिया खोला पुल निर्माण गर्दा स्थानिय वातावरणमा पर्न सक्ने प्रतिकूल प्रभावहरू न्यूनिकरण गर्ने, सकारात्मक प्रभावहरूलाई बढोत्तरी गर्ने र प्रतिवेदनमा उल्लेख गरिएका गतिविधिहरू निरीक्षण गर्ने प्रावधान सहित वातावरण व्यवस्थापन योजना समेत प्रतिवेदनमा उल्लेख छ । वातावरण व्यवस्थापन योजना कार्यान्वयन गर्नका लागि रु. १,५२१,६८०.०० विनियोजन गरिएको छ ।

९.० निष्कर्ष

प्रस्तवित सिया खोला पुललाई कर्णाली विकासको मुख्य द्वार रुपमा त्यस क्षेत्रका वासिन्दाहरूले लिएका छन् । उक्त पुल निर्माण गर्दा वातावरणमा कम मात्र नकारात्मक प्रभावहरू पर्ने सो प्रभावहरूलाई प्रतिवेदनमा उल्लेख गरिएको उपायहरू अवलम्बन गरेमा सजिलै समाधान गर्न सकिने हुनाले यस पुल निर्माण प्रस्ताव यथाशिघ्र अधि बढाउन सुझाव सहितको निष्कर्ष निकालिएको छ ।

Sija Khola Bridge

Initial Environmental Examination

Executive Summary

1.0 The proposal

The Sija River Bridge is proposed over the Sija River which is located along the Surkhet-Jumla Road at the boundary of Kalikot and Jumla district connecting two different VDCs (i.e., Phoi Mahadev of Kalikot and Raralihi of Jumla District). The proposed location is 2048 m above the mean seal level. The proposed bridge not only connects two districts, but also links the people of Dolpa 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

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

Road Sector Development Project,
Department of Roads,
Sanogaucharan, Kathmandu

2.0 Details of the Proposal

The length of the proposed Sija Khola Bridge is 41.20m while its breadth is 11m. The construction of permanent concrete bridge over the Sija River requires construction of 140m approach road (including both side), which is more upgrading of existing road. The geographical location of the proposed bridge is 29°12'8.341"N and 81°54'43.03"E. The total cost for the construction of the proposed project is NRs. 6,089,327.89.

3.0 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 Sija 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).

4.0 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.

5.0 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.

6.0 Existing Environmental Condition

The proposed location for the implementation of Sija Khola Bridge lies in the Himalayan region of Mid-western Development Region. The proposed location is about 190m upstream from the confluence of Sija and Tila River. Mostly alluvial deposits are available around the proposed bridge location. The existing road and settlement is about 30 m above the river channel and thus the chance of flooding is very low in case of Sija River. The hills on either side of the Sija River are relatively stable and the probability of natural disasters is low. The area experiences snowfall during winter season and the total precipitation around that area is 1868mm. From the earthquake perspective the area is less vulnerable. Agricultural land dominates the land use of the area and public tap and Shiva temple on Jumla side are the public structures that lie near the bridge axis.

Pine, Rhododendron, Devdar, Oak, etc. are the dominant vegetation observed in the forest near the proposed location. The location for the construction of the bridge lies near the settlement and thus, the area is not the habitat of the wildlife. Interactions with the local people suggest that Musk deer, Ghoral, Jackal, Langur, Monkey, wild Boar, etc. are the wildlife observed around the forest of project affected VDCs. Similarly, birds like Danfe, Kalij, Chakhura, Himalayan Vulture, etc. are common in that area. Asla, Dhami and tite are the common fish species observed in the Sija River.

Chhetri, Brahmin, Thakur and Dliat are the ethnic groups residing around the project area. The status of education and health facilities is satisfactory around the project area; however, the educational status of female is very poor compared to that of male. The project area lacks electricity supply as the only micro-hydro operating in that area is damaged and the local people have to rely on solar lamp to light their dwellings. Due to improved road access some of the households in the project area are found to be using LPG for cooking purpose. CDMA phone and local radio are the most common means of communication in the project area.

The construction of the proposed bridge will affect four structures belonging to three households and land belonging to one household. Out of the four project affected households two belong to Chhetri and two belong to Thakur ethnic groups. The highest education received by the members of project affected families is Intermediate Level. Business and foreign employment are the main occupation of the members of project affected families and they earn about NRs. 200,000 to 300,000 per month from their regular occupation. 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.

7.0 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 impacts 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.

8.0 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 techniques 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 80 saplings of local trees have been proposed for the plantation. Out of the 80 saplings 50 will be planted to reclaim spoil disposal sites, 30 along the approach road and remaining 10 around the Shiva temple. 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. 1,521,680.00 has been allocated.

9.0 Conclusion

The project have very minimal environmental impacts that can be mitigated through the mitigation measures proposed in this document and the construction of the Sija 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.

Acronyms and Abbreviations

amsl:	above mean sea level
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
DHM:	Department of Hydrology and Meteorology
DHQ:	District Headquarters
DoR:	Department of Roads
EIA:	Environment Impact Analysis
EMAP:	Environment Monitoring Action 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
IUCN:	International Union for Conservation of Nature
J:	Joint
KII:	Key Informant Interview
LC:	Least Concern
LPG:	Liquid Petroleum Gas
MoPIT:	Ministry of Physical Planning and Transportation
MoSTE:	Ministry of Science, Technology and Environment
NEPAP:	Nepal Environmental Policy and Action Plan
NGO:	Non-Governmental Organization

N-M:	Narayanghat-Muglin
NT:	Near Threatened
PAH:	Polycyclic Aromatic Hydrocarbons
PSC:	Pre-Stressed Concrete
PWD:	Public Works Directive
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
EMP:	Environment Management Plan
DFO:	District Forest Office
RAP:	Resettlement Action Plan
IRDST:	Income Restoration and Skill Development Training
LCF:	Local Consultative Forum
PAP:	Project Affected Person
LCLA:	Local Community Liaison Assistant
AP:	Affected Person

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CHAPTER 1: NAME AND ADDRESS OF THE PROPONENT

1.1 Proponent

The name and address of the institution preparing the Initial Environmental Examination (IEE) Report of Sija Khola 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

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 Sija 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, Baitadi, 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.

Sija Khola is a perennial river originating from the Himalayan range of Jumla and Mugu district with elevation greater than 3,000 m at its origin. The Sija River is one of the major tributaries of Karnali River, which got its name because of its flow through the Sija region of Jumla district. The Surkhet-Jumla Highway crosses the Sija Khola at the chainage (205+550) which also separates Kalikot and Jumla district. The road section is one of the strategically important road sections of Mid-Western region benefitting the people of Karnali zone through the improved access. The estimated length the proposed bridge is 41.20m 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 40m 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

The Sija Khola is a perennial river originated at the mountainous range of Mugu and Jumla district with an elevation greater than 3,000m around its source. The river flows through the Sija region of Jumla district, and from there its name has been derived. The proposed Sija Khola Bridge is located at the border of Kalikot and Jumla district and provides access to the people of Humla, Mugu, Jumla and Kalikot district. In particular, Nepal Army has recently opened a tract along the valley of Sija Khola that connects the people of Humla and Mugu to the zonal headquarter of Karnali Zone, i.e. Jumla. The road is single lane black top road. The existing bridge over the Sija Khola is Bailey bridge which limits the transport of heavy equipment and machineries. The total load bearing capacity of existing Bailey bridge is only 15 tons. In this regard, the proposed bridge not only serves the people residing along the Surkhet-Jumla Highway, rather it provides the highly awaited road access to the entire people of Karnali region. Furthermore, the construction of the proposed bridge at double-lane standard even assures the year around safety of the passengers during the travel. The design of the Sija Bridge has been made with seismic analysis. Hence, the bridge is earthquake resistant.

CHAPTER 3: PROJECT DESCRIPTION

3.1 Project Area

The proposed Sija Khola Bridge is located at the boundary of Kalikot and Jumla district over the Sija River. The total catchment area of Sija Khola from the confluence of Sija-Tila is 68.69 km². The bridge is located at 190m upstream from the confluence at the geographical position 29°12'6.58"N and 81°54'36.96"E and elevation 2059m above msl. Moreover, the bridge lies near the junction of four VDCs, viz. Phoi Mahadev (Kalikot district), Mahabepatthar khola (Jumla), and Lihi Rara (Jumla).

The topography near the proposed bridge location is characterized by the presence of steep river valley topography with higher gradient on right bank compared to the left one. The land use pattern around the project reveals the presence of agricultural and barren land in the dominant proportion. One of the famous marketplaces (Nagma) is present near the proposed bridge, which is an economic hub for the people of Jumla and Mugu districts. The location map (figure 3.1), topographical map (figure 3.2) and Google map (figure 3.3) is shown below:

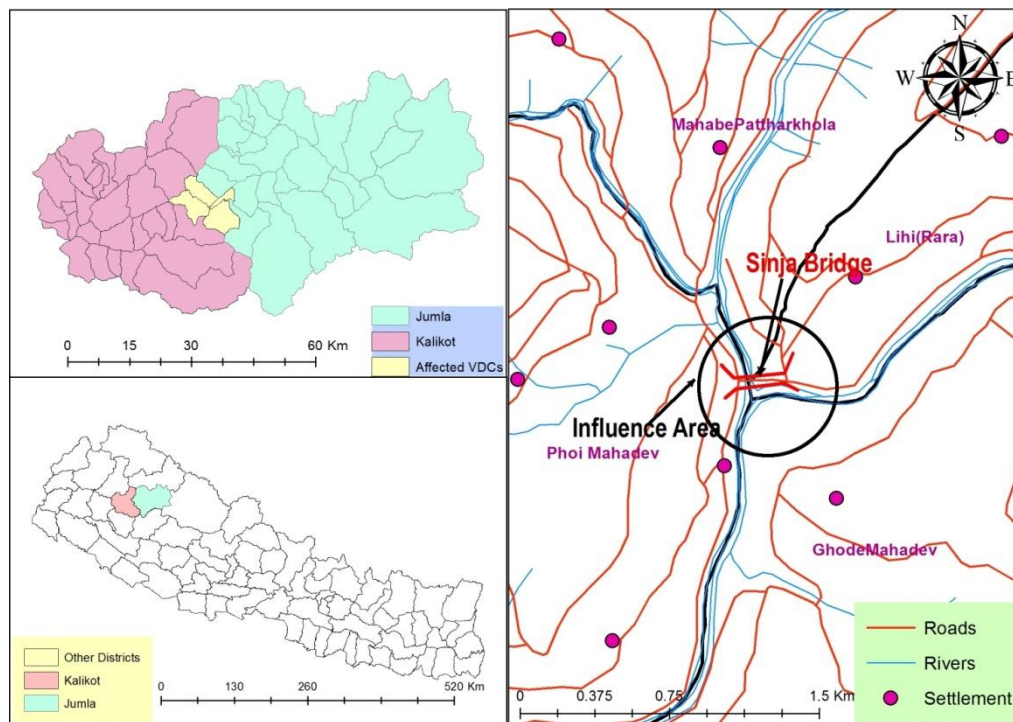


Figure 3-1: Location Map of the Proposed Project.

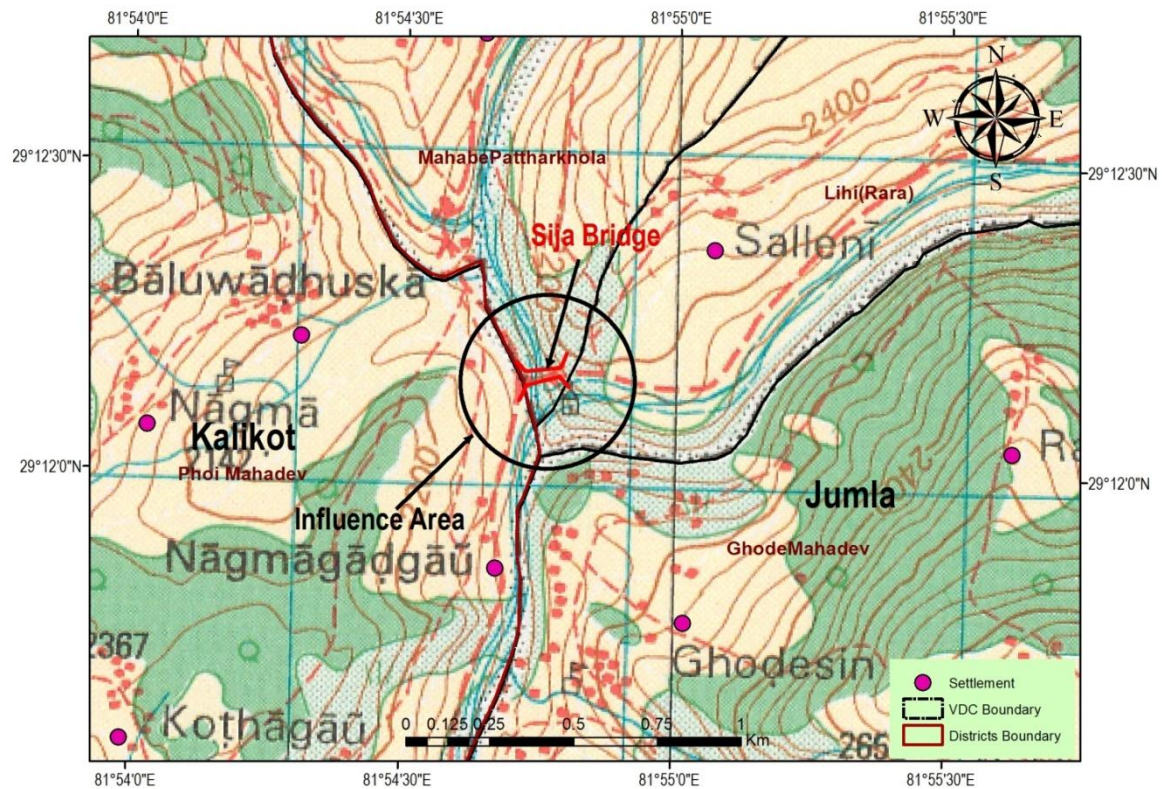


Figure 3-2: Topographical Map Showing Study Area and Project Impact Area.

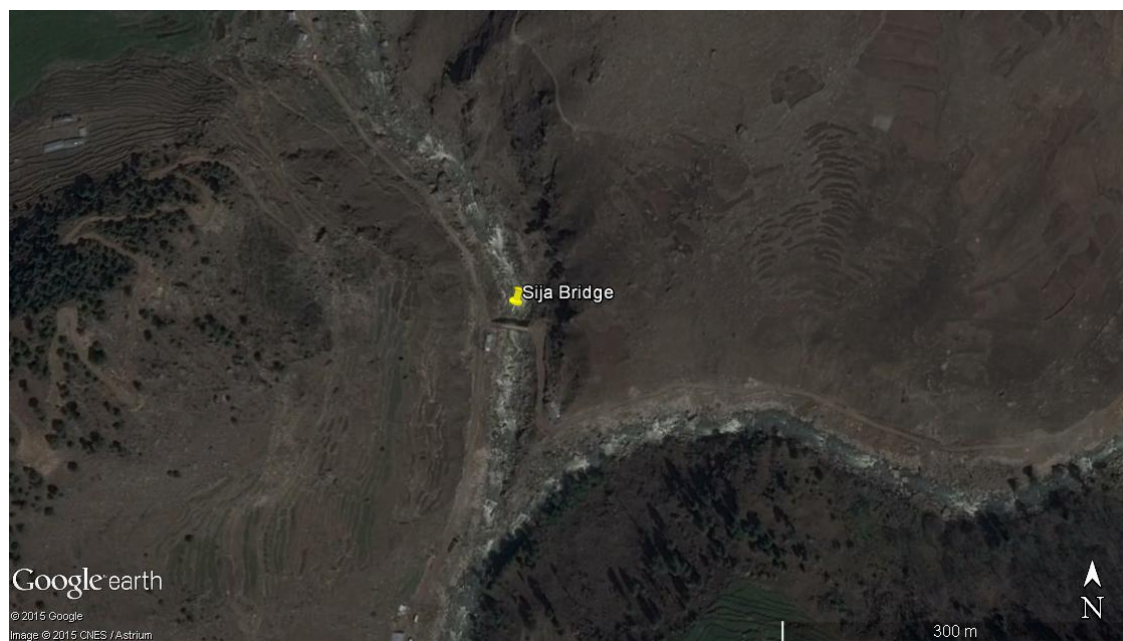


Figure 3-3: Project Site in Google Map

3.2 Salient Features

The salient feature of the proposed bridge is presented in Table 3.1.

Table 3-1: Salient Features of the Project

Name of the Project	Sija Khola Bridge
Development Region	Mid-Western Region
Zone	Karnali
District	Kalikot and Jumla
VDCs	Phoi Mahadev (Kalikot district), Mahabepattharkhola (Jumla), and Lihi Rara (Jumla)
Name of the Road	Surkhet-Jumla Road
Chainage of the Bridge site	205+550
Geographical Location	Latitude: 29°12'6.58"N
Classification of Road	SRN Road
Type of Road Surface	Blacktop
Terrain / Geology	Mountainous
Structure	
Total length of the Bridge	41.20 m
No of span	1 x 40.0 m
Total width of the bridge	11 m
Width of Carriage way	7.5
Width of Footpath with railing	1.5
Type of Structure	
Type of Superstructure	Two girders PSC bridge
Type of Bearing	Pot cum PTFE
Type of Abutment	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	1897 m ³ /sec
Linear waterway	40m
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/mm²	
Total Project Cost	NRs. 66,089,327.89

3.3 Detail of Project Requirements

3.3.1 Land Requirement

The construction of Sija Khola Bridge and approach road on either side of the bridge requires about 0.198 ha of land belonging to various land use categories. The land use categories within the construction area mainly comprises of existing road, river bank, river channel, and barren hill slope. The hill slope around right hand side of the bridge (Kalikot side) is very steep and excavation over such slope should be done with special attention with the immediate implementation of mitigation measures.

Table 3-2: Project land requirement

Project Component	Private		Government		Total (ha)
	Temporary	Permanent	Temporary	Permanent	
Approach Road and Bridge axis and river training	0	0.792	0	0.99	0.198
Construction Yard and Stockpiling Area	0	0	0.04	0.0	0.04
Construction Camp	0	0	0.08	0.0	0.08
Spoil Disposal			0.05	0.00	0.05
Total	0	0.792	0.17	0.198	0.368

3.3.2 Source of Construction Materials

The construction materials as gravel and sands can be available along the riverbed from the Tila River within 5 km distance. Boulders and cobble pebbles can be found as construction materials from the riverbed of the Tila River. Some materials can be extracted from the hill slope around the Sija Khola. The collection of construction materials will involve the use of machineries like excavators, tippers, loaders, etc.

Reliable source is Tila River and some quarry site along Surkhet Jumla Road within 5 km distance from bridge site area. Some materials can be taken from the Sija Khola riverbed about 2 km upstream from the site.

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

Other construction materials like cement, rod, ad mixtures, etc. shall be transported from Surkhet and other sources by the project contractor during the construction phase and stored safely around the camp site.

Table 3-3: Quarry site as proposed by the project geological team

Location	Distance	Slope Stability	Source	Quantity m3	Materials	Remarks
Tila River	Within 5 km distance from the bridge	Stable after extraction of materials due to wide flood plain	Sand and gravel from riverbed Quartzite and gneiss 60%, Phyllite 10%	1000x10x2	Quartzite, gneiss, granite	Boulder 40%, cobble and pebble 30% and Sands 20%
Quarry site	Along the road within 5 km distance	Hill slope	Old alluvial deposits	200x10x3	Gravel/sands	Slope stability shall be good after excavation of the materials. Colluvium of the road side has disturbed during monsoon
Sija Khola	Within 2 km upstream	Riverbed	Gneiss 100%	200x2x5	Boulder and cobble from river bed	Stable

Source: Project Detail Report

3.3.3 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 construction camp shall be supplied with LPG so that the possible forest destruction can be prevented.

3.3.4 Labor Camp and Material Stockpiling Site

The labor camp and the material stockpiling site will be located adjacent to each other. The bushy land at the right side of the Surkhet-Jumla Road, about 100 m from the proposed bridge at the Nagma has been proposed for labor camp and material stockpiling site. The proposed land is under the government ownership. Stockpiling on particular site will not affect the smooth movement of vehicles. The labor camp will be provided with separate drinking water facility, toilet facility, etc.

3.3.5 Spoil Management Site

A total of about 16148.62m³ of earthen materials shall be excavated for the construction and maintenance of approach road, while 780m³ materials shall be excavated for the construction of foundation. Similarly, about 6,000m³ 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. Two different sites for the disposal of spoil have been recommended. First one is 65 m u/s from the existing Bailey Bridge on the left bank of Sija River, while the second one is 500m towards Jumla from the existing bridge on the right bank of Tila River. Since, both the recommended sites for the disposal of spoil are located on the bank of river special attention has to be given while disposing the spoil here.

3.3.6 Approach Road and Diversion

The project requires the construction of 140m approach road (total of either side). Since, there is existing road; the type of approach road construction is more upgrading (widening) type. The existing Bailey bridge can be operated throughout the construction period and no additional diversion has to be made.

3.3.7 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, 18000 man-days of unskilled workforce, and 9000 man-days of skilled and semi-skilled workforce. The project will prioritize the local people in proposed bridge construction works.

3.3.8 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 resource 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.

3.3.9 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 Sija 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.

3.3.10 Maintenance approach

In the case of maintenance, persons assigned to SJ 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.

3.3.11 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 Sija 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 and Jumla, 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., Phoi Mahadev (Kalikot), Mahabepatthar khola (Jumla), and Lihi Rara (Jumla).

4.4 Collection of Environmental Baseline Data/ Information

The following table presents a synopsis for the baseline information that were 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
• Physical Environment	
Physiology, 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 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,	Direct field observation / Interaction with

Data Requirement	Methods/ Tools
camp sites etc.	designengineers, 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 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 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 were 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.

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.

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

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 Science, Technology and Environment (MoSTE).

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 *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.

5.2.3 *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.

5.2.4 *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.

5.2.5 *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.

5.2.6 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.

5.2.7 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 be 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.

5.2.8 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).

5.2.9 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.

5.2.10 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 possess such as Ailani, or Government-owned any other land, and if they prefer land for land.

5.2.11 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.

5.2.12 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 works 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 thereat or coercion or any other way against his will”. Under Section 6, in case any Enterprise has to engage a child in works, 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 Regulations

5.3.1 Environment Protection Regulations, 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.

5.3.2 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.

5.3.3 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.

5.4 Policies and Plans

5.4.1 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.

5.4.2 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.

5.4.3 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 country's 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.

5.4.4 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.

5.4.5 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.

5.5.6 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.

5.4.7 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 Sija 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 are 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.

5.5 Manuals/Guidelines/ Directives

5.5.1 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.

5.5.2 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.

5.5.3 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 guidelines also outlines implementation methods for undertaking mitigation measures for activities related to these issues.

5.5.4 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 recommend various environmental and social approaches, actions and strategies.

5.5.5 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.

5.5.6 *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.

5.6 Standards

5.6.1 *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

5.6.2 *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

Parameters	Units	Averaging Time	Concentration in Ambient Air, maximum
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
PM2.5	$\mu\text{g}/\text{m}^3$	8-hours*	40
Ozone	$\mu\text{g}/\text{m}^3$	8-hours*	157

5.6.3 Nepal Road Standard 2070 BS

Nepal Road Standards- 2070 (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.

5.6.4 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.

5.6.5 National Diesel Generator Emission Standard, 2012

The MoSTE 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.

5.6.6 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 test 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.

5.7 International Conventions and Treaties

5.7.1 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 Sija Khola Bridge is located at the boundary of two districts; Kalikot and Jumla, near the junction of three different VDCs. The proposed bridge is located at the distance of 190 m upstream of the Sija- Tila confluence at the of 2048m amsl. The average gradient of 54.8% is observed along the course of Sija River at the bridge location. The steepness of the Sija River valley is very high in the downstream region from the proposed construction site. Figure 6-1 reveals the longitudinal profile of the Sija River from the Sija-Tila confluence.

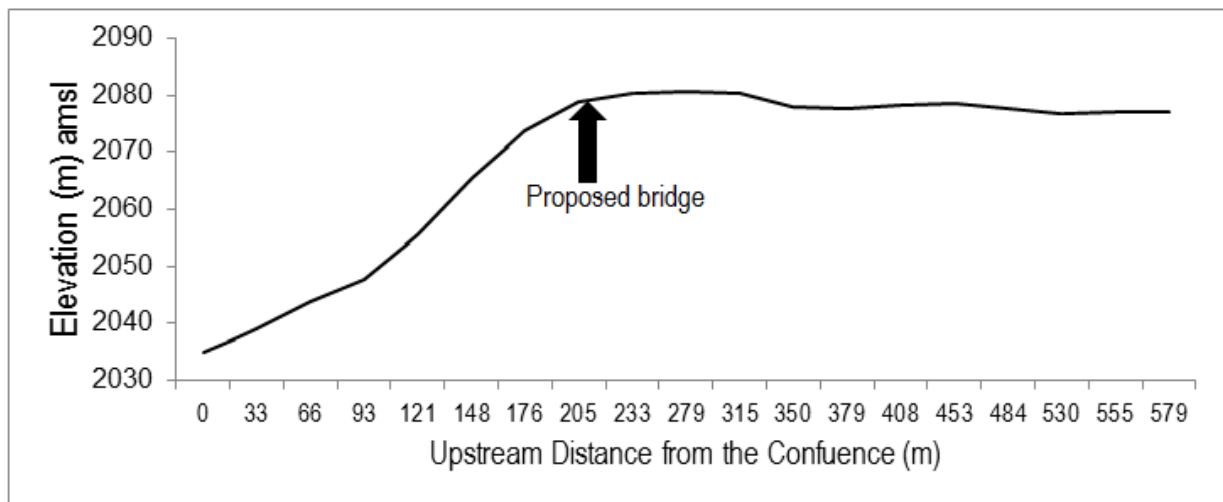


Figure 6-1: Longitudinal Profile of the Sija River

6.1.2 Geology and Soil

Geologically, the project area lies within the Sallyanigad formation of the Lesser Himalaya. The major rock species observed within this formation include augen gneiss and biotite gneiss. The surface geology around both bank of Sija River comprises colluvium and alluvium deposits with particularly exposed bedrock on the left bank. No any landslides and instabilities were observed around the proposed construction location. Major geological structures like faults and the thrust cannot find around the location of the bridge. The bearing of the proposed bridge axis is 085-275 degrees. The flowing direction of the Sija Khola around the proposed bridge site is 005-185 degrees.

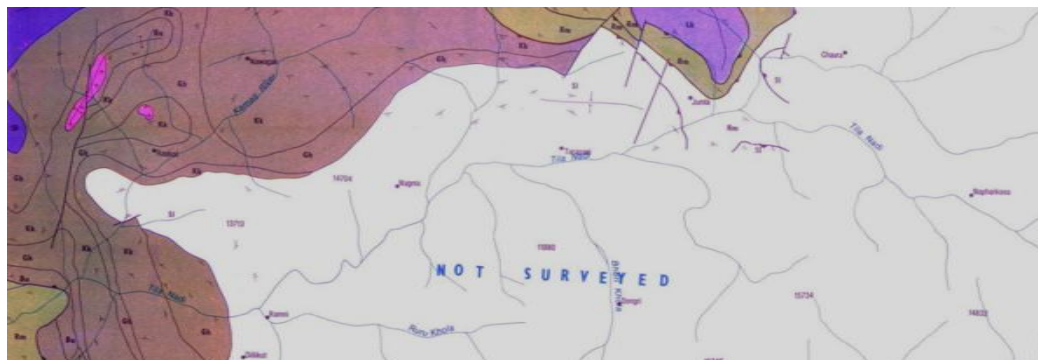


Figure 6-2: Geology around Tila River Area (**Source: DMG**)

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 SijaKhola. The thicknesses of alluvial deposits are more than 3 m. The alluvial deposits are composed of boulders, cobbles, pebble and sands. Boulder, cobbles and pebbles are mainly granite, quartzite from the Lesser Himalaya (0.5 to 2 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.

6.1.3 Slope Stability

The slope stability condition is good even there are loose materials along the river banks. In general the slope stability is more or less good on the left bank whereas on the right bank there is less possibility of occurrence failure. The wedges formed by the intersection of the joints and foliation plane seem to be stable.

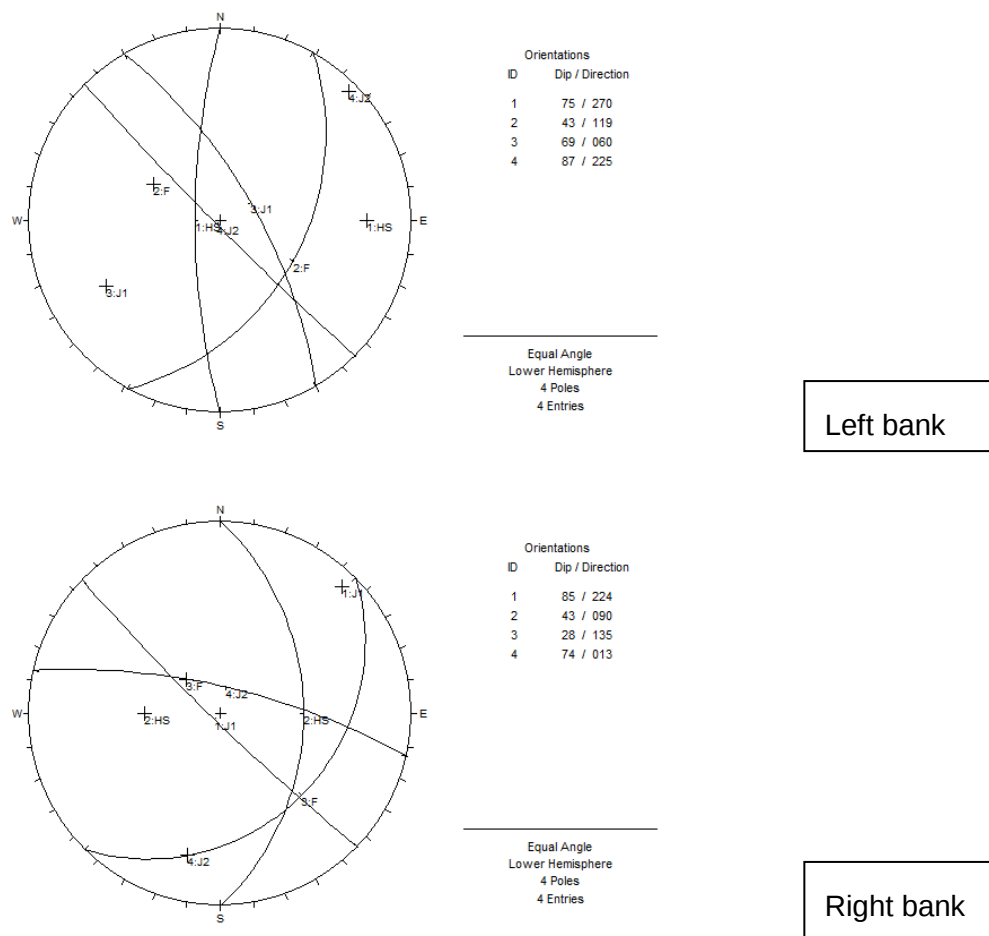


Figure 6-3: Stereographic projection of the proposed bridge site area

Table 6-1: Condition of the slope stability of the rock

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

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

6.1.4 Seismological Study

The proposed area located far from remarkable thrust. 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.

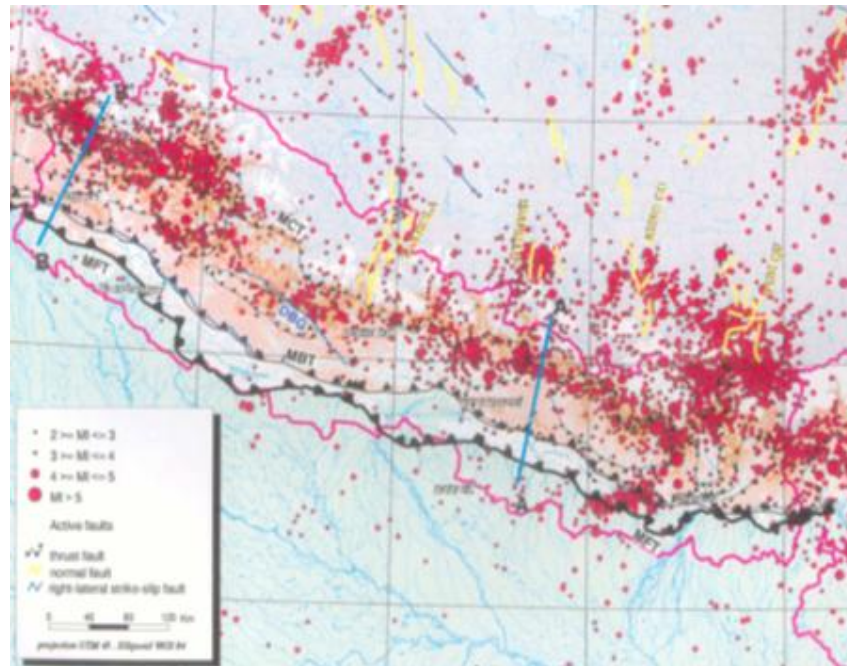


Figure 6-4: Epicenters of earthquakes in the Nepal Himalaya

Similarly, the seismic hazard of the Nepal Himalaya is presented in figure 6-5 below:

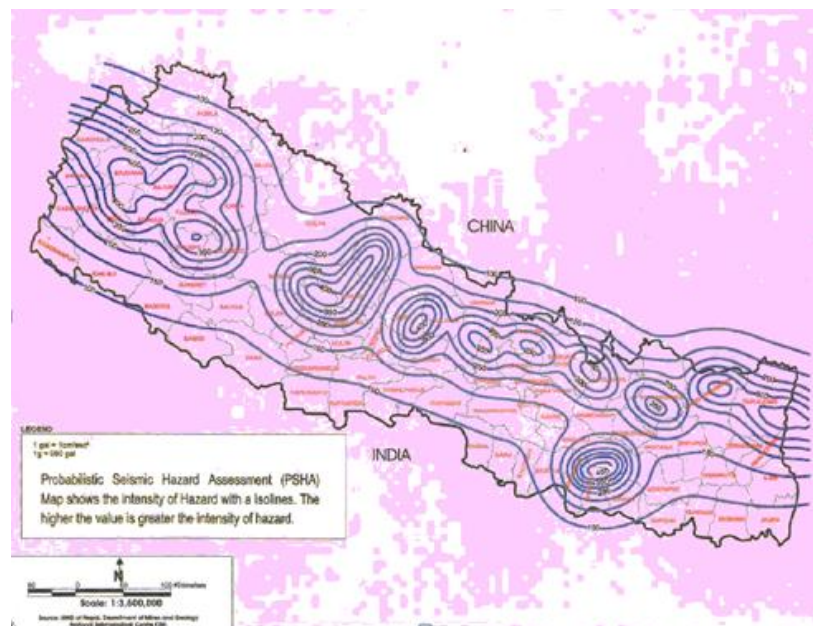


Figure 6-5: Seismic Hazard Map of Nepal

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).

6.1.5 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.

6.1.6 Drainage and Hydrology

The proposed bridge has been proposed over the Sija River which is a Perennial river. The gradient of the river d/s of the bridge is found to be lower than its u/s. The river shows the complex dendritic pattern comprising of many rivers making the confluence with it. The Sija River makes the confluence with the Tila River at 190 m downstream from the proposed bridge location. The drainage characteristic of the Sija River is presented in figure 6-6.

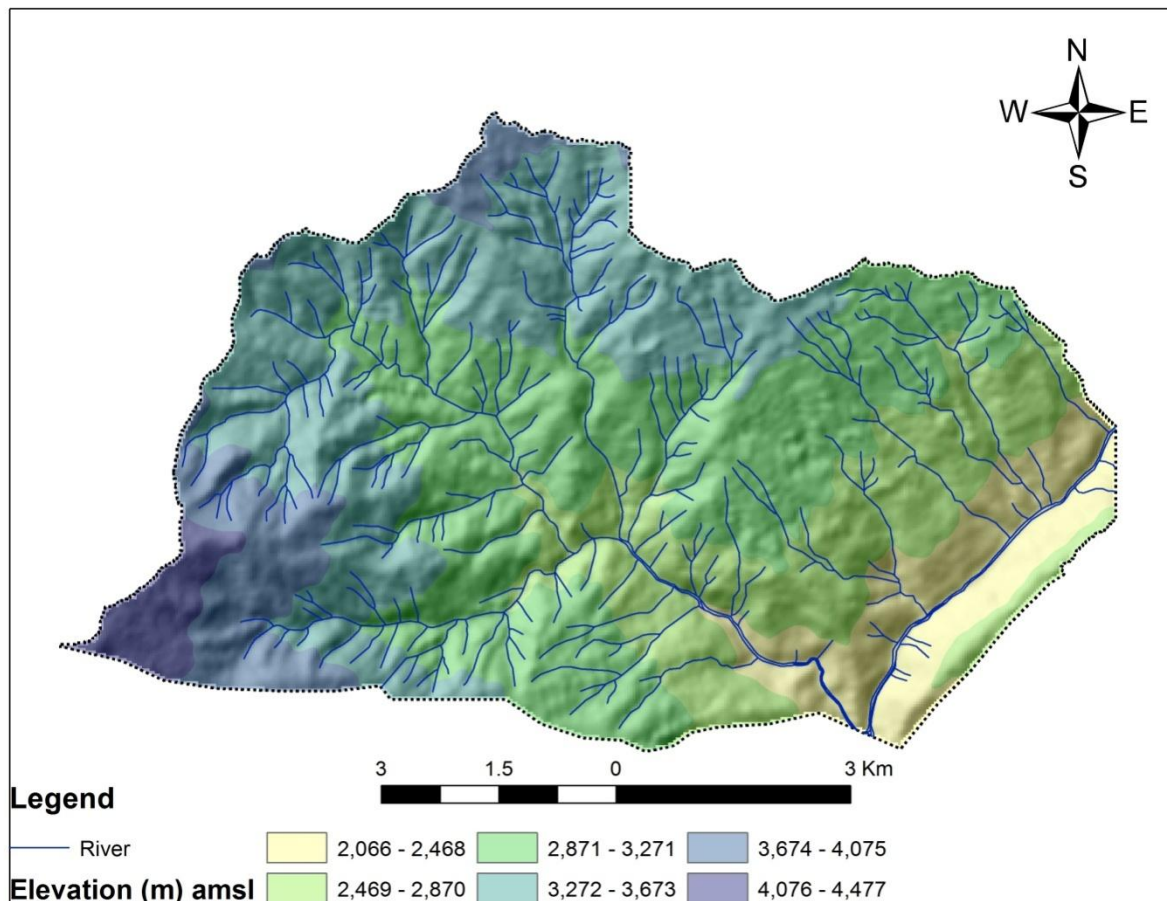


Figure 6-6: Drainage map of Sija River

The lowest and highest elevations of the Sija River Catchment are 2,066 and 4,477 m above mean sea level respectively. Furthermore, the total area of Sija River Catchment is 809.03 Km² and the total channel length is 78.05 Km. Similarly, the recommended discharge for the Sija River at Nagma (near the bridge construction location) is 1,670m³/s. As identified from

the observation of flood marks and the consultations with the local people the maximum depth of water during rainy season is 1.5m.

6.1.7 Landuse

The land use around the proposed bridge is dominated by grassland and cultivated land. There is a temple located nearby the bridge location. Settlements with cultivated land can be found 300m away from the bridge location. Similarly, forest is located at about 350 m from the bridge location. The land use around the Sija Bridge is shown in figure below:

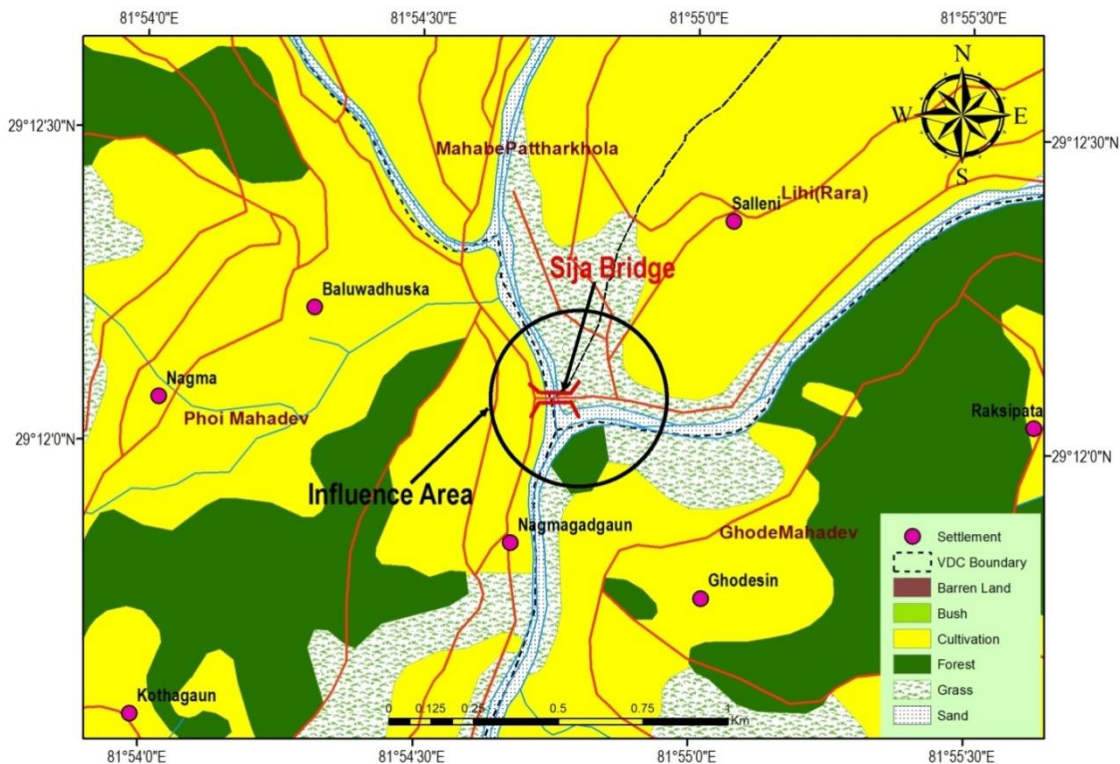


Figure 6-7: Landuse around the proposed Sija Khola Bridge.

6.1.9 Public Structures

There are no any public structures that are directly affected by the project. However, Shiva Temple is present near the confluence of Sija and Tila River with the influence area of the project. The Shiva Temple is of high religious significance as, people worship the temple daily and even huge fest (mela) is celebrated during Tej and Shiva Ratri.



6.1.10 Air Quality, Water Quality and Noise levels

There are no stationary sources of air, water and noise pollutants, and the vehicles moving through the Surkhet-Jumla Road are only responsible for the deterioration of ambient air and noise quality.

6.2 Biological Environment

The immediate area near the proposed bridge location is devoid of forest and vegetation. As the proposed bridge project does not affect any tree species and other vegetation, hence no

trees need to be cut for the bridge construction. The following headings deal with the biological environment found around the project area.

6.2.1 Floral Diversity

The project area being situated in the higher altitude, temperate forests can be found covering the long ridges of the area dominated by blue pine (*Pinus wallichinia*) and deodar (*Cedrus deodara*). The other plants that can be found in the area are Rhododendron (*Rhododendron arboreum*), Himalayan Cypress (*Cupressus torulosa*), Oak (*Quercus semicarpifolia*) and Silver fir (*Abies alba*).

6.2.2 Faunal Diversity

The temperate 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 Musk deer (*Moschus spp.*), Goral (*Naemorhedus goral*), Jackal (*Canis aureus*), Wild Boar (*Sus scrofa*), Langur (*Colobinae ajax*) and Rhesus Macaque (*Maccaca mulata*). Likewise, the birds include Mallard (*Anas platyrhynchos*), Common Teal (*Anas crecca*), Merganser (*Mergus merganser*), Snow Cock (*Tetraogallus himalayensis*), Kalij (*Lophura leucomelanos*), Danphe (*Lophophorus impejanus*), Chyakhura and Himalayan Griffon (*Gyps himalayensis*).

6.2.3 Fish Diversity

The Sija Khola serves a potential habitat for many aquatic lives. The major fish species found in the Sija khola are Bucche Asala (*Schizothorax plagiostomus*), Chucche Asala (*Schizothoracichthys spp.*), Tite (*Psilorhynchus pseudecheneis*), and Dhami.

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:

S. N	Local Name	Scientific Name	Categories		
			GoN	IUCN	CITES
Fauna					
1	Musk Deer	<i>Moschus spp.</i>	P	EN	I
2	Goral	<i>Naemorhedus goral</i>		NT	I
3	Langur	<i>Semnopithecus ajax</i>		EN	I
4	Wild Boar	<i>Sus scrofa</i>		LC	
5	Jackal	<i>Canis aureus</i>		LC	
Flora					
1	Deodar	<i>Cedrus deodara</i>		LC	
2	Himalayan Cypress	<i>Cupressus torulosa</i>		LC	
Avifauna					

1	Danphe	<i>Lophophorus impejanus</i>	P	LC	I
2	Kalij	<i>Lophura leucomelanos</i>		LC	I
3	Himalayan Griffon	<i>Gyps himalayensis</i>		NT	
4	Mallard	<i>Anas platyrhynchos</i>		LC	
5	Common Teal	<i>Anas crecca</i>		LC	III
6	Merganser	<i>Mergus merganser</i>		LC	

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 Sija Khola Bridge project lies in two districts, namely Kalikot and Jumla. Phoi Mahadev VDC of Kalikot District and Raralihi and Mahabaipatharkhola VDCs of the Jumla Districts are the project affected VDCs of proposed Sija Khola Bridge. The socio-economic information of the project affected VDCs are given below:

a. Demography

According to National Population Census of 2011, the total population of Raralihi, and Mahabaipatharkhola VDCs of Jumla District are 2,681, and 2,998 respectively and Phoi Mahadev VDC of Kalikot district is 3,418. Out of the three VDCs, Phoi Mahadev VDC is the highly populated VDC with greater number of households than the other VDCs. Moreover, the population of female in Phoi Mahadev, Raralihi and Mahabaipatharkhola VDCs is slightly greater than that of male. The details of population distribution are presented in the following table:

Table 6-2: Demographic Characteristics of the Project affected VDCs

District	VDC/ Municipality	Household	Population			Average household size	Sex Ratio
			Total	Male	Female		
Kalikot	Phoi Mahadev	617	3,418	1,708	1,710	5.54	99.88
Jumla	Raralihi	486	2,681	1,335	1,346	5.52	99.18
	Mahabaipatharkhola	500	2,998	1,494	1,504	6	99.34

Source: CBS, 2011

b. Ethnic Composition

According to the National Population Census of 2011, Chhetri is the dominant ethnic group in terms of population in the project affected VDCs. Kami is the second large ethnic groups found in the VDCs. Other ethnic groups within the project affected VDCs are Brahmin, Thakuri, Damai, Sarki, etc. The ethnic composition of the project VDCs is presented in the following table:

Table 6-3: Population distribution around project VDCs according to ethnicity

VDC/ Municipality and Ethnicity/ Caste	Total	Percentage (%)
Phoi Mahadev		
Chhetree	1045	41.11
Thakuri	843	24.66
Brahman-Hill	553	16.18
Others	617	18.05
All caste	3418	100
Raralihi		
Chhetree	2014	75.12
Kami	12	0.45
Damai/Dholi	323	12.05
Sarki	299	11.15
Others	33	1.23
All Caste	2681	100
Mahabaipatharkhola		
Chhetree	1916	63.91
Brahman-Hill	182	6.07
Thakuri	366	12.21
Kami	347	11.57
Others	187	6.24
All Caste	2998	100

Source: CBS, 2011

c. Sanitation and Drinking water facilities

According to the National Population Census of 2011, about 70% of the households in Phoi Mahadev VDC of Kalikot district do not have toilet facility. Likewise, more than 80% of the households in Raralihi VDC have toilet facility; whereas about 60% of households have toilet facility in Mahabaipatharkhola VDC of Jumla district. The proportion of households with flush toilet is found to be much greater than the ordinary toilet in all the affected VDCs of Jumla district. The sanitary facility in Phoi Mahadev VDC of Kalikot district is found to be not satisfactory whereas the sanitary status of the affected VDCs of Jumla district is quite well. The table below shows the status of toilet facility in project affected VDCs.

Table 6-4: Household proportion with and without toilet facility around project VDCs.

District	VDC/ Municipality	Total Household s	Househol ds without toilet facility	Household with facility of		Toilet facility not stated
				Flush Toilet	Ordinar y Toilet	
Kalikot	Phoi Mahadev	617	427	13	174	3
Jumla	Raralihi	486	40	435	9	2
	Mahabaipathar khola	500	204	240	53	3

Source: CBS, 2011

Pipe line covers large fraction of households as the source of drinking water in the project affected VDC. Besides, piped water supply systems, few of the households are still relying on traditional water sources such as spout water, well, etc. The details of the source of drinking water in project affected VDC are given in the table below.

Table 6-5: Drinking water facilities in project VDCs

District	VDC/ Municipality	Total Househ old	Main Source of Drinking Water				
			Tap/ piped water	Covered well/ kuwa	Uncover ed well/ Kuwa	Spout water	River/ Strea m
Kalikot	Phoi Mahadev	617	480	5	1	116	1
Jumla	Raralihi	486	481	0	1	1	2
	Mahabaipath arkhola	500	486	0	0	3	8

Source: CBS, 2011

d. Energy usage

The project VDC has majority of households that use firewood as the main source of fuel for cooking while other sources do not contribute to any. Only one of the households in Raralihi VDC is found using LPG as fuel for cooking purpose. The details of the source of fuel for cooking in project affected VDCs are given in table below.

Table 6-6: Fuel used for cooking purpose

District	VDC/ Municipality	Total Household	Fuel usually used for cooking					Not- state d
			Wood/ Firewoo d	Kerosen e	LPG	Santhi/ Guitha (Cow dung)	Biogas	
Kalikot	Phoi Mahadev	617	614	0	0	0	0	3
Jumla	Raralihi	486	483	0	1	0	0	2
	Mahabaipat harkhola	500	497	0	0	0	0	3

Source: CBS, 2011

Solar covers significantly larger proportion of energy source for lighting in Phoi Mahadev VDC of Kalikot district and Mahabaipatharkhola VDC of Jumla district whereas, Electricity covers the large proportion of energy source for lighting in Raralihi VDCs of Jumla district. The use of solar is found to be very less in Raralihi VDC. Moreover, kerosene lamps for lighting are found still prevalent in some of the households. However, none of the households are found to be using biogas to light their houses. The details of the source of fuel for lighting in project affected VDCs are given in table below.

Table 6-7: Fuels used for lighting purpose

District	VDC/ Municipality	Total Household	Fuel usually used for lighting				Others
			Electricity	Kerosene	Biogas	Solar	
Kalikot	Phoi Mahadev	617	4	0	0	196	414
Jumla	Raralihi	486	430	3	0	2	49
	Mahabaipatharkhola	500	2	4	0	245	246

Source: CBS, 2011

e. Education and health facilities

As per the National Population Census of 2011, the literacy rate of Phoi Mahadev VDC is 66%. However, the male literacy rate (77.19%) is higher than that of the female literacy rate (54.73%). The details of the literacy status of the project VDC are given in the table below:

Table 6-8: Literacy Status of the Project VDC

District	VDC/Municipality and sex	Population who			Literacy Rate (%)
		Can read & write	Can read only	Can't read & write	
Kalikot	Phoi Mahadev				
	Both Sex	1,920	91	898	66
	Male	1,127	40	293	77.19
	Female	793	51	605	54.73
Jumla	Raralihi				
	Both Sex	979	74	990	47.01
	Male	618	38	334	64.06
	Female	361	36	656	28.88
	Mahabaipatharkhola				
	Both Sex	1,596	34	1,218	43.88
	Male	906	15	486	55.23
	Female	690	19	732	32.46

Source: CBS, 2011

f. Communication facilities

Radio and mobile phones are the major and most widespread communication facilities available within the project VDCs. Other sources of modern communication facilities like

television, computer, and telephone are very less. However, none of the households are found to have cable television and internet facilities. The details of the available communication facilities in the project VDCs are given in the table below:

Table 6-9: Communication facilities in project affected VDCs

District	VDC/ Municipality	Total	Household having facilities of					Mobile Phone
			Radio	TV	Cable TV	Computer	Telephone	
Kalikot	Phoi Mahadev	617	240	5	0	1	4	167
Jumla	Raralihi	486	154	17	1	1	7	207
	Mahabaipat harkhola	500	189	0	0	0	0	202

Source: CBS, 2011

6.3.2 Direct Impact Zone

6.3.2.1 Demographic Composition

There are 58 households located within the direct impact zone of the proposed sub-project. The total population of the direct impact zone is 275, with the population of female slightly greater than the population of male. Furthermore, the average household size is 4.75.

Table 6-10: Demographic characteristics of direct impact zone

Name of bridge	Affected HHs	Male	Female	Total	HHs size
Sija Khola	58	135	140	275	4.75

Source: Field Survey, 2016

6.3.2.2 Ethnicity Composition

The project construction site is located in mid-western of Nepal. The major ethnic groups present within the direct impact zone are Chhetri, Thakuri, Brahmin and Dalit. The population of chhetri and Thakuri represent more than 70% of the total ethnic population of the direct impact area.

6.3.2.3 Age Distribution

Among the population of direct impact zone, majority (52.63%) are economically active and about 16% population are dependent which indicates that these age group populations are economically inactive and dependent for their livelihood.

Table 6-11: Age Distribution of Direct Impact Zone

Age Distribution	Population	%
Below 5 Years	43	15.79
6-15	58	21.01
16-60	145	52.63
Above 60 Years	29	10.53
Total	275	100.00

Source: Field Survey, 2016

6.3.2.4 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 79% are literate and 21% are illiterate. The student's dropout rate seems increasing in higher education. About 13% 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.

6.3.2.5 Sources of income

Business is the prime source of income among the people of direct impact zone. Almost all of the houses in the direct impact zone have either hotels or grocery shops or electronic shops, etc. similarly, very few people in DIZ are involved in foreign employment.

6.3.2.6 Food Sufficiency Level

The people of DIZ were asked level of food sufficiency. Most of them reported that they have very small size of land and the productivity of land is also poor because of irrigation facility. Among the surveyed households none of them have food sufficient for whole year. The table below shows food sufficiency level among affected households

Table 6-12: Food sufficiency status of DIZ

Food Sufficiency Level	%
No agriculture	25.00
Below 3 Months	75.00
3-6 Months	0.00
6-9 Months	00.00
9-12 Months	0.00
Total	100.0

Source: Field Survey, 2016

6.3.2.7 Measures to Meet Food Deficit

The survey reports the populations of DIZ do not have sufficient food production for whole year. While asking about the ways to meet food requirements it has been reported that business and foreign employment is sources of income which supplement income for food grain.

6.3.2.8 Level of Income

Local business is the major sources of income among the population of DIZ. The range of income shows that they have equal range of income level. All of the affected households earn NRs 200,001 to 300,000 per year.

6.3.2.9 Level of Expenditure

There seems similarity between income and expenditure of the population of DIZ. Among the affected households, 50 percentage households expenses is in 200,001 to 300,000 per year and remaining 50 percent have above 300,000 expenditure in a year.

6.3.2.10 Health and Sanitation

District hospital located in district headquarter of both districts is center for treatment but 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.

6.3.2.11 Source of Water

The water source is local springs. They have tapped the water from source to their yard. Twenty four-hour water supply facility is available in the DIZ.

6.3.2.12 Toilet Facility and Defecation Practice

Open defecation practice is highly prevailed in bridge construction site. Only 50% of the households in DIZ have 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.

6.3.2.13 Female 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 girls enrolment in schools are 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

6.4 Public Consultation

Public consultations were done on two locations, one at Nagma of Phoi Mahadev VDC, ward no. 3 and another at Nagmagad, the boundary of Rara Lihi-1 and Mahabipathar Khola-9. The total participants in the consultations were 9 in Nagma and 10 in Nagmagad. The public consultations led to the following conclusions:

- The project should be implemented as soon as possible.
- The project should provide the employment opportunities to the local people.
- The project should not affect the market located near the project location.
- The project should be implemented with minimal environmental impacts.
- The environmental impacts of the project should be mitigated with suitable mitigation measures.
- The construction of project should not impede the Highway.

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 bridge over the Sija Khola requires a number of skilled, semi-skilled and unskilled manpower. The project shall generate the employment opportunity to 60 workers, among them 20 will be skilled and unskilled whereas 40 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 of high magnitude, local in scale and short term in duration.*

▪ Enhancement of skills

The unskilled manpower would get the chance to be involved in different construction works 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. *This impact will be high magnitude, local in scale and long term in duration.*

Operation Stage

▪ Improved Mobility

The existing bridge over the Sija 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 Jumla, 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 Jumla is very low, the construction of road network towards the neighboring districts from 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

The bridge connects the two districts namely Kalikot and Jumla. Hence, 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 the bridge does not require the diversion of the river and the construction of the bridge will be carried out during the dry season when the water flow of the river will be minimal. *Hence, this impact will be of low significance, site specific and short term in duration.*

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

The construction of the bridge does not need to acquire large area of the land permanently. Only about 13.2 m² of the land is required for the foundation of the bridge. Likewise, the construction camp and stockpiling of the construction materials need to acquire some private and public land temporarily. About 1200m² of the land is occupied by the construction camp and about 400 m² of the land is required for the stockpiling of the construction materials. *The impact due to change in land use is of low magnitude, site-specific and short-term.*

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

The construction of foundation and approach road for the proposed Sija Khola Bridge requires the excavation of about 0.198 ha of land area. The hill slope on the left bank of Sija River (Kalikot side) is 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 envisaged to be of 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 extraction of construction materials. Among the three, two of them are flood plain of Tila and Sija Rivers where annual river deposits are collected and used as construction materials, while the remaining one is the hill slope 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.

During the construction phase of Sija Khola Bridge, there would be abundant materials during the excavation of hill slope for the construction of the approach road that can be used as construction materials. This would ultimately reduce the possible stress on the proposed quarry site, leading towards the minimized exploitation. *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 16928 m³ of spoil. Out of the total spoil generated about 6,000 m³ will be used for backfilling. Similarly, some amount of excavated materials is even used for river training works and just about 10,000 m³ of spoil have to be disposed. The random and improper disposal spoil can be very hazardous as the runoff during rainy season would wash the materials causing water

pollution in the nearby water bodies and even resulting in several water borne diseases. *Hence, the impact will be medium, 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**

The construction of the Sija Khola Bridge requires the construction of approach road on either side of the bridge. Construction around the Kalikot side is particularly vulnerable as a stable hills slope consisting of low to moderately weathered rocks has to be cut for the construction of 70m approach road. 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 Sija 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 (Due to leakage of waste fuels, grease and lubricants)**

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 the 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. 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 nature.*

- **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.*

- **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.*

- **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 regular/periodic 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 forest, and 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 Sija 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 Sija 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**

During the construction period of the proposed Sija 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 Sija 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**

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

7.2.3 Socio-economic Environment

Construction Stage

- **Social Conflicts**

For the construction of the Sija 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.*

- **Accidental risks**

The construction of Sija 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.*

▪ Impact on private and public properties

The construction of the Sija Khola Bridge requires only 13.2 m² of land permanently for the foundation of the bridge. Likewise, for the construction camp and stockpiling of the construction materials, the lands are required temporarily only. Hence, the construction of the bridge does not have significant impact on private and public properties. *This impact is considered medium in magnitude, site-specific in nature and medium term in duration.*

▪ Public grievance related to project construction

The local people from both Kalikot and Jumla 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 four private built structures belonging to three different owners and private land belonging one owner. The details of structure that are directly affected by the project are presented in 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(in M)	No of Storey	Present Use	Present Use	Type of structure	Built Year	Remarks
1	Udaya Bahadur Shahi	Phoimahadev-1, Kalikot	1837	8	2	Kachhi	Residential cum commercial	Semi Modern	2,072	Bal Bahadur Rawal
		Phoimahadev-1, Kalikot	1837	8	3	Kachhi	Residential cum commercial	Semi Modern	2,064	
2	Nabin Shahi	Phoimahadev-1, Kalikot	1837	8	2	Kachhi	Residential cum commercial	Semi Modern	2,071	Bal Bahadur Rawal
3	Mahindra Buda	Raralihi-2, Jumla		8	1	Kachhi	Empty	Traditional	2,067	Absentee/Alainee

(Source: Draft Resettlement Action Plan)

Similarly, the details of land area affected by the project are presented in table 7-2.

Table 7-2: Details of land affected by the project

S.N	Cod No.	Land Owner	Father's Name	VDCs	Ward No.	Sheet No.	Kitta No.	Total Area (m ²)	Affected Area (m ²)	Position	Land Type	Remarks
1	32	Bal Bdr. Rawat	Karne Rawat	Phoi Mahadev	1	023-591	1837	500	500	East	Private	Kalikot
2	34	Nepal Govt.		Phoi Mahadev	1	023-591	1844	3450	370	South	Govt. Land	Kalikot

(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 cultural, religious and historical sites**

There is Shiva Temple at a distance of 70 m from the proposed bridge location. Although there is no direct impact of project construction on the temple, any kind of ill behavior of any construction crew would pose negative impact on the religious environment around the temple. *This impact is envisaged to be medium significance, site-specific and medium term in duration.*

- **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.*

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**

Experience from the study of project area suggests that the connection of Kaliokt and Jumla district by the existing Bailey bridge has indirectly facilitated the development of thick market on both sides of the bridge. The Nagma Bazaar is the market center to the people of Jumla and Mugu districts. Thus, it is highly likely that the construction of permanent concrete bridge over the Sija River connecting Kalikot and Jumla district will increase the extent of current market area. The on route vehicles for Surkhet/Nepaljung to either Jumla or Sija or even Mugu will queue around the Nagma Bazar causing the congestion around the adjoining areas of bridge abutments. This impact is envisaged to be of medium significance.

CHAPTER 8: ALTERNATIVE ANALYSIS

The objectives of carrying alternative analysis for the proposed Sija 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

Three different location alternatives were analyzed during the design period of the proposed bridge project. **Annex F2** shows the three different alternatives considered during the course of bridge design and out of the three alternatives, alternative **three** is approved for the further project development. All three alternatives were feasible from the design perspectives; however, alternative first requires excavation of at least 700m stretch of hill slope which is costly in itself, management of spoil generated after the excavation is another challenge. The second alternative was the displacement of existing Bailey bridge and construction of new bridge at the same axis. The main drawback of this alternative is that, once the Bailey bridge is removed, the movement of vehicles along the route will be completely halted and few houses have to be displaced during the construction of the approach road. Finally the third alternatives (best alternative) overcome all the issues mentioned above and the length of proposed approach road is very short which will involve minimal environmental damage. Moreover, the boulders excavated during the construction of approach road can even be utilized during the construction of bridge abutments.

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 Sija 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 Sija 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 Sija Khola Bridge can benefit them as they will be able to do construction related works in other projects too.

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 Sija 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.

- **Degradation of water quality**

Following mitigation measures will be adopted to minimize the impact on the Sija 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 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 Sija Khola Bridge and approach road will require only 0.198 ha 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 associated with sand and gravel extraction**

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.

The recommended methods for the disposal of spoil are as follows:

- ✓ Five meter tall gabion structures have been built along the bank of river at both sites prior to the spoil disposal so that the spoil would not get contaminate with the river water.
- ✓ After the spoil is filled up to five meter, additional two meter spoil can be adjusted at each site by making a sloppy surface of 60° on the river side.
- ✓ As soon as the spoil disposal gets completed the site should be planted with trees. Altogether 50 trees have to be planted around the spoil disposal site.

▪ **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 embankment erosion**

River training works will be adopted for the mitigation of embankment erosion.

▪ **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.

- **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.
- **Mitigation of impacts associated with the transportation of construction materials**

This impact will persist during construction period only and cannot be avoided at all. Adoption of alternative schedule is the only solution to this impact.

- **Mitigation of impact associated with bridge safety during project construction**

Bridge safety can be assured through the installation of sign post to discourage the flow of people around the construction site, awareness raising program, adoption of alternative schedule, etc.

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 are 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.

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.

▪ **Impact on public and private properties**

The project will not pose direct impact on the public structures, but four 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.

▪ **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 cultural, religious and historical site**

The project will formulate and implement strict code of conduct to the work force so that they will not be allowed to hinder the cultural and religious environment of the local area. Similarly, the project will also support for the improvement and betterment of existing Shiva Temple.

9.2.2 *Operation Stage*

1. Physical Environment

▪ **Reinstatement of project components**

Several project components like labor/contractor's camp, material stockpiling yard, etc. will be cleaned after the completion of the project. The project will put its effort to bring back the natural condition of those sites.

▪ **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.

2. Biological Environment

- **Barrier effects on aquatic animals**

During the operation phase disturbance on water system will be minimized so that there would be negligible effect on the movement of aquatic animals.

3. Socio-economic environment

- **Congestion around the adjoining areas of bridge abutments**

The expansion of Nagma Bazaar will create congestion around the adjoining areas of bridge abutments. This impact will remain as a residual impact during the operation stage of the bridge and hence no mitigation measure for this impact has been proposed.

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 Sija Khola Bridge are presented in table 10-1.

Table 10-1: Institutions and their role in EMP implementation

Institution	Roles	Responsibilities	Remarks
Ministry of Environment and Population	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	Unit under the DoR responsible for technical	✓ Review, comment, and forward ToR and IEE for	

Social Unit (GESU)	advice for IEE	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.

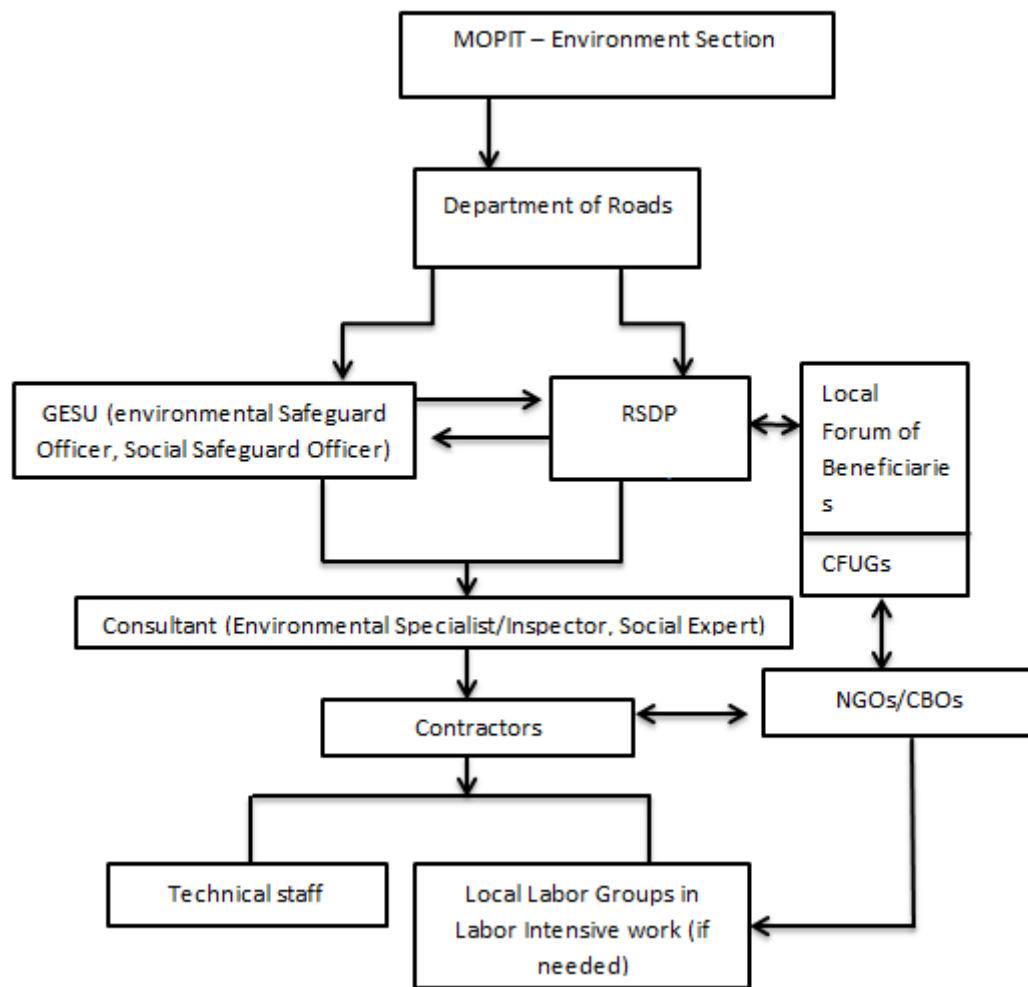


Figure 10-1: Agencies responsible for the implementation of EMP

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 (RSDP, DoR)
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 (RSDP, DoR)
Environmental protection measures, including pollution prevention, water and soil management, slope stabilization, cut and fill, spoil and waste management,	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	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,	Before and during construction period	Consultant (for baseline survey) Contractor	Proponent, (RSDP, DoR)

environmental and socially critical sites, protection of fauna and flora	wildlife sensitive habitats, forests and fuel wood use.	enforcement records.			
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, (RSDP, DoR)
Air and noise pollution	Visual inspection and frequency of air borne respiratory infection with the consultation with local people Noise level measured around the construction area	Interview data, photographs, noise level meter record	Regular by contractor, once a month during construction by consultant	Contractor	Proponent, (RSDP, DoR)
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, (RSDP, DoR)
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	Proponent, (RSDP, DoR)
Adequate technical and environmental supervision	Adequate number of technicians mobilized regularly at site. Ability to implement labour	Check number and type of technicians available at site. Skill of work carried out.	During construction by contractor. Once a month by	Consultant	Proponent, (RSDP, DoR)

	based bridge construction concept	Discussion.	consultant		
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, (RSDP, DoR)

The parameters selected for the impact monitoring are as follows

Table 10-4: Parameters selected for the impact monitoring

Parameter	Verifiable Indicators	Verification Methods	Location	Schedule	Responsible Implementing Agency	Responsible Monitoring Agency
Slope Stability Erosion	Inclination, Slope failures, causes; Drainage facilities such as catch drain, side drains and functionality of DC structures; Fresh gullies and erosion Success/failure of bio-engineering solutions	Site observation, photos Discussion with people and technicians	Near steep slopes and at slide areas and sites where bio-engineering failed	Continuously during construction and operation	Technical consultant Maintenance Division DoR	Proponent, (RSDP, 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, (RSDP, DoR)
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	Site observation and interviews, photos, geo-referencing sites	At specific locations where such sites occur	During construction	Contractor	Proponent, (RSDP, DoR)

	lands					
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, (RSDP, DoR)
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, (RSDP, DoR)
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, (RSDP, DoR)
Air Quality	Atmospheric dust	Visual inspection	At construction sites and at sensitive spots (Schools, hospitals)	During construction and operation	Contractor	Proponent, (RSDP, DoR)
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, (RSDP, DoR)
Harvest/ trade of Medicinal herbs	Sales of medicinal herbs increased	Observation, interview, photos	Project Areas and markets	During operation	Local stakeholders	Proponent, (RSDP, DoR)
Wildlife	Wildlife hunting trapping and poaching by work force, Trade of Wildlife, Biological survey on selected	Interview with local people/DFO, Photos Observations	Forest areas at roadside	Throughout project	Contractor, LCF, DFO	Proponent, (RSDP, DoR)

	biota					
Change in Economy	Numbers of people employed by the project during construction Numbers of women in work forces Changes in land use pattern	Records kept by the project management, discussion with people	Project Area	Twice a year during construction and operation	Contractor, Consultant,	Proponent, (RSDP, DoR)
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, (RSDP, DoR)
Industries	Establishment of industries in the vicinity of Project Area	Records and interview, photos	Project Areas/Zone of influence	Throughout project	Consultant	Proponent, (RSDP, DoR)
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, (RSDP, DoR)

10.2 Environmental Management Plan

The complete sets of environmental enhancement and mitigation measures have been formulated for the sustainable implementation of Sija Khola Bridge. The environmental management plan ensures the involvement of all the parties that are directly and indirectly associated with the construction of Sija 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
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	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)	30,000 (@10, 000 per day)-included in BoQ	Project Implementation agency (RSDP)	Supervision consultant/DoR
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 disposal and quarry site operation	Pollution of water resources	- Spoils generated during the excavation will be disposed-off safely in the designed spoil disposal site. - 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	Bridge construction area, spoil disposal site and quarry site	During construction and quarrying	No additional cost required	Contractor	Supervision consultant/DoR

		releasing into the water bodies. Accidental spillage of the oil, grease and other chemicals substance will be captured immediately without allowing 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 operation site	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
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	Around the quarry site	During quarrying	NRs. 30,000 for quarry site reclamation (Cost included in BoQ)	Contractor	Supervising consultant/DoR

		sedimentation cycle of the river. In case of quarrying over the hill slope, the hill slope will be stabilized by constructing the slope protection structures once the quarrying requirements are met.					
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	NRs. 20,000 for fire extinguisher (five 4kg, cylinder, at the rate of 4000/cylinder)	Contractor/project	Supervision consultant/DoR
Construction materials stockpiling	Environmental issues associated with the material stockpiling	- The land allocated for the storing of construction 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	Material stockpiling site	During construction period	NRs. 10,000 for fencing and covering materials (included in BoQ)	Contractor	Supervision consultant/DoR

		side barriers and covered to avoid mix up with deleterious materials.					
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 erosion. - Vegetation plantation will be done over the spoil disposed surface to reclaim the area.	Spoil disposal area	During construction period	NRs. 40,000 for gabion structure construction	Contractor/CBOs/Project	Supervision consultant/DoR
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	Soil, water and	Proper handling of bitumen to avoid soil and water	Approach	During	NRs.	Contractor	Supervision

handling and heating	air pollution	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.	road and bridge	construction period	20,000 for cleaning sites after bitumen heating		consultant/DoR
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

		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 workers	- 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.	Construction area	During Construction period	Included in project design	Contractor	Supervision consultant/DoR
Operation of bridge	Road accident	Project will install required delineators, safety signs, etc. as per the requirement.	Around the project	During operation stage	Included in detail design	Contractor	Supervision consultant/DoR

		Installation of sign boards at accident-prone spots and busy spots.	area				
Bridge construction	Impact on cultural, religious and historical site	- The project will formulate and implement strict code of conduct to the work force so that they will not be allowed to hinder the cultural and religious environment of the local area. - Project will support some funding for the improvement and betterment of existing Shiva Temple.	Near the project area	During construction stage	NRs. 30,000 for fencing and installing solar lamp in the temple premises	Project/Contractor	Supervision consultant/DoR/local stakeholders
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	NRs. 5,000 for sign posts	Contractor	Supervision consultant/DoR
Biological Environment:							
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	Construction camp	During construction period	No additional cost	Consultant	Supervision consultant/DoR

		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					
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 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	Around construction site	During construction period	No additional cost	Contractor	Supervision consultant/DoR
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
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
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	Around the construction area	During pre-construction and construction stage	No additional cost	Project/Contractor	Supervision consultant/project

		contractor's fault work for his 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

Cost included in table 10-6 are summed on table 10-9 and 10-10.

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	4	1,600,000
II. House displacement allowance	Number	4	80,000
III. Transportation allowance	Number	4	40,000
IV. Business displacement	Number	4	80,000
V. Support Allowance	Number	4	0
VI. Compensation of Land	Number	1	750,000 ¹
Sub Total of 1			2,550,000
2. Indirect Cost			
I) LEST Cost	Lump sum		450,000
5% provisional sum of heading 2 (I)			22,500
Sub Total of 2			472,500
Total (1+2)			3,022,500

1500 square meter this was determined by Land Revenue Office of the affected district fiscal year 2072/73

(Source: Draft RAP)

b) Income Restoration and Skill Development Training for Affected HHs

One member of each affected households will be provided incomerestoration measures under the **Income Restoration and Skill Development Training (IRSDT)** program according to the requirements of the Environment and Social Management Framework (ESMF). RSTD include trainings on income generating activities which will be delivered through trainings and others supplementary investments. These programs are expected to re-establish PAPs' lost livelihood options and uplift of new income generating opportunities. Regarding the information from the consultations some list of training

is listed below and this training will deliver as per their need basis during construction phase. ***This cost will not be included in this report.***

Table 10-8: Proposed training and cost estimate

S.N.	Name of Trainings	Targeted Participants		Duration	Start date	Cost (NRs)
		Male	Female			
1	Mobile repairing	3	3	15 days	During construction	100,000
2	Motorcycle Repairing Training	2	1	45 day	During construction	350,000
	Total	5	4		450,000	

(Source: Draft RAP)

c) Cost of tree plantation

Tree plantation will be mainly done for the restoration of spoil disposal site, road side plantation and plantation to enhance the aesthetics of the Siva Temple. Altogether the plantation of 80 trees has been proposed in this report. Out of 80 trees 50 of them will be planted around spoil management site, 20 along the approach road and 10 around the Shiva Temple. The cost estimate for the plantation of trees is presented in table 10-9.

Table 10-9: cost of tree plantation

Activities	Cost in Rs.	Remarks
Plantation of 80 saplings, including site preparation, pitting and mulching	8,000	Lump sum cost of NRs. 100/sapling (including cost for site preparation, pitting and mulching)
Replacement of 24 dead saplings at the rate of Rs. 70	1,680	Assuming 30% mortality
Tools	2,000	Lump sum
Tending and maintenance for 5 years	10,000	Lump sum
Sub-total	21,680	

d) Cost for Physical Impact Mitigation

The cost for the mitigation of physical impacts is presented in table 4-10 below. The cost includes all the cost included in EMP matrix.

Table 10-10: Cost of physical impact mitigation

Environmental Issues	Unit	Rate (Rs)	Amount (Rs)	Remarks
Camp site - Contractor Office/ Workshop - Labor camp	Provisional Sum (PS)	200,000	200,000	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	Contractor will conduct all necessary trainings related to bridge construction
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 provided to work force, visitors, supervision consultant.
Awareness Raising Program to the local (Training related to	3 day	10,000	30,000	

river safety like awareness regarding wastes not to be disposed in river banks, river bed extraction within 500 m u/s and d/s from the bridge location, health and sanitation, biodiversity conservation				
Quarry, Rock break, river bed extraction site rehabilitation	PS	30,000	30,000	Reinstatement of quarry and river bed extraction site
Safe disposal of spoil including transportation and rehabilitation of site	PS		40,000	The cost includes transportation of spoil to the designated site, and rehabilitation of the site
Fund for temple maintenance	PS	25,000	25,000	None of the public structures needs to be relocated by the project
Traffic Sign Post	PS	1500*3+500	5,000	NRs. 1500 per post and 500 installation charge
Bitumen Heating (Safe storage, heating and handling and closure)	PS	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	5	4,000	20,000	
Sub-Total			520,000	

e) 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 10-11: 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 MoPIT	Lump Sum		150,000.00
		Sub-Total	980,000.00

10.3.2 Total Cost for EMP Implementation

The breakdown of cost for the implementation of Environmental Management Plant is presented in table 10-12.

Table 10-12: Total cost of implementation of EMP

S.N.	Activities	Cost	Remarks
1	Mitigation measure under physical environment	520,000.00	
2	Tree Plantation	21,680.00	
4	Environmental Monitoring	980,000.00	
Total Cost of EMP implementation		1,521,680.00	

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:

ComplaintsofPAPsonanyaspectofcompensation,relocation,orunaddressedlosseswillbe settledinfirstinstance verbally orinwrittenforminfieldbasedprojectoffice. Theconcerned personneltosettle theissuesatlocal level candiscussthecomplaintinaninformalmeeting with thePAP. Thecommunityconsultation,involvementofsocialandresettlement expertswillbe helpfulinthisregard. ItwillbetheresponsibilityoftheLCFandProjectIn-charge toresolve the issue within15daysfromthe dateofthecomplaintreceived.

Stage2:

Ifnounderstandingoramicablesolutionreachedornoresponsefromtheprojectoffice, thePAPcanappealtotheCDC. While lodging thecomplaint, thePAPmustproducedocumentsto supportthis/herclaim. TheCDC will providethedecisionwithin15daysof registeringthe appeal.

Stage3:

IfthePAPisnotsatisfiedwiththedecisionofCDCorinabsenceofanyresponseofits representatives, within35daysofthecomplaint, thePAP, inhis/herlastresort, maysubmitits caseto thecourt

CHAPTER 11: CONCLUSION AND RECOMMENDATION

The construction of Sija 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 Sija 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 on the Kalikot side which would require immediate mitigation measures to prevent the future hazards associated with the excavation.

As a part of social impact, four built structure and 500m² land belonging to private owner have to be acquired during the construction of the proposed bridge. The project affected household will be compensated as per the cost mentioned in the resettlement plant (Table 10-6).

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.

Give 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 (ToR)

Annex B: Public Notice

लोकप्रिय राष्ट्रिय दैनिक



राजधानी

काठमाडौं, धरान र बुटवलबाट एकैसाथ प्रकाशित

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 2014



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 : सिजा खोला पुल

विश्व बैंकको सहयोगमा नेपाल सरकार, भैतिक पूर्वाधार तथा यातायात मन्त्रालय, सडक विभाग अन्तर्गत सडक क्षेत्र विकास आयोजनाले सुर्खेत-जुम्ला सडक खण्डमा पर्ने सिजा खोला माथि निर्माण गर्न प्रस्ताव गरेको ४१.३ मी. लम्बाई (१४४० मी. 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 र जुम्ला

प्रभाव पर्ने सक्ने गा.वि.स.को नाम: फोड्महादेव, महावौपाथरखोला, रारालिही 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.: ०१-४४७९३६९,

पोष्ट बक्स नं.: १२४१९, काठमाडौं,

इमेल: safe@ermc.wlink.com.np

Annex C: Deeds of Inquiry (Muchulka)



नेपाल सरकार

सङ्घीय मामिला तथा स्थानीय विकास मन्त्रालय

गाउँ विकास समितिको कार्यालय

फोइमहादेव, कालीकोट



पत्र संख्या:- ०६२/०९९

चलानी नं. :- १५८

मिति :- २०७२/१२/२६

विषय:- सूचना राख्न गरिएको बारे।

तथा शाश्वत
श्री ~~सङ्घ विभाग~~ ~~सं-वातावरण~~ ~~संरक्षण~~ ।

असुरत विषयमा स्विचलेको प्रस्ताव गरिएको सिमानामा
पुलको ईष्टर्त क्रममा सल्लोवालाहरूको राय सुन्नुको लागि मिति
२०७२/१२/२३ गते एउटापि ईतिमामा प्रकृति पुचाराको हायाप्रतियस
गाविसको सूचना गरिमा राख्न गरिएको भएको जानकारी
अत्रोछे छ ।

गाउँ विकास समिति
गाउँ विकास समिति
गाउँ विकास समिति



नेपाल सरकार
संघीय मामिला तथा स्थानीय विकास मन्त्रालय
श्री गाउँ विकास समितिको कार्यालय
रासालिम्बु, जुम्ला

पत्रा-२०७२/०७३

मिति: २०७२/११/२८

च.न. १४६

विषय: सूचना राख्न गरिएको वीर ।

श्री सडक विभाग श्रीवातावरण

तथा सामाजिक शाखा

— x —

प्रस्तुत विषयमा यस जुम्ला जिल्लाको पश्चिम तर्फ सिमा
खोला पक्की पुल निर्माणको लागि (I E E) प्राथमिक कोषावलीय पश्चिम
सम्बन्धि सर्कसबिछ पुर्णता राख्नको लागि एलेकावालाहको एप प्रोजेक्ट
को मिति २०७२/११/२३ गते एमथानी ट्रेनिंगमा प्रकाशित भूतनाको
छायाँ प्रती यस गाविसको पुर्णता पारीमा राख्न गरिएको
छाहोस् जानकारीको लागि अनुरोध गरिन्छ ।


२०७२/११/२८
सुन बहादुर राई
(गा.वि.स. सीबो)



नेपाल सरकार
संघीय मामिला तथा स्थानीय विकास मन्त्रालय
गाउँ विकास समितिको कार्यालय
हात्तीचौर, जुम्ला

प.स.: ०६२/०६३
च.नं: १५९

मिति: २०६२/१२/२८

विषय: सूचना राँसे गरिएको /

श्री स्वाक विभागा धु-कावावर तथा
स्वामाजिक क्षेपण

प्रस्तुत विषयमा यस जुम्ला जिल्लाको महाकालाञ्चल
जी.वि.स.को दक्षिणतर्फ नामम सिमरकोट प्रखे वल निर्माण
को लागि (IEE) प्रारम्भिक कावावरणीय परीक्षण सम्पन्नको
स्वायम्भेव सूचना राँसेको लागि स्वीकारणालाईको
बाप, सुकाव को मिति २०६२/१२/२३ गते बाजधानी देखि
मा प्रकाशित सूचनाको काफैन्फा यस जी.वि.स.को -
सूचना फाटीमा राँसे गरिएको बखतमा जान्ने रीति को लागि
अनुरोध गरिन्छ /

०६२/१२/२८
लोकप्रसाद उपाध्यक्ष
गा.वि.स. समित एवं अध्यक्ष

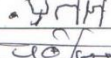
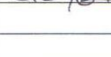
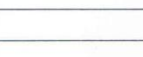
प्रारम्भिक वातावरणीय परिक्षण सम्बन्धि सूचना टाँसको मुचुल्का

आज मिति २०७२/१२/२२ गते बिहिवारको दिन यस फौजमहोदेव गा.वि.स./न.पा. वडा नं. २ स्थित लाउमा भन्ने ठाउँमा सिजा खोला पुलको प्रारम्भिक वातावरणीय परिक्षण गर्ने क्रममा सम्पूर्ण सरोकारवालाहरूलाई प्रस्तावित पुल निर्माण गर्दा त्यस क्षेत्रको भौतिक, जैविक, आर्थिक सामाजिक तथा सांस्कृतिक वातावरणमा पर्न सक्ने असर तथा ति असरहरू न्यूनिकरण गर्न अवलम्बन गर्न सकिने सम्भावित उपयहरू वारे आफ्ना राय सुभाबहरू पठाउन आवहान गर्दै मिति २०७२/१२/२२ को राष्ट्रिय दैनिक राजधानिमा प्रकाशित १५ दिने सार्वजनिक सूचनाको छाँया प्रति हामी निम्न सरोकारवालाहरूको उपस्थितिमा टाँस गरिएको व्यहोरा सही हो भनि यो मुचुल्कामा हस्ताक्षर गर्दछौ ।

क्र.स.	नाम/भर	ठेगाना	पेशा	हस्ताक्षर
१	सुरदा शाही	फौजमहोदेव-९.	छापाखाना	सुरदा
२	महेन्द्र भोसले	पाथर खोला-२, दुमला	छापाखाना	महेन्द्र
३	रश्मी खड्का	दिग्वी सडक	छापाखाना	रश्मी
४	पद्मा हमाल	फौजमहोदेव, ८	छापाखाना	पद्मा
५	प्रेम कोरमा	फौजमहोदेव-२	छापाखाना	प्रेम
६				
७				
८				
९				
१०				

प्रारम्भिक वातावरणीय परिक्षण सम्बन्धि सूचना टाँसको मुचुल्का

आज मिति २०७२/१२/२८ गते ^{आइतबार} ~~बिहवार~~ ^{मङ्गलबार}को दिन यस ^{०९} ~~महोत्तरी~~ ^{रासालेही} गा.वि.स./न.पा. वडा नं. ९ र ९ स्थित ~~गाउँपालिका~~ ^{सिजा} भन्ने ठाउँमा पुलको प्रारम्भिक वातावरणीय परिक्षण गर्ने क्रममा सम्पूर्ण सरोकारवालाहरूलाई प्रस्तावित पुल निर्माण गर्दा त्यस क्षेत्रको भौतिक, जैविक, आर्थिक सामाजिक तथा साँस्कृतिक वातावरणमा पर्न सक्ने असर तथा ति असरहरू न्यूनिकरण गर्न अवलम्बन गर्न सकिने सम्भावित उपयहरू बारे आफ्ना राय सुन्नाबहरू पठाउन आवहान गर्दै मिति २०७२/१२/२९ 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	धन कृष्ण ब्याजाले	हात्तु-२, जुम्ला	सेवा	
२	पुर्ण रायबा	महोत्तरी-१, जुम्ला	सिक्की	
३	निरु गार्ही	रासालेही-१, जुम्ला	गृहिणी	
४	पुर्ण आधिका	"	गृहिणी	
५	परमजित सुब्बा	रासालेही-१, जुम्ला	व्यवसाय	
६				
७				
८				
९				
१०				

Annex D: Recommendation Letter



नेपाल सरकार

सङ्घीय मामिला तथा स्थानीय विकास मन्त्रालय

गाउँ विकास समितिको कार्यालय

फोडमहादेव, कालीकोट

गाउँ विकास समितिको कार्यालय
फोडमहादेव, कालीकोट

पत्र संख्या:- ०६२/०६३

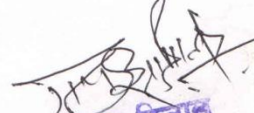
चलानी नं. :- १२९

मिति :- २०७२/१२/२६

विषय:- सिफारिस

श्री सुदक विमण, भू-वातावरण तथा
सामाजिक शाखा ।

प्रस्तुत विषयमा कालीकोट जिल्लाको फोडमहादेवको सिमाना
भएर कोरे सिमानेको छल निर्माण गर्दा त्यस क्षेत्रको ग्रामिण, रैथि
र इमर्यिङ सामाजिक वातावरणमा न्यून झर्ने हुनेगर्ने निर्माण गर्न र
हुन गएको झतिहद घर्न हुपका न्युनित्रिण गरी आयोजना कार्य
त्वयत गर्न सिफारिस गरिन्छ ।


मणेशप्रसाद रिजाल
। ज.वि.स.महादेव



नेपाल सरकार
संघीय मामिला तथा स्थानीय विकास मन्त्रालय
गाउँ विकास समितिको कार्यालय
महापौरादर १०५१, जुम्ला

मिति : २०७२/१२/२८

प.स. : २०७२/०७५
च.नं. : १२८

विषय : सिफारिस स्तम्भमा १

श्री सडक विभाग भु-वातावरण तथा
सामाजिक सेवा,

प्रस्ताव विषयमा जुम्ला जिल्लाको महापौरादरकोला
गा.वि.स.को दायिबा गर्दै सिमाना भएर खाने लाग्ने सिमाना
पक्की पुल निर्माण गर्दा उक्त क्षेत्रको भौतिक, जैविक र आर्थिक
सामाजिक वातावरणमा न्यून अपि हुने गरी निर्माण गर्न र
हुने गरीका अतिरिक्त पूर्ण रूपमा न्युनीकरण गरी आउने
कार्यन्वयन गर्न हुन सिफारिस स्तम्भ अनुसन्धान गरी

२०७२/१२/२८
लोकप्रसाद उपाध्याय
गा.वि.स. सचिव एवं अध्यक्ष



नेपाल सरकार
संघीय मामिला तथा स्थानीय विकास मन्त्रालय

श्री गाउँ विकास समितिको कार्यालय

रासवारी, जुम्ला

पं.सं. - २०६२१०६३

मिति : २०६२/११/२८

च.नं. १४६

विषय : रिजामि सार्वजनिक

श्री सडक विभाग, भु-वातावरण तथा

सामाजिक शाखा,

प्रस्तुत विषयमा जुम्ला जिल्लाको रासवारी गा.वि.स.को
पश्चिम तर्फ रिजामि भएर बग्ने सिंजाकोला पक्की पुल निर्माण
गर्दा ठुलो क्षेत्रको अतिक्रमण, जेविक र आर्थिक सामाजिक वातावरणमा
न्युन क्षति हुनेगर्ने निर्माण गर्ने र हुन जानुका क्षतिहरू
पूर्ण रूपमा न्युनिष्ठा गर्ने आयोजना कार्यसम्पन्न गर्ने हुन
रिजामि सार्वजनिक अनुमति पत्र दिइएको।

२०६२/११/२८
सुन बहादुर रायत
(गा.वि.स. सचिव)

Annex E: Minutes of Public Consultation

આજ મિતે ૨૦૭૩/૧૨/૨૮ ગતે આસ્તવાલ થત કોડમહાદેવ ગા.લે.ના વડા નં. ૨ સ્થિત નાગમ અને ઠાડેમા સેસજા રવોલ પુલકો પ્રાપ્તિ વાતાવરણ પરિસ્થિતિ ક્રમમા સરોવારવાતાદર સડો દલપત ગરી રાય સુઆવ સડુલત ગતે કાર્ય ગરિયો

ત્રેલાડો ઉપલેશર્તી

ક્ર.સ.	નામ	હેગાના	પેશા	દલપત
૧	ચાશલા શાહી	કોડમહાદેવ - ૬	બાપાર	શાહી
૨	મહેન્દ્ર અધિકારી	પાથર ચ્વોલા - ૨	"	શાહી
૩	પદ્મા હમાલ	કોડમહાદેવ - ૧	"	શાહી
૪	દરે નેપાલી	ભાથા - ૫, મુમ્લા	કોડમહાદેવ	શાહી
૫	ત્રેમા શ. શાહી	કોડમહાદેવ - ૨	બાપાર	શાહી
૬	સુનાલ અધિકારી	મુદ્દોળા પાથર ચ્વોલા	બાપાર	શાહી
૭	જુલિયર બુઢા	કોડમહાદેવ - ૭ મુમ્લા	"	શાહી
૮	લક્ષ્મી અધિકારી	કોડમહાદેવ - ૨	"	શાહી
૯	દિપક શાહી	મુદ્દોળા પાથર ચ્વોલા ૭ મુમ્લા		શાહી
૧૦				

ત્રેલાડા નિર્ણાયદર

- ૧) આયોજના દિલો કાર્યાન્વયન હુનુ પને
- ૨) સ્થાનિય વાસિન્દાલારો રોજગારો પ્રદાન ગર્નુ પને
- ૩) નિમાર્ણ કાર્યાલો વજાર લેત્રલારો કર્તી ગર્નુ નહુને
- ૪) આયોજના કાર્યાન્વયન ગરી ન્યૂત વાતાવરણાય તાતે સુનિલિચત હુનુ પને

आज मिति २०७३/१२/२८ गते आइतवारको दिन यस मे सिका खोला पुलको प्रारम्भिक वातावरणीय परिक्षण गर्ने क्रममा स्थानिय सरोकारवालाहरूसँगै सरोबिधी - १ र २ म कोइमहर महावैपथर खोला - ९ को साँध नामगछ भन्ने स्थानमा राख सुक्रात सङ्कलन गर्ने कार्य गरियो ।

क्र.स	नाम	ठेगाना	पेशा	हस्ताक्षर
१.	सवास पाण्डे	कालिकोट, गा.म-९	विद्यार्थी	
२.	सुर्जु लुका	खरलीहि-१, जुम्ला व्यापार		
३.	प्रभा शेकाया	महावैपथर खोला-६	किसान	
४.	कृष्ण अधिकारी	कालिका खेतु -३	समाज सेवा	
५.	धन कृष्ण न्यौपाने	हाकु -२ जुम्ला	सेवा	
६.	जय शेकाया	कालिका खेतु -४	किसान	
७.	लाल शर्मा	महावैपथर खोला-८	किसान	
८.	गुरु शाही	महावैपथर खोला-४	व्यापार	
९.	रानी शाही	महावैपथर खोला-४	जोगिर	
१०.	निरु शाही	महावैपथर खोला-४	व्यापार	

उपरोक्त सरोकारवालाहरूसँगै हो, धलफलबाट निम्न निर्णयहरू गरियो ।

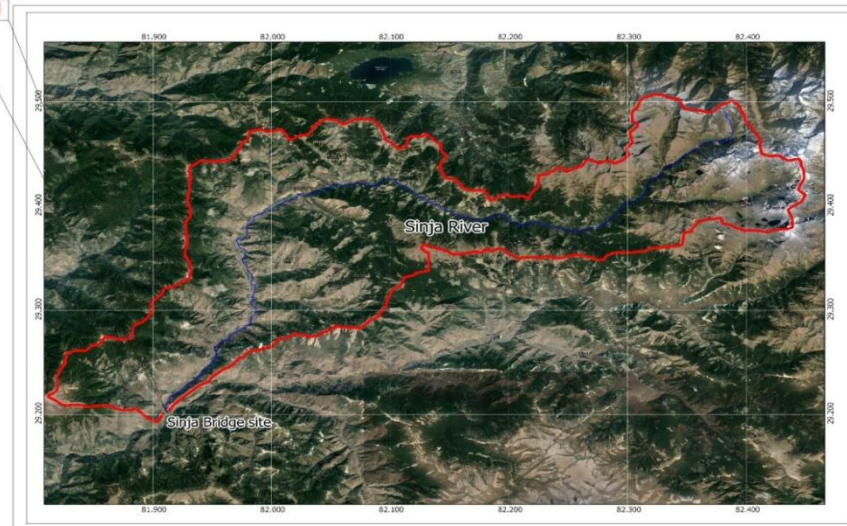
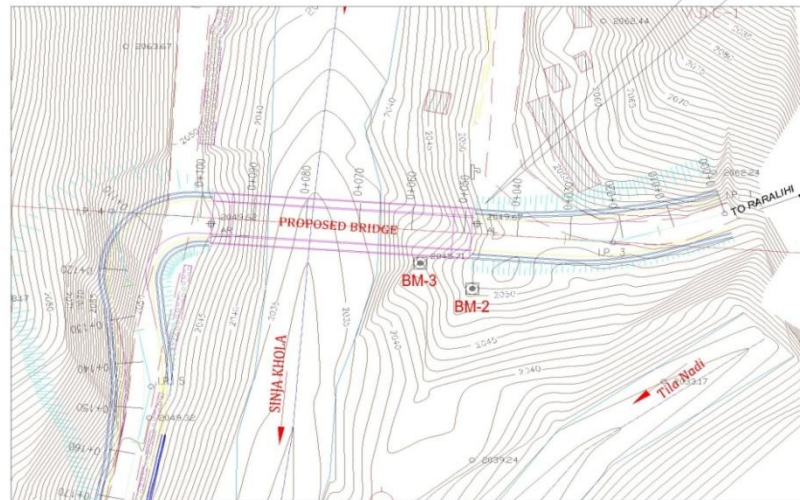
१. हाल कायम पुल पुरानो भएको र धेरै भार धेउन नसक्ने भएकाले जति सक्दो छिटो नयाँ पक्की पुल निर्माण गर्ने पर्ने जसमा स्थानियको पूर्ण समर्थन हुने ।
२. पुल निर्माण गर्दा स्थानिय वातावरणमा कुनै क्षति भएमा उपयुक्त उपायहरू अवलम्बन गर्ने पर्ने ।
३. स्थानिय मजदुरहरूसँगै रोजगारी प्रदान गर्ने पर्ने ।
४. आयोजन निर्माण क्रममा राजमार्ग अवरोध हुन नहुने ।

Annex F: Maps and Layouts

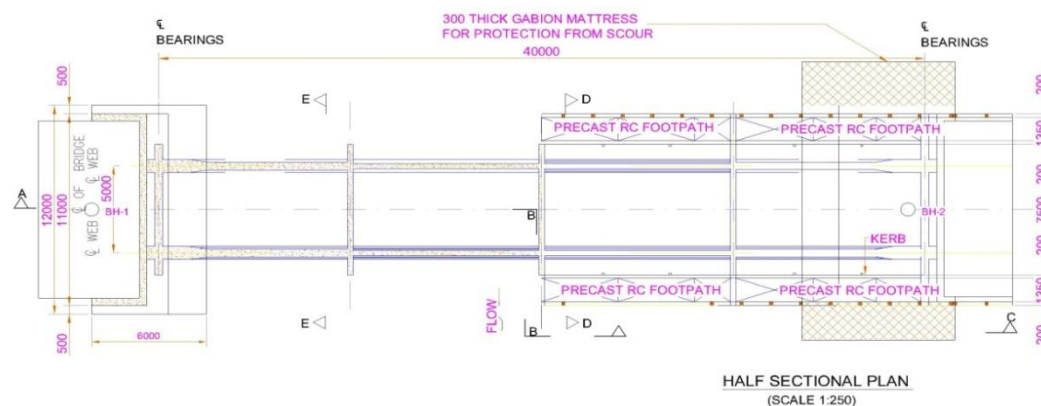
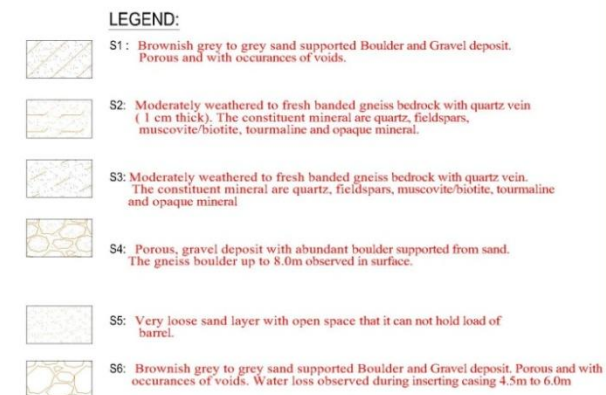
Annex F1: Topographic Maps and General Layouts



PROJECT LOCATION

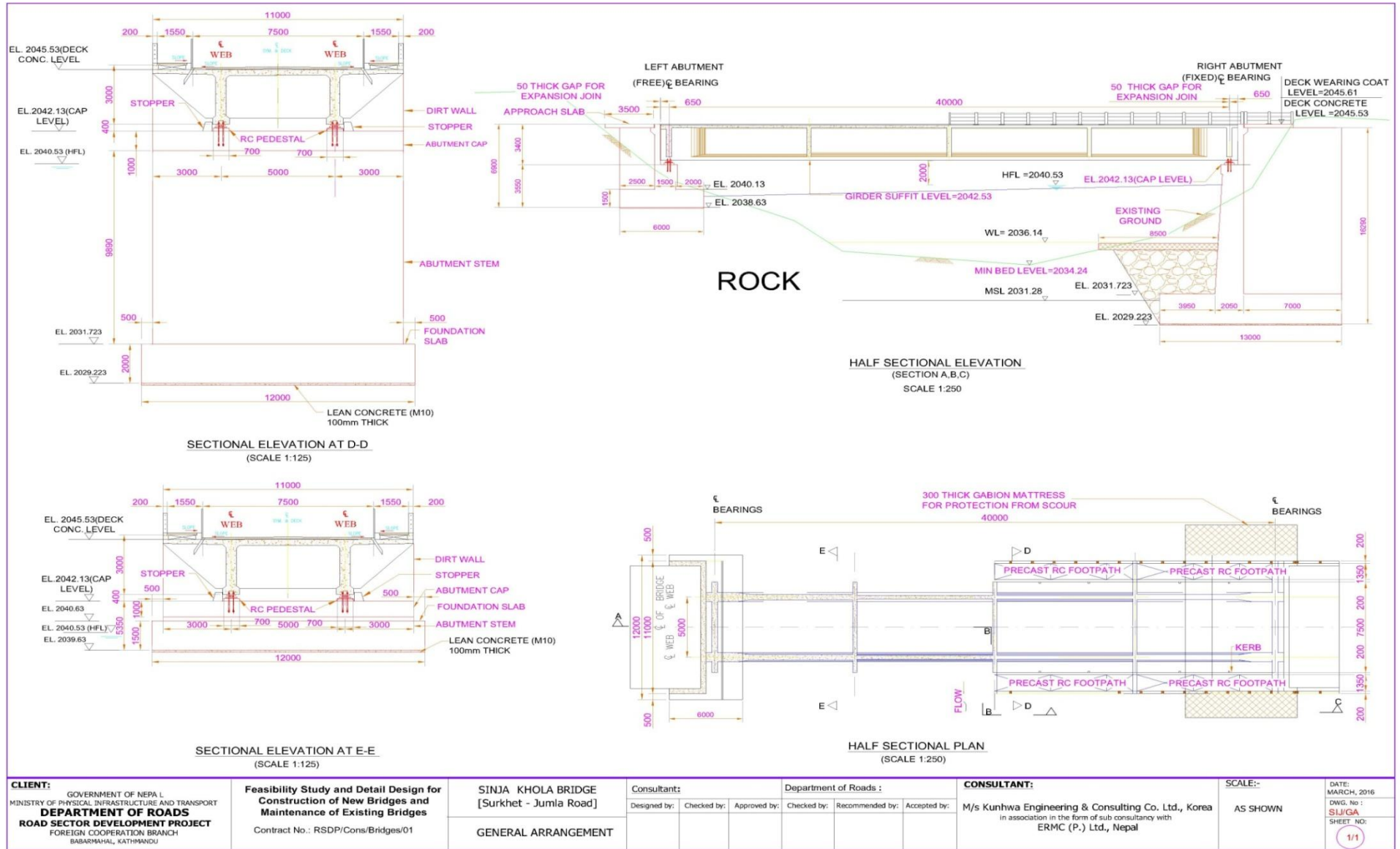


CLIENT: GOVERNMENT OF NEPAL MINISTRY OF PHYSICAL INFRASTRUCTURE AND TRANSPORT DEPARTMENT OF ROADS ROAD SECTOR DEVELOPMENT PROJECT FOREIGN COOPERATION BRANCH BASARMAHAL, KATHMANDU	Feasibility Study and Detail Design for Construction of New Bridges and Maintenance of Existing Bridges Contract No.: RSDP/Cons/Bridges/01	SJIA KHOLA BRIDGE [Surkhet - Jumla Road] INDEX MAP (LOCATION MAP)	Consultant: Designed by: Checked by: Approved by:	Department of Roads: Checked by: Recommended by: Accepted by:	CONSULTANT: M/s Kunhwa Engineering & Consulting Co. Ltd., Korea in association in the form of sub consultancy with ERMIC (P.) Ltd., Nepal	SCALE:- NOT TO SCALE	DATE: MARCH, 2016 DWG. No : SJ/ILM SHEET NO: 1/1
--	--	--	---	---	---	--------------------------------	---

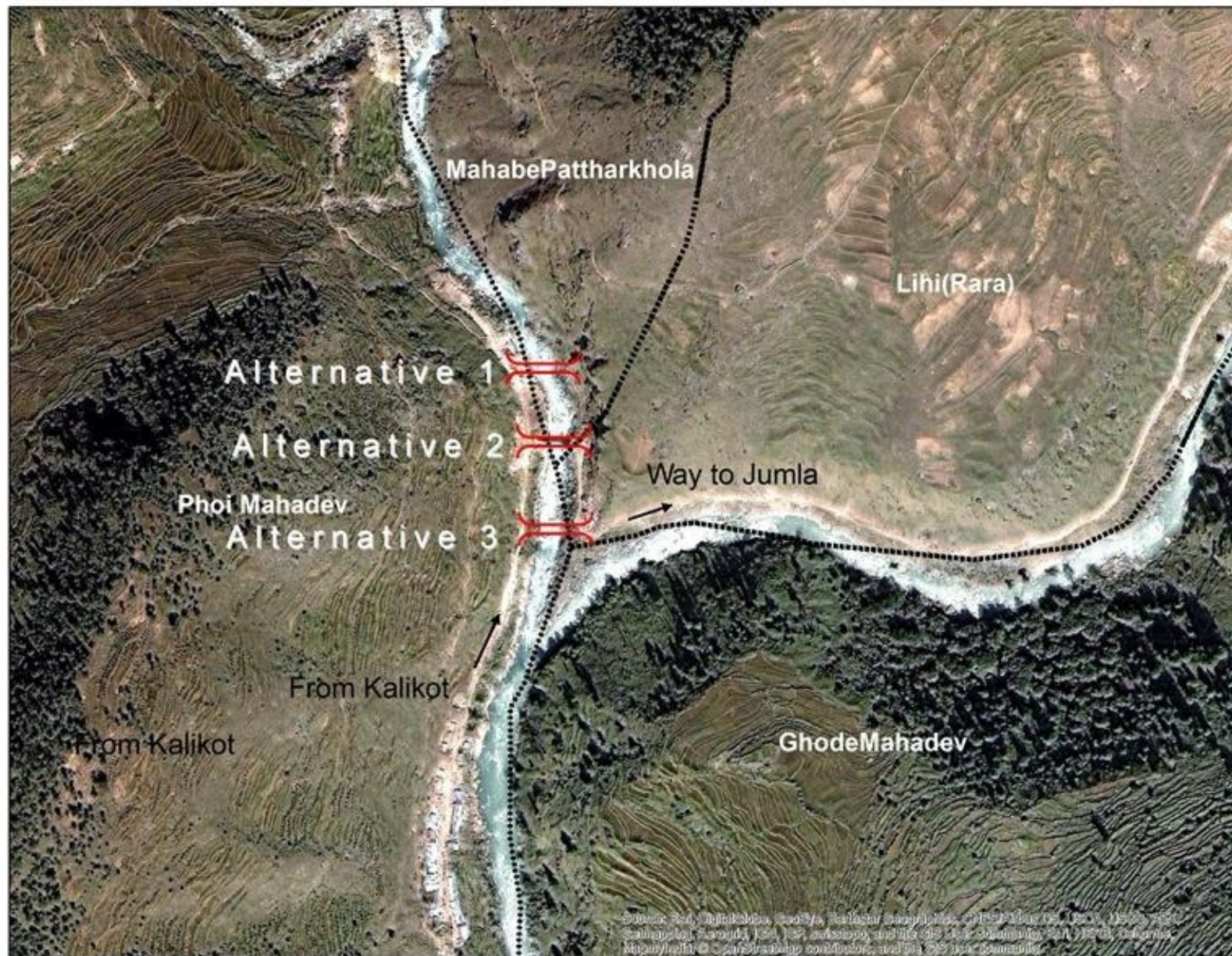


- 1: **Abutment Protection** has been done to minimise Scour.
- 2: **Rock investigation** should be done before construction starts and if necessary modification should be done.

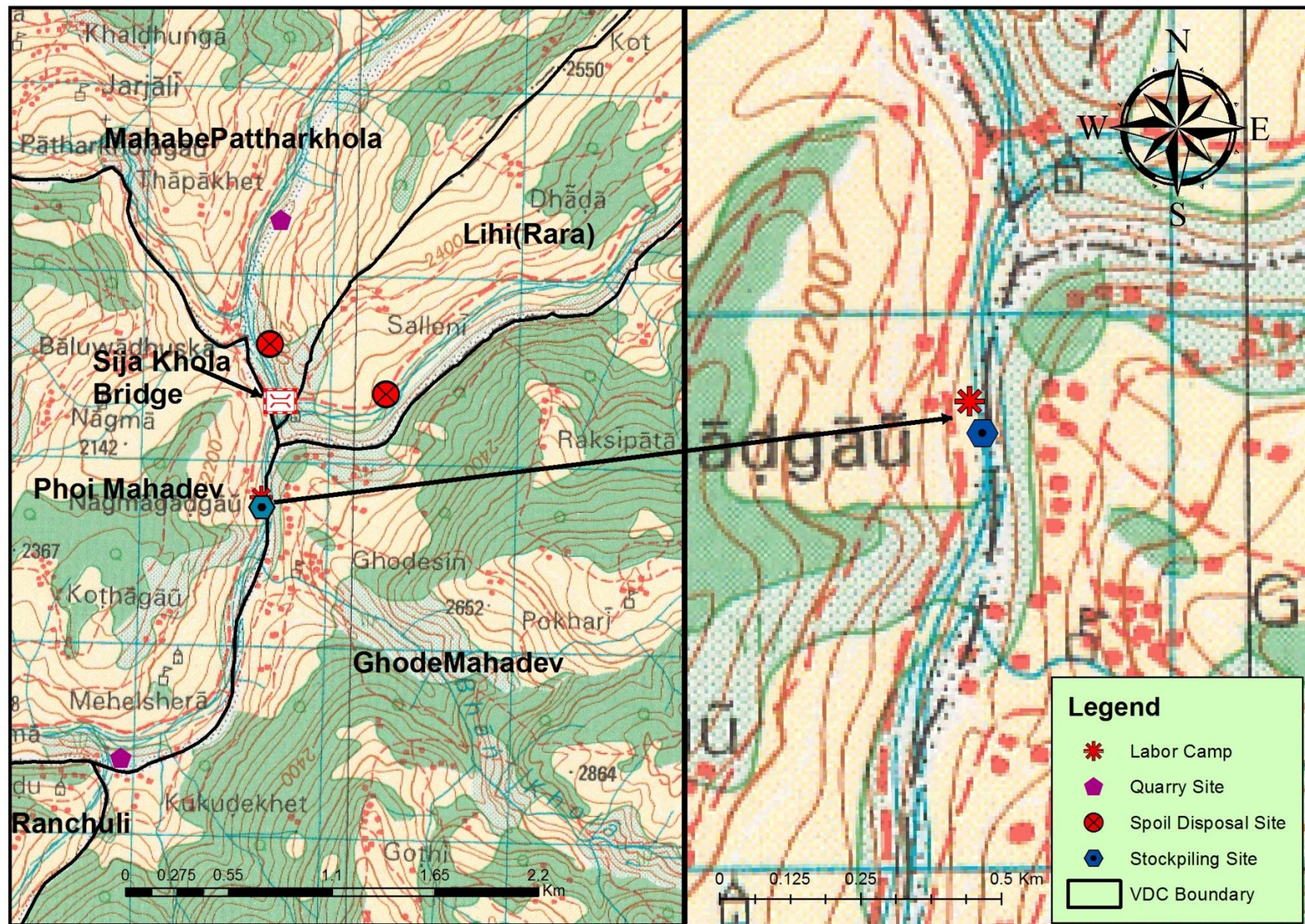
CLIENT: GOVERNMENT OF NEPA L MINISTRY OF PHYSICAL INFRASTRUCTURE AND TRANSPORT DEPARTMENT OF ROADS ROAD SECTOR DEVELOPMENT PROJECT FOREIGN COOPERATION BRANCH BABARMAHAL, KATHMANDU	Feasibility Study and Detail Design for Construction of New Bridges and Maintenance of Existing Bridges Contract No.: RSDP/Cons/Bridges/01	SINJA KHOLA BRIDGE [Surkhet - Jumla Road] SOIL PROFILE	Consultant:			Department of Roads :			CONSULTANT: M/s Kunhwa Engineering & Consulting Co. Ltd., Korea in association in the form of sub consultancy with ERM (P.) Ltd., Nepal	SCALE:- AS SHOWN	DATE: MARCH, 2016
			Designed by:	Checked by:	Approved by:	Checked by:	Recommended by:	Accepted by:			DWG. No : SL/SP
											SHEET NO: 1/1



Annex F2: Alternatives of the Project



Annex F3: Topomap with project components



Annex G: Sample Questionnaire

आधुनी सर्वेक्षण प्रमाणपत्र

१. आवातमुल विवरण

क्र.सं.	प्रश्न	उत्तर
१.१	प्रत्यासनी - न	न/ह
१.२	अन्तर्जातीयिकी मिति	२८/०३/१३/२०१३
१.३	विषय	
१.४	माहिती	राता लिमिटेड
१.५	मठा नं.	१.
१.६	मठा / कर्मचारी नाम	शेखी हाट
१.७	उत्तरदाताको नाम	नविन लिमिटेड
१.८	उत्तरदाताको निवा	पुन ☒ खोटा ☐
१.९	आधुनीको नाम	अर्पण
१.१०	आधुनीको निवा	पुन ☒ खोटा ☐
१.११	आत / आनी (उत्तरदाता एक वा एक उत्तरदाता सोही समूहमा आत/आनी)	आत ☒ खोटा ☐ आत/आनी ☐ आत/आनी ☐ आत/आनी ☐ आत/आनी ☐
१.१२	आत/आनी ☐ (उत्तरदाता एक वा एक उत्तरदाता सोही समूहमा आत/आनी)	आत ☒ खोटा ☐ आत/आनी ☐ आत/आनी ☐ आत/आनी ☐ आत/आनी ☐
१.१३	आत/आनीको उत्तर (उत्तरदाता एक वा एक उत्तरदाता सोही समूहमा आत/आनी)	आत/आनीको उत्तर आत/आनीको उत्तर ☒ आत/आनीको उत्तर

२. आधुनी विवरण

२.१. आधुनी विवरण

क्र.सं.	आधुनीको नाम	निवा	उमेर (पुन आत/आनी उमेर)	विषय (२० वर्ष अघि)	पेशा (१५ वर्ष अघि अघि)	आत/आनी आत/आनी
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		पु	म				भएको	नभएको
१	आमा	१	२	२७	७	३	१	२
२	श्रीमती	१	३	२२	११	११	१	२
३	छोरा	१	२	५ महिला			१	२
४	छोरी	१	३	२१/२			१	२
५	बुवा	१	२	४५	१२	१	१	२
६	आमा	१	४	४२	१२	७	१	२
७	दाई	१	२	२२	६	२	१	२
८	भाई	१	२	१८	७	६	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, बुवा -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 बिच्छेद 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 वसाई सराई

क्र.सं	प्रश्न	उत्तर
३१	तपाईंका परिवार (पूर्वा) कहिले देखि यस ठाउँमा बस्दै आउनुभएको हो ?	दुई पुस्ता भन्दा अघिबाट (५० वर्ष) एक पुस्ता भन्दा अघिबाट २५ वर्ष

		हालसाले १० वर्ष भन्दा कम। ४ वर्ष							
३२	यदि तपाईं बसाई सरेर आउनुभएको हो भने कृपया तपाईंको पूर्खाको ठाउँ तोकनुहोस् ?	जिल्लाको अर्को गा वि मह छिमेकी जिल्ला अन्य जिल्ला							
३३	के तपाईंको परिवारका कुनै सदस्य कामको सिलसिलामा बसाई सरेर आएको छ ?	छ छैन ✓							
३४	यदि छ भने बताउनुहोस्।	कामको लागि स्थान/ठाउँ							के बसाइ सराई वार्षिक चलन हो
	कम संख्या	जानेको संख्या लिइ		जिल्ला भित्र	जोडिएको जिल्ला	अर्को जिल्ला	भारत	विदेश	नेपाल
		पुरुष	महिला						

४. परिवारमा विरामी

क.सं	प्रश्न	उत्तर
३७१	गाएका १२ महिनामा तपाईंको कुनै सदस्य विरामी हुनु भएको थियो?	थियो ✓ थिएन

४१ 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					

क्र.सं	रोगको नाम	विरामी सदस्य संख्या		मौसम (कृपया टिक लगाउनुहोस्)		
		पुरुष	महिला	वर्षा (आषाढ-असोज)	हिउँद (कार्तिक-फागुन)	गर्मी (चैत-जेठ)
७	निमोनिया					
८	मुटु सम्बन्धि					
९	अन्य (खुलाउनुहोस्) Intestine	✓		✓		
१०	अन्य (खुलाउनुहोस्)					
११	अन्य (खुलाउनुहोस्)					
१२	अन्य (खुलाउनुहोस्)					

४ शौचालय सुविधा

क्र.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 ?	खान्दे चपी / कच्चा चपी ✓ पक्का चपी

५ खानेपानीको सुविधा

क्र.सं	श्रोतहरू	प्रयोग गरेका मुख्य तिनवटा श्रोतहरू		प्रयोगका आधारमा प्राथमिकीकरण गर्नु होस्
		छ	छैन	
१	धारा (निजी धारा)	१	२	
२	धारा (सामूहिक)	✓ १	२	
३	कुवा / मूल / ढुङ्गेधारा	१	२	
४	अन्य (खुलाउनुहोस्).....			

६ आयोजना सम्बन्धि

६.१ तपाईंलाई यस आयोजना बारे जानकारी छ ?



६.२ यदि छ भने कुन माध्यमबाट थाहा पाउनु भयो ?

After Survey

६.३ यस आयोजना बनाउँदा तपाईंलाई कुन प्रकारको हानी नोक्सानी पुग्यो ?

छैन

- जग्गाको क्षती
- भौतिक संरचनामा क्षती

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

छैन

६५ यस आयोजनाले यस क्षेत्रमा रहेको के कस्तो सांस्कृतिक तथा मौलिक संरचनामा असर गर्छ ? हैन

६६ यो आयोजनाले यस क्षेत्रमा रहेको मठ, मन्दिर, तथा अन्य सांस्कृतिक सम्पदाहरूमा असर पुर्याउने देख्नु हुन्छ ? हैन

६७ यो आयोजनाले के कस्तो फाइदा पुर्याउने देख्नु हुन्छ ?
आवक जावत सुविधा

६८ आयोजना बाहे तपाईंको राय सुझावहरू के के छन् ?
दिदी कालीन हुनु पर्यो ।

Annex H: ToR Approval Letter



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

फ्याक्स: ५५२९१०६

फोन नं. ५२६०६९६

हाल: पाटन, ललितपुर

ई-मेल: gesunit@dor.gov.np

वेब साइट: www.dor.gov.np

चलानी नं-११०/२.२.२/०७२/७३

मिति : २०७२/१०/०८

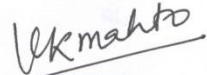
श्री वैदेशिक महाशाखा
बबर महल, काठमाडौं ।

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

उपरोक्त सम्बन्धमा त्यस महाशाखा अर्न्तगत Sija Khola Bridge (Surkhet-Jumla Road) को IEE को ToR भौतिक पूर्वाधार तथा यातायात मन्त्रालयको प.सं.०७२/०७३/२.३ च.नं. ६०२ मिति २०७२/०९/२८ को पत्रानुसार नेपाल सरकार (सचिवस्तर) को मिति २०७२/९/२६ को निर्णयानुसार शर्त सहित स्वीकृत भएको व्यहोरा अनुरोध गरिन्छ ।

संलग्न: १. भौतिक पूर्वाधार तथा यातायात मन्त्रालयको पत्र छाँयाप्रति - १ थान

२. स्वीकृत ToR - २ प्रति


विजय कुमार महतो
ईकाई प्रमुख
विजय कुमार महतो
ईकाई प्रमुख/सि.डि.ई.
भू-वातावरण तथा सामाजिक शाखा

बोधार्थ: (आवश्यक कार्याथको 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 छाँयाप्रति - १ थान

२. स्वीकृत ToR - १ प्रति)



नेपाल सरकार

भौतिक पूर्वाधार तथा यातायात मन्त्रालय

(वातावरण तथा सामाजिक शाखा)

URL: www.moppw.gov.np
e-mail: info@moppw.gov.np

फोन नं.: ४२११८८०
४२११९३१
४२११६५५
फ्याक्स नं.: ४२११७२०
सिंहदरबार, काठमाडौं,
नेपाल।

पत्र संख्या: ०७२/०७३/२.३
च.त.: ६०२



सचिवालय
भू-वातावरण तथा सामाजिक शाखा
दस्तावेज नं.: ३५६
मिति: ०७२/०५/३०
मिति: २०७२/९/२८

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 **Sija Khola Bridge (Surkhet-Jumla Road), Kalikot** को प्रारम्भिक वातावरणीय परीक्षण(IEE) को कार्यसूची नेपाल सरकार (सचिवस्तर) को मिति २०७२/९/२६ को निर्णयानुसार कार्यसूचीमा उल्लेख गरिएका Issue/Impacts का अलावा प्रतिवेदन तयारीका समयमा अन्य Issue/Impacts देखा परेमा सो पनि समावेश गर्नुपर्ने शर्तमा स्वीकृत भएको व्याहोरा अनुरोध छ।

श्री ग.
५/३०

श्रीमा
०९/२८
(शोभा भण्डारी)
समाजशास्त्री

Annex I: Photographs



Photo 1: Existing Bailey Bridge Over Sija River



Photo 2: Interaction with the local people



Photo 3: Pasting the public notice



Photo 4: Shiva Temple near the bridge construction site



Photo 5: Himalayan vulture observed around the project area



Photo 6: View of site for the construction of the bridge

Annex J: Comment Incorporation Matrix

S.N.	Comment	Incorporation Section	Remarks
1.	Revisit Area delineation DIZ, IIZ and ZOI (DIZ is 500 m surrounding, IIZ is adjoining ward no of both sides, ZOI is affected VDC/Municipality)	Section 4.3, Table 4-1, page number 11	
2.	Submit the clear Topo Map including delineation area if possible color Map	Topomap included in Figure 3-2, page number 5	
3.	Page: 3, missing amount, page:11, add public utilities issues in physical aspects. Page - 13, Section Hydrology, Add information drainage and flood pattern information, Page:45, Add labor camp, Page:46, Add- Bridge safety, Occupational Congestion around the adjoining area of Bridge Abutment (operation phase) etc.	For missing amount table 3-1, public utilities table 4-2, pg. 11; hydrology section 6.1.6, other issues chapter 7.	
4.	Page 16, Mention clause of Solid Waste Management Act & Rule. Explain it. Public Road Act, 2031(1974),. Review World bank, (EA-OP.01), Natural Habitats (OP-4.04) ,Forestry (OP.4.36), ESMF, 2007, Environmental Management Guidelines, GESU/DoR, July 1999.	All the suggested act, rules, policies are incorporated in chapter 5	
5.	Follow the Addendum ESMF, 2013 (Bridge Related site specific issue)		Addendum ESMF, 2013 was followed during report preparation
6.	Add issue: Adverse impact Construction Phase - Sand and gravel extraction - Degradation of water quality - Bridge safety - Transportation of construction materials - Approach road for bridge	All the suggested issues are incorporated in chapter 7, section 7.2.1	

	construction areas • River flooding and bank erosion at both banks of river • Occupational Health safety • Bridge safety Operation Phase • Encroachment of DIZ area of Bridge • Scouring/ Congestion around the adjoining around of Bridge abutment • Embankment erosion • Reinstatement of environmental component (stockpiling Yard, labor/ Contraction camps, quarry etc)		
7.	Add the bridge related Act, Rules, Policies and Manuals: • The Aquatic Anima protection Act, 1961, • Bridge policy , 2005, • Bridge maintenance manuals, 2005, • Environmental assessment (EA)(OP 4.01), cultural property (OPN:11.03) World Bank and other related	All the suggested act, rules, policies are incorporated in chapter 5	
8.	Training/Awareness • River training • Protection of river • Protection of embankment(bioengineering), etc.	Incorporated in table 10-5 and 10-6	
9.	Include Muchulkas & Recommendation letter of affected VDCs published notice	Incorporated in annex B, C and D	
10.	Table of content should as per EPR – 1997	Table of content as per EPR 1997	
11.	Include filled sample checklist	Filled checklist attached in	

		annex G	
12.	Include approved letter of ToR	Approved letter of ToR attached in annex H	
13.	Baseline/impact/mitigation/monitoring should be correlated and described as phase wise		Baseline/impact/mitigation/monitoring are related to one another and described phase wise
14.	Revisit the chapter 9.1 and 10.1		Chapter 9.1 and 10.1 revisited
15.	Clarify some line and word like ESMF-Dolidar, group judgment, ethnicity, etc.		Clear meaning of ESMF included in various part of report. Words like Dolidar and group judgment not included in report.