Initial Environmental Examination
of
Bungaad Bridge (Chinchu - Jajarkot Road)

Submitted By:

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Submitted to:

Ministry of Physical
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कार्यकारी सारांश

१. प्रस्तावना

प्रस्तावित वनगाढ खोला पुल छिन्चु-जाजरकोट सडक खण्ड अन्तर्गत सल्यान जिल्लाको देवस्थल गा.वि.स. हुदै बग्ने वनगाढ पर्दछ । यस आयोजनाले सल्यान, जाजरकोट, सुर्खेत र डोल्पाका वासिन्दाहरुलाई प्रत्यक्ष लाभ पुऱ्याउने देखिन्छ । यस वनगाढ पुल निमार्णको प्रस्तावकको नाम र ठेगाना निम्न अनुसार रहेको छ ।

भू-वातावरण तथा समाजिक शाखा,

सडक विभाग,

चाकुपाट, ललितपुर

फोन: ०१-५००५५२०

ईमेल: gesunit@dor.gov.np

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

सडक क्षेत्र विकास आयोजना,

बैदेशिक महाशाखा,

सडक विभाग,

सानो गौचरन, काठमाडौं

२. प्रस्तावको विवरण

वनगाढ पुल छिन्चु - जाजरकोट सडक अन्तर्गत सल्यान जिल्लाको देवस्थल गा.वि.स. भएर बग्ने वनगाढमा निमार्ण गर्न प्रस्ताव गरिएको छ । वनगाढ पुल भेरी र वनगाढको दोभान भन्दा करिव ७०० मीटर माथि पर्दछ । प्रस्तावको भौगर्भिक अवस्थिती २८°३०'४१.९९" उत्तर अक्षांश र ८२°०१'४७.२०" पूर्व देशान्तर रहेको छ भने उचाई समुद्री सतहबाट ५७२ मी. माथि रहेको छ । प्रस्तावित वनगाढ पुलको कुल लम्बाई ३६.२० मी.को हुनेछ भने यसको चौडाइ ११ मी. को हुनेछ । यसै गरी पुल निर्माण सँगै ११५ मी. (पुलको दुवै भाग गरेर) पहुँच मार्ग समेत निर्माण गर्नु पर्ने हुन्छ ।

३. प्रस्तावको सान्दर्भिकता

वातावरण संरक्षण नियमावली, २०५४ को अनुसुची १ को नियम ३ अनुसार कुनै पनि मुख्य पुलहरु निमार्ण गर्दा प्रारम्भिक वातावरणीय परिक्षण गर्नु पर्ने कानुनी प्रावधान रहेको छ । राष्ट्रिय पुल मापडण्ड २०६७ का अनुसार २५ मी. भन्दा बढी लामो स्पान भएका पुलहरु मुख्य पुल भित्र पर्दछन् । प्रस्तावित वनगाढ पुलको स्पान १×३५ मी. भएकाले उक्त पुल निमार्ण

गर्नु पूर्व त्यस पुलको प्रारम्भिक वातावरणीय परिक्षण तयार गरी भैतिक पूर्वाधार तथा यातायात मन्त्रालय मार्फत स्वीकृत गराउनु पर्ने कनुनी व्यावस्था रहेको छ ।

४. प्रारम्भिक वातावरणीय परिक्षणको उद्देश्य

यस प्ररम्भिक वातावरणीय परिक्षणको मुख्य उद्देश्य प्रस्तावित आयोजनाको कार्यान्वयनबाट आयोजना क्षेत्रको भौतिक, जैविक, सामाजिक, आर्थिक, साँस्कृतिक वातावरणमा पर्न सक्ने सकारात्मक तथा नकारात्मक प्रभावहरुको अध्ययन गरी सकारात्मक प्रभावहरुको बढोत्तरी तथा नकारात्मक प्रभावहरुलाई न्युनीकरण गर्ने उपायहरु पहिल्याउनु हो ।

५. कार्यविधि

यो अध्ययन प्रतिवेदन वातावरण संरक्षण नियमावली २०५७ दोस्रो संसोधनको प्रावधान अनुसार तथा यसै प्रस्तावको कार्यसुची (Terms of Reference) मा उल्लेख गरिए अनुसार तयार पारिएको हो । यसका लागि सान्दर्भिक ग्रन्थहरुको पुनरावलोकन तथा आयोजना प्रभावित क्षेत्रको निर्धारण गर्ने कार्य गरियो । अध्ययन टोलीद्वारा सामूहिक रुपमा २०७२ साल चैत महिनामा स्थलतग सर्वेक्षण गर्ने, आवश्यक सूचनाहरु संकलन गर्ने र स्थानीय समुदाय र सरोकारवालाहरु सँग समूहगत छलफल, परामर्श गर्ने कार्य गरियो । सरोकारवालाहरूको जानकारी तथा लिखित राय सुझावहरुको लागि राष्ट्रिय दैनिक राजधानिमा मिति २०७२ साल चैत १८ गते सार्वजनिक सूचना प्रकाशित गरियो ।

६. विद्यमान वातावरणीय अवस्था

प्रस्तावित क्षेत्र मध्यपश्चिमाञ्चल विकास क्षेत्रको पहाडी भेगमा पर्दछ । उक्त पुल भेरी नदी र वनगाढ खोलाको दोभान भन्दा ७०० मी. माथि वनगाढ खोलामा पर्दछ । उक्त पुल निमार्ण क्षेत्र वरपर मुख्य गरी खोलाले बगाएर ल्याएको ढुङ्गा, माटो प्रसस्त रुपमा देख्न सकिन्छ । भौगार्भीक रुपमा आयोजना स्थल रानिमाटा फर्मेसनमा पर्दछ । पुल बन्ने क्षेत्रमा हल्का भिरालो तथा सम्मो जमिन पर्दछ । यसै गरी प्रस्ताव कार्यान्वयन गरिने क्षेत्र वरपर हाल कुनै किसिमको प्राकृतिक प्रकोपको जोखिम समेत नरहेको देखिन्छ तर वनगाढ खोलाको बहाब क्षेत्र खासै गहिरो नभएको हुनाले वर्षा याममा वरपरको क्षेत्रमा वाढीको जोखिम देखिन्छ । आयोजना स्थल उष्ण जलवायु क्षेत्रमा पर्दछ । यहँको जाडो यामको औसत तापाक्रम ३ देखि १४° से हुन्छ भने गर्मी यामको तापाक्रम १४ देखि ३६° से सम्म पुग्ने गर्दछ । आयोजना क्षेत्रको हावा, पानी तथा ध्वनीको गुणस्तर सन्तोषजनक रहेको पाइन्छ ।

बकाइनो, सिमल, बेल, किम्मु, आदि यस क्षेत्रमा पाइने मुख्य रख प्रजातिहरु हुन् । त्यसै गरी साना वनस्पतीहरुमा केरा, वयर, अजम्बरी, सिस्नु, वेसरम, आदी पाइन्छ । यहाँ पाइने वन्य जन्तुहरुमा स्याल, रतुवा, चितुवा, वदेल, रातो वाँदर आदि पाइन्छन् । त्यसतै चराहरुमा भगेरा, काग, तित्रा, पानीहाँस, आदि पाइन्छ । सरकारको संरक्षित सूचिमा रहेको १ प्रजातिको वनस्पती र २ प्रजातिका वन्यजन्तु पाइन्छन् ।

जतिय हिसाबले क्षेत्री, मगर, नेवार, ब्रमण, ठकुरी र दलित जातिको बासेबास रहेको उक्त क्षेत्रमा शिक्षा, स्वाथ्यको राम्रो प्रवन्ध रहेको छ । यद्यपी तुलनात्मक रुपमा हर्ने हो भने पुरुषको तुलनामा महिलाहरु निकै कम साक्षर रहेको पाइन्छ । सडक सञ्जाल राम्रो भएका कारण केही घरधुरीहरुमा खाना पकाउन ग्यासको समेत प्रायेग हुने गर्दछ । सञ्चारको विषयमा उक्त क्षेत्रमा हाल नेपाल दुरसञ्चारको सञ्चार सुविधाहरु प्रयोगमा आएको पाइन्छ ।

आयोजना निमार्णबाट १२ परिवारका २३ वटा संरचनाहरुमा असर पर्ने देखिन्छ । जस मध्य ४ दलित परिवार छन् भने १ आदिवासी (मगर) परिवार पर्दछन् । शिक्षका दृष्टीले आयोजना प्रभावित परिवारका सदस्यहरुको अधिकतम शिक्षा प्रमाणपत्र तह रहेको छ । व्यापार र बैदेशिक रोजगारी आयोजना प्रभावित परिवारको मुख्य अयश्रोत हो र त्यस बापत वार्षिक ५०,००० देखि १५०,००० आम्दानी हुने गर्दछ । आयोजना प्रभावित घरहरुमा शौचालय प्रयोगको अवस्था निकै कम्जोर रहेको छ र हाल समेत खुल्ला ठाँउमा चर्पी बस्ने चलन विद्यमान छ । आयोजना क्षेत्र वरपरनै लैङ्गीक भेदभाव विद्यमान छ र विकासको पहुचका हिसाबले महिलाहरु निकै पछी रहेका छन् ।

७. वातावरणीय प्रभावहरु

आयोजना कार्यान्वयन हुदाँ आयोजना क्षेत्रको वातावरणमा सकारात्मक र नकारात्मक दुवै खाले प्रभाव हुने देखिन्छ । सकारात्मक प्रभावका कुरा गर्दा स्थानिय रोजगारीको सृजना, सिप प्रवाह तथा अभिवृद्धी, सहज तथा सुलभ यात्रा र त्यस क्षेत्रको विकासको सम्भावनाका ढोक खुल्नु सकारात्मक विषय हुन ।

नकारात्मक प्रभावहरुमा पुल निमार्ण तथा सडक सुधारका क्रममा भित्ताहरु काट्दा वढ्न जाने पहिरो लगायतका प्रकोपहरुको जोखिम, खानी सञ्चालन गर्दा निम्तने वातावरणीय प्रभावहरु, 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 फोहोरहरुले सृजना गर्ने वातावरणीय प्रभावहरु, अवैध रुपमा हुने रुख विरुवा, माछा लगायतका जलचरमा पर्ने असर, जडिबुटी र वान्यजन्तुको चोरी शिकारी, घर जग्गा अधिग्रहण, सामाजिक कलह, दुर्घटनाका सम्भावनहरु, पेशागत स्वास्थ्य तथा सुरक्षाका सवालहरु, आदी पर्दछन् । आयोजनाले सार्वजनिक भौतिक संरचनामा १५ मीटर जती सिचाई आयोजनाको नहरलाई असर गर्ने देखिन्छ । त्यसै गरी पहुँच मार्गको विस्तारको क्रममा ३ वटा विजुलीका खम्बाहरुलाई सार्नु पर्ने दखिन्छ ।

८. वातावरणीय प्रभाव न्युनिकरण तथा वातावरणीय व्यावस्थापन योजना

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

यसै गरी यस प्रतिवेदनमा वृक्ष रोपणको समेत प्रावधान रखिएको छ । जसमा ८० वटा विभिन्न जातका स्थानिय विरुवाहरु ढुङ्गा माटो व्यवस्थापन गर्न छुट्याइएको स्थानमा रोप्ने गरी प्रस्ताव गरिएको छ । आयोजना सँग सम्बन्धित कमदारहरुले स्थनिय जैविक विविधतामा प्रतिकुल प्रभाव नपरुन भनेर प्रतिवेदनमा उनीहरुलाई रुख विरुवा काट्न, माछा मार्न र शिकार गर्न रोक लगाउने कुरा समेत उल्लेख भएको छ । सडक निमार्णका क्रममा हुन सक्ने दुर्घटना कम गर्न संकेतहरु रख्ने, रातको समयमा बत्तीहरु बाल्ने व्यवस्था मिलाउने लगायतका उपायहरु प्रतिवेदनमा समावेश गरिएको छ ।

यसरी प्रस्तवित वनगाढ पुल निमार्ण गर्दा स्थानिय वातावरणमा पर्न सक्ने प्रतिकुल प्रभावहरु न्यूनिकरण गर्ने, सकारात्मक प्रभावहरुलाई बढोत्तरी गर्ने र प्रतिवेदनमा उल्लेख गरिएका गतिविधिहरु निरिक्षण गर्ने प्रावधान सहित वातावरण व्यवस्थापन योजना समेत प्रतिवेदनमा उल्लेख छ । वातावरण व्यवस्थापन योजना कार्यान्वयन गर्नका लागि रु. २,५९६,५२० विनियोजन गरिएको छ ।

९. निष्कर्ष

प्रस्तवित वनगाढ पुललाई सल्यान, सुर्खेत, जाजरकोट, डोल्पा लगायतका क्षेत्रको विकासको मुख्य द्धार रुपमा त्यस क्षेत्रका वासिन्दाहरुले लिएका छन् । उक्त पुल निमार्ण गर्दा वातावरणमा कम मात्र नकारात्मक प्रभावहरु पर्ने सो प्रभाहरुलाई प्रतिवेदनमा उल्लेख गरिएको उपायहरु अवलम्बन गरेमा सजिलै समाधान गर्न सकिने र यो प्रस्ताव कार्यान्वयन गर्नका लागि प्रारम्भिक वातावरणीय परिक्षणनै पर्याप्त हुनाले यस पुल निमार्ण प्रस्ताव यथाशिघ्र अधि बढाउन सुझव सहितको निष्कर्ष निकालिएको छ ।

Executive Summary

1. The proposal

The Bungaad River bridge is proposed over Bungaad along Chhinchhu-Jajrkot road section which is located at Devasthal VDC of Salyan District. The construction of bridge will facilitate the people of Salyan, Jajarkot, Surkhet, Dolpa Districts. The name and address of the proponent preparing the report is as follows:

Geo-Environment and Social Social Unit,

Department of Roads,

Chakupat, Lalitpur

Phone: 01-5005520

Email: gesunit@dor.gov.np

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

Road Sector Development Project,

Foreign Coopration Branch,

Department of Roads,

Sanogaucharan, Kathmandu

2. Details of the Proposal

The bridge is to be constructed over Bungaad along Chhinchhu Jajarkot road. The Bungaad is a tributary of Bheri River and, make confluence with Bheri River approximately at 700m d/s from the project site. The geographic coordinate of Proposed Bridge is 28°30'41.99"N latitude and 82°01'47.20"E longitude with the altitude of 572m amsl. The proposed bridge is of Simply supported RCC type with 36.2 (1*35) long and 11 m wide. The construction of bridge is also supplemented by constructing 115 m approach road (including both side) which includes upgrading of existing road.

3. Relevancy of the proposal

As per the mandate on the EPR, 1997, Initial Environmental Examination (IEE) is compulsory prior to the construction of Major Bridge. The Bridge Standard, 2010 defines the bridge with span greater than 25m as the major bridge. Since, the Bungaad Bridge has span of 35 m, an IEE report has to be

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

4. Objectives of IEE

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

5. Methods adopted for IEE study

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

6. Existing Environmental Condition

The proposed location for the implementation of Bungaad Bridge lies in the mountainos region of Mid-Western Development Region. The proposed bridge location is located at 700 m u/s of Bungaad and Bheri river confluence. The proposed bridge site is located in the rocks of the Ranimatta Formation. The land around the bridge has gentle slopes with stable features on both banks. The slope stability condition is good even there are loose materials along the river banks. Both banks of Khola are dominated with settlements and agricultural land. The catchment area of Bungaad upto the proposed bridge location is 131.4 km^2. The bridge site has low stream bed gradient which is why during monsoon, the adjoining areas are prone to flooding. Tropical climate is found around the proposed project site. Average temperature during winter ranges between 3^0c to 14^0c whereas during summer the temperature ranges between 14^0c to 36^0c. Air, water and noise quality of the project area is relatively fair in the area.

Bakenu (*Melia azederach*), Simal (*Bombax ceiba*), Bel, Mango, Kimbu (*Morus sp*.) trees are found around the project area. Shrubs and herbs found around the proposed bridge area includes Kera (*Musa paradisiaca),* Bayar (*Zyziphus mauritiana*) Sisno *(Urtica dioeca),* Ajambari *(Kalanchoe pinnata),* Besharam *(Ipomea carnea*). Chituwa (*Panthera pardus*), Jackal (*Canis aureus*), Wild Boar (*Sus scrofa*), Langur (*Colobinae ajax*) and Rhesus Macaque (*Maccaca mulata*) are some of the wildlife found around the project area. Bhangera (*Passer domesticus*), Parewa (*Columba*

palumbus), Pani Haans (*Anas crecca*), Kalij (*Lophura leucomelanos*), and Himalayan Griffon (*Gyps himalayensis*), Teetra (*Francolinus fracolinus)* are the avifauna found around the project are. Altogether 1 plant species and 2 animal species recorded in the area belongs to Government Protected species.

Chhetri, Dalits, Magar, Newar are the ethnic group residing around the project area. The status of education and health facilities is satisfactory around the project area; however, the educational status of female is very poor compared to that of male. The project area has the electricity supply through the Surkhet Substation. Due to improved road access some of the households in the project area found to be using LPG for cooking purpose. NTC, CDMA phone and local radio and TV are the most common means of communication in the project area.

The construction of the proposed bridge will affect 23 structures belonging to 12 households. Out of the four project affected households 4 belongs to Dalits and 1 belong to Indigenous (Magar) family. Business and foreign employment are the main occupation of the members of project affected families and they earn about NRs. 50,000 to 150,000 per year 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. 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 the region.

Adverse environmental impact include the risk of disasters due to excavation of hill slope for the construction of the approach road, environmental issues associated with quarry site and spoil disposal site, air and noise pollution associated with the operation of machineries and vehicles, environmental issues associated with spoil management, environmental impacts of solid and liquid waste from labor camp, illegal hunting, fishing and trade of wildlife and medicine, social issues associated with land acquisition, possibility of accidents, issues associated with occupational health and safety, etc. Similarly, 15 m section of irrigation canal due to bridge construction and 3 electricity poles is likely to be affected due to widening of approach road.

8. Environmental Impact Mitigation and Environmental Management Plan

Suitable and cost effective mitigation measures for the prevention of environmental impacts are recommended. This includes mitigation measures for 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 120 saplings of local trees have been proposed for the plantation. Out of the 120 saplings 80 will be planted to reclaim spoil disposal sites, 40 along the approach road. To avoid the extraction of fuel wood from the nearest forest, fishing, and hunting of wildlife, this report recommends the formulation of strict code of conduct. In order to avoid accidental risks around the construction site, this report recommends the installation of sign boards and lighting system.

In this way the report includes all possible measures for the enhancement of positive impacts and mitigation of adverse impacts. There is a separate chapter called Environment Management Plan which guides for the implementation of mitigation measures and monitoring provision for those mitigation measures. For the successful implementation of Environmental Management Plan NRs. 2,596,520.00 has been allocated.

9. Conclusion

The project has some environmental impacts that can be mitigated through the mitigation measures proposed in this document and the construction of the Bungaad Bridge will open all the possibility for the overall development of area. 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
BoQ:	Bill of Quantity
CBS:	Central Bureau of Statistics
CBO:	Community Based Organization
DDC:	District Development Committee
DHM:	Department of Hydrology and Meteorology
DoR:	Department of Roads
EMAP:	Environmental Management Action Plan
EPA:	Environment Protection Rules
EPR:	Environment Protection Act
GESU:	Geo-environmental and Social Unit
GI:	Galvanised Iron
GIS:	Geographic Information System
HFL:	High Flood Level
IEE:	Initial Environmental Examination
IRC	Indian Roads Congress
MoPIT:	Ministry of Physical Infrastructures and Transport
NGO:	Non-Governmental Organization
RCC:	Reinforced Cement Concrete
RSDP:	Road Sector Development Project
SRN:	Strategic Road Network
TOR:	Terms of Reference

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CHAPTER 1: INTRODUCTION

1.1. Name and address of the institution preparing the report

The name and address of the institution preparing Initial Environmental Examination (IEE) of Bungaad Bridge within Chhinchu-Jajarkot road is as follows:

Geo-Environmental and Social Unit (GESU),

Department of Roads (DoR),

Ministry of Physical Infrastructure and Transport

Chakupat, Lalitpur

Phone: 01-5005520

Email: gesunit@dor.gov.np

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

Road Sector Development Project (RSDP),

Foreign Cooperation Branch,

Department of Roads

Sanogaucharan, Kathmandu

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

Kunhwa Engineering and Consultancy Co., Ltd., Korea

In association with

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

Mid-Baneshwor, Kathmandu, Nepal

P. O. Box: 12419, Kathmandu

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

Email: safe@ermc.wlink.com.np, **Web:** www.ermcnepal.com

CHAPTER 2: GENERAL INTRODUCTION OF THE PROPOSAL

2.1 Background

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

Bungaad that lies in the Salyan District is a part of Chhinchu- Jajarkot road at the chainage 44+600. The geographical location of the proposed bridge is 28°30'41.99" N latitude and 82°1'47.20" E longitude and the elevation is 551 m above mean sea level (amsl). The area around the proposed bridge is characterized by the presence of settlement and market of Salli Bazaar and agricultural land. Salli bazaar is the centre for people destined to Chaurjahari of Rukum, Jajarkot, and different places of Surkhet, Salyan and Dolpa District. Well developed and expanded social facilities like health posts, schools, police post, market place, electricity are found near Salli bazar which is located nearby the proposed bridge area. The Bungaad is an ephemeral stream and remains waterless during driest month of the year, however, during high rain periods the flow in the stream often obstruct the free movement of the vehicles. The construction of bridge over Bungaad will ensure the year round movement of vehicles providing safer and reliable mode of transport of people of Surkhet, Salyan, Jajarkot, and even people of Dolpa Districts. The project area is connected through motorable road to both district headquarter and capital city.

2.2 Objectives of Initial Environmental Examination (IEE)

The objectives of IEE are as follows:

- Identify and predict the major environmental issues that may arise as a result of construction of new bridge and their likely impact on bio-physical, socio-economic and cultural environment of the project area.

- Identify easily implementable mitigation measures for the negative environmental and social issues and suggest remedial plans in case of residual impacts if any identified.
- Recommend practical and site specific environmental mitigation and enhancement measures, prepare and implement Environmental Management Action Plan (EMAP) for the project.
- Allow project proponents, designers, implementing agencies and funding agencies to address environmental issues during project implementation.

2.3 Rationality of IEE

The Bungaad Bridge has been proposed for 36.2 m with a single span of 35 m, which according to Bridge Standard, 2067, is categorized as major bridge. As per Environment Protection (EPA) and 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). Estimated cost of the proposed project is Nrs. 62,183,319.81. The project implementation District is Salyan (the hilly district) and construction of Bungaad bridge do not require clear felling of forest area of more than 5 hectares. As per national legal requirement the implementation of the project should undergo IEE study before implementation.

2.4 Relevancy of the Proposal

The Bungaad is ephemeral stream; however, its discharge will be relatively high during monsoon season often halting the traffic movement across it. It is along the Chhinchu-Jajarkot road section at chainage of 44+600. Due to lack of Bridge in the Bungaad, passengers have to change the vehicles to complete their journey on the road. The goods have to be carried out through porters up to Rakam increasing the market price of the goods. Similarly, the agriculture product of Surkhet and Jajarkot has suffer difficulties in finding markets due to unreliability of the transport system in the area. Thus, upon the completion of the proposed project, the people around the area will get benefits in multiple of ways. It will provide enhanced access to connect people of Salyan, Surkhet, Jajarkot, Dolpa districts with markets, schools, health post or hospitals and other facilities. The year round transportation services will facilitate the local people with their safe, reliable and timely mobility and further help to augment the economic status of the local people, in both direct and indirect manner. The double lane standard of the proposed bridge with the provision of foot path will ensure safety of the passenger moving across the road.

CHAPTER 3: PROJECT DESCRIPTION

3.1 Project Location and Accessibility

The proposed Bridge is at Gairi Bazaar near Salli Bazaar located at Devsthal Village Development Committee (VDC) of Salyan District. The bridge is to be constructed over Bungaad along Chhinchhu Jajarkot road. The Bungaad is a tributary of Bheri River and, make confluence with Bheri River approximately at 700 m d/s from the project site. The geographic coordinates of proposed bridge are 28°30'39.778" N latitude and 82°1'52.194" E longitude with the altitude of 551 m amsl. The project area can be assessed through Chhinchhu of Kholapur-Surkhet Road (Ratna Highway) which is about 58.5 km from Kohalpur, and from Chhinchhu, the project site is located at 44.6 km. Through road network project site is about 603 km from the capital city Kathmandu. The location map of the project area in topographical map and Google map is given in Figure 3-1, 3-2 and 3-3.

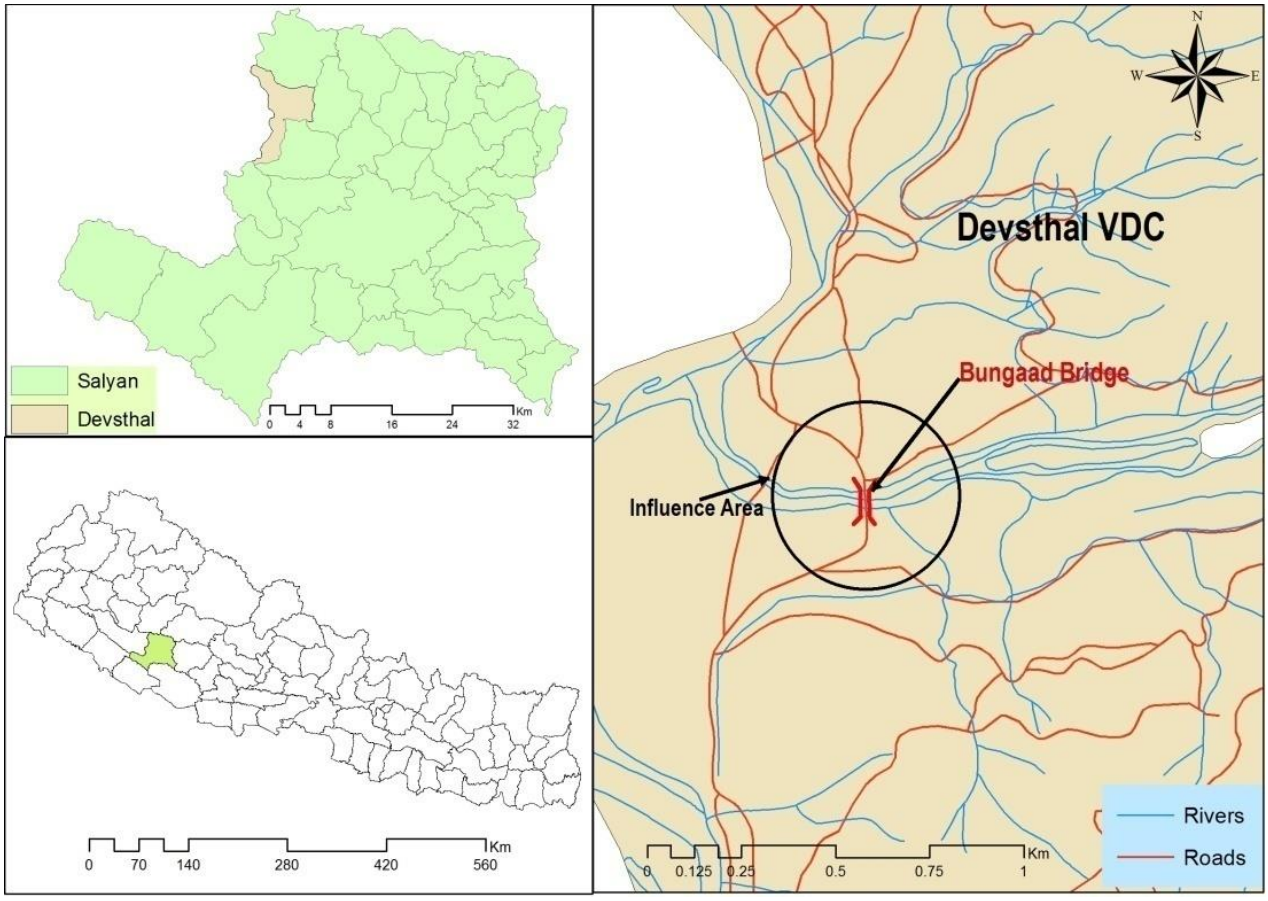

Figure 3-1: Location Map of the Project Area

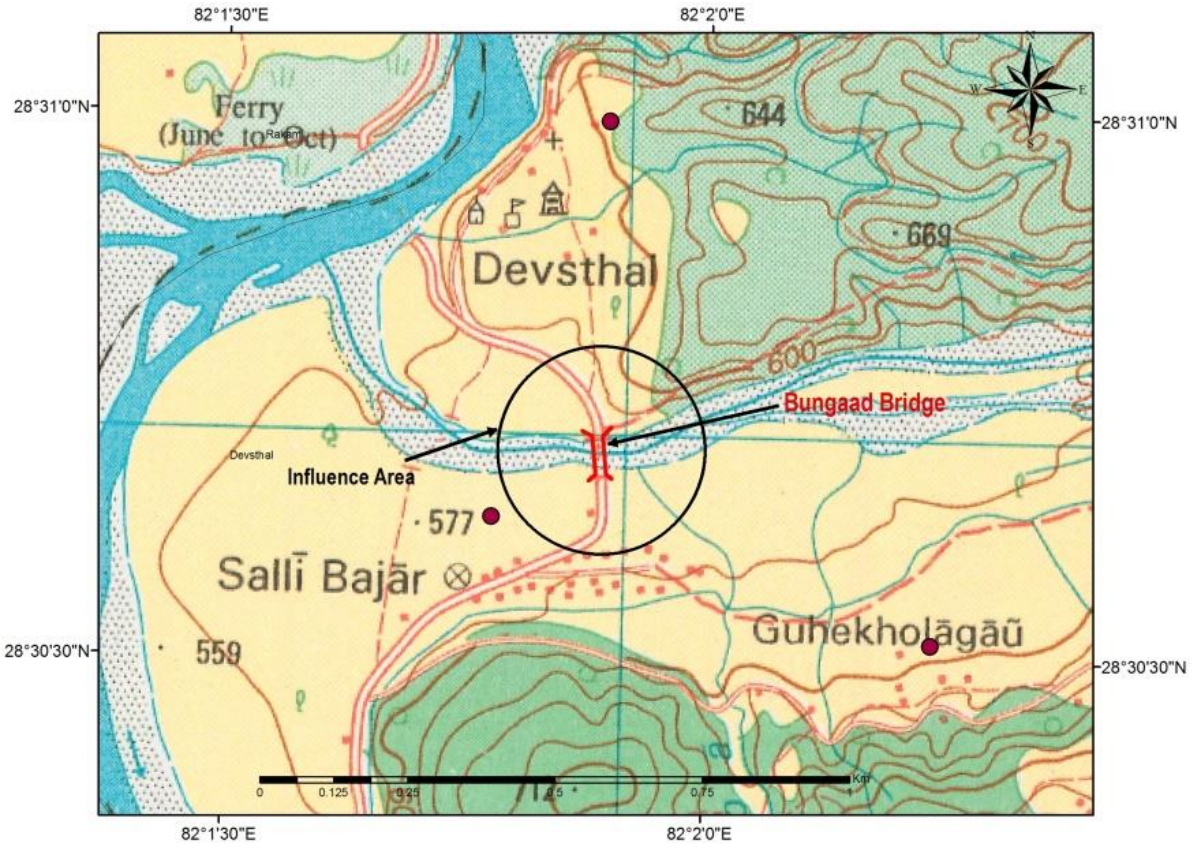

Figure 3-2: Project Area in Topographic Map

Figure 3-3: Project area in Google Image

3.2 Salient Features of the Project

The Terms of Reference (ToR) for the Initial Environmental Examination of Bungaad Bridge was prepared based on preliminary field information and this IEE document contains information which slightly deviates from the ToR as final design information are placed in this report.

Table 3.1: Salient Features of the Project

1. Name of the Project	**Bungaad Bridge**
2. Name of the River	**Bungaad**
3. Location	
3.1 Development Region	Mid-Western Development Region
3.2 Zone	Bheri
3.3 District	Salyan
3.4 VDC	Devasthal-9, BungaadTole
3.5 Name of the Road	Chhinchu-Jajarkot Road
3.6 Chainage of the Bridge site	44+600
3.7 Geographical Location	Northing 28°30'39.778" Easting 82°1'52.194"
3.8 Type of Road Surface	Bituminous
3.9 Terrain / Geology	River Valley
4. Structures	
4.1 Total length of the Bridge	36.2 m
4.2 Span Arrangement	1x 35m
4.3 Total width of the bridge	11.0 m

4.4 Width of Carriage way	7.50m
4.5 Width of Footpath	1.5m
4.6 Kerbs	0.35 m
4.7 Type of Structure	Simply Supported
4.8 Type of Superstructure	Pre-stressed
4.9 Type of Bearing	Elastromeric
4.10 Type of Abutment	RCC (Cantilever Type)
4.11 11Type of Foundation	Open Foundation
5. Design Data	
5.1 Live Load	IRC Class 'A', IRC class 70R,
5.2 Net bearing capacity of soil	500 KN/m^2
5.3 Design Discharge	695 m3/s
5.4 Scour Depth	3.88 m from minimum river bed level
5.5 Highest Flood Level	554.10 m
5.6 Lowest Bed Level	550.65 m
5.7 Concrete Grade	M35 – Superstructure, M25 Substructure and Foundation
5.8 Reinforcement Bars	Fe 500 (TMT Steel),
5.9 Approach Slab	RCC (3.5 m)
Approach Road	Total 776 m (180 m on left bank and 556 m on right bank)
6. Summary of Cost	

6.1 Total Cost of the Bridge	NRs. 62,183,319.81
6.2 Cost per running meter	NRs. 1,776,666.28

Source: Design Report of Bungaad Bridge, 2016

Project Requirements

3.2.1.1 Land Requirement

The construction of Bungaad Bridge and approach road (on either side of the bridge requires about 0.245 ha of land belonging to various land use categories including private land, barren land, RoW of the existing road, stream bank and flood plain.

3.2.1.2 Resource Required for the Construction of the Project

The resources required for the construction of the Bungaad Bridge can be divided into two categories i.e., resources that can be acquired locally and resources that have to be derived.

Sand, gravel, boulders can be acquired locally from the quarry sites mentioned in table 3.2.

Quarry Number	Distance from the bridge (m)	Sand (m^3)	Gravel (m^3)	Boulders (m^3)
Q1	750 m d/s from the bridge location	890	625	129
Q2	496 m d/s from Q1 along Bheri Bridge	70,229	46,819	23,409

(Source: Field Survey, 2016)

Similarly, other materials like cement, rod, cable wire, etc. will be derived from either Surkhet, Nepalgunj or other convenient market.

3.2.1.3 Energy required for Construction

The project area is availed with electricity supplied through national grid. However, power shed is frequent in the area so to meet the energy requirements during blackouts diesel generator will be operated. Bitumen heating will be performed through the use of Kerosene. To meet the energy requirement of worker's camp, LPG and kerosene will be used. Fuel wood consumption for fulfilling the energy requirement will be avoided.

3.2.1.4 Labour Camp and Materials Stockpiling Site

The labor camp can be established at around 100 m u/s of the proposed bridge construction site. Whereas, materials stockpiling can be done nearby the proposed bridge site at 80 m u/s from the proposed bridge location. For these purpose barren land belonging to government property will be utilized.

3.2.1.5 Spoil Disposal Site

Earthen materials shall be excavated for the construction and maintenance of approach road, for the construction of foundation. Substantial amount of spoil can be reused especially as filling materials during approach road construction. The remaining waste will be disposed safely in along the banks of Bungaad stream with appropriate protection.

3.2.1.6 Approach Road and Diversion

The project requires the construction of 115 m approach road including both sides. The construction of approach road is more upgrading than new construction. During the construction of approach road on the right bank of Bungaad, hill slope excavation is essential and this document deals with the physical issues associated with the approach road construction.

At present there is no any crossing structure across the Bunggad and vehicles crosses the river driving through the water way. The existing way will serve as diversion until the construction completes.

3.2.1.7 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 Grader, Pump, Vibrator roller, Roller, Water Bowser, Loader, Boiler, Sprayer, Air compressor, Hand sprayer, Aggregate spreader, Pneumatic Tyre, Mixer, Vibrator/Compactor, Generator, Bitumen distributer, 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).

CHAPTER 4: PROCEDURES ADOPTED WHILE PREPARING THE REPORT

The IEE report was prepared in compliance with the provisions of EPA (Clause 3) and EPR (Rule 5,7,10 and 11 and schedule 1,3 and 5). An efficient and integrated method of IEE preparation was adopted to meet the objectives of IEE study. The study has followed the approaches and procedures set in approved ToR of Bungaad Bridge. In general, the methodologies used for the preparation of IEE study includes desk study, literatures review, field survey/investigations/observations interactions and discussions with the local communities/stakeholders/concerned agencies/project design team, data analysis, application of impact identification methods and expert judgement inter alia. The following sections details out the different methods and approaches adopted during IEE study

Desk Study and Literature Review

Various information and useful data from reliable sources related with the project's IEE study was collected and reviewed. Such sources of information included existing laws, rules, guidelines and manuals, IEE reports of similar projects, revised Environment and Social Management framework (EMSF), Nepal Bridge Development Program: Environment and Social System Assessment (ESSA), projects engineering survey and design of the Bungaad Bridge Project i.a., were reviewed, to determine the nature and scope of activities of the project. Past IEE reports of bridge projects were also reviewed. 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 project influence area. VDC. Preliminary acquaintance with the general environmental setting of the project area was built by reading maps of different types like topographical maps, geological maps. Similarly, project location and geographical boundary of the Zone of Influence (ZoI) was defined and delineated on the topographical map.

Preparation of Checklists and Questionnaire: Based on the desk study and review of past literatures, project specific checklists and questionnaire were prepared to facilitate the data collection regarding physical, biological and socio-economic and cultural environment.

4.1.1 Field Visit

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.

4.1.2 Public Involvement and Information Disclosure

Local people and stakeholders were involved during various phases of study process through activities like public consultations, meetings, interactions, and discussions. These activities were employed to collect information on various environmental factors and local peoples issues and concerns regarding the project.

Public Notice: A 15-day public notice was published in the "*Rajdhani*" national daily newspaper dated 2072-12-18 to inform the concerned stakeholders and general public about the proposed project and requesting concerned and affected parties to provide in written form, their suggestion and comments regarding environmental impacts of the proposed project. The notice was pasted in different places in the project area. The Deeds of Enquiry (Muchulka) of pasting copies of notice was obtained from the relevant stakeholders.

Public Consultations: The IEE team carried out a consultation meeting on 2072-12-24 at Gairi Bazaar near Salli Bazaar of Devasthal VDC. Additionally, several interactions were conducted with the local people and concerned stakeholders during field visits. The consultation and interactions were focused on the environmental sensitivity and concerns in and around the project area, environmental features and their status, likely environmental impacts due to project implementation and possible mitigation measures.

Information Disclosure: Approved IEE reports will be sent to Devasthal VDC and Salyan DDC office desk for stakeholder's references. The copies will be made available in Ministry of Physical Infrastructures and Transport (MoPIT), Road Sector Development Project (RSDP) office, Office of Geo-environmental and Social Unit of Department of Roads, World Bank Nepal office and electronic copy will be made available in RSDP official website for public disclosure.

Table 4.1: Summary of Public Consultation Meetings

Date	Venue	Address	Participant		Issues and suggestion of local people during public consultation
			Male	Female	
2072/12/24 (September 7, 2013)	Local field at Gairi Bazaar at Devasthal-09	Gairi Bazaar	9	3	• Bridge should be made as soon as possible as during rainy season flow in the stream disrupts the smooth movement of the vehicles. • The Gairi Bazaar is vulnerable to flood during rainy season so during bridge construction appropriate flood management measures should be applied. • Appropriate compensation should be provided to the affected private properties. • If possible emphasis shall be provided to employ the local people in bridge construction activities.

(Source: Field survey, 2016)

4.1.3 Project Area Delineation

Based on the environmental impacts likely to be resulting from the implementation of the project, the project-impact areas are classified as in Table 4-2.

Table 4.2: Impact Area Delineation of the Project

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

4.1.4 Data Collection methods and Analysis

This section deals with the specific method of data collection and analysis for different environmental domains as physical, biological and socio-economic and cultural environment to establish a preliminary baseline on various components of these environmental domains. The following table describes the specific methodology used for collection of information on specific environmental component. Regarding the analysis technique, mainly descriptive analysis technique was used. Nonetheless, simple quantitative analysis techniques (e.g. percentage and average) were used for some environmental components.

Table 4.3: 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.

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

Data Requirement	Methods/ Tools
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.

4.1.5 Impact 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.

4.1.6 Report Preparation

Based on the processed data and information, a draft IEE report has been prepared with specific baseline information and alternative analysis. All identified and predicted likely environmental impacts have been included and analyzed in the draft report, which also contain environmental management plan (EMP). EMP has focused on realistic mitigation measures, environmental monitoring including implementation responsibilities/monitoring agencies, staffing, budget and co-ordination aspects.

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

Relevant legal measures including the constitution, acts and regulations, policies and plans, manuals and guidelines, standards and conventions relevant to the proposed project implementation has been reviewed during IEE study. Relevant legal measures reviewed are listed in the following sections. Constitution

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

Acts and Regulations

5.1.1 Environment Protection Act, 2053 BS (1997 AD)

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

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

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

5.1.2 Environment Protection Rules, 2054 BS (1997 AD)

The EPR adopts the environmental assessment criteria mentioned in the National EIA Guidelines. Major highlights of the Rule are;

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

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

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

standards shall rest with the person or institution that has generated the solid waste. Section 5(2) mentioned that, it is the duty of every person, institution or entity to reduce the quantum of the solid waste by making arrangements to dispose the disposable (biodegradable/Organic) solid waste within their own area or making arrangement for the reuse thereof and discharging the remaining solid waste thereafter. Chapter 9 section 38 assumes offences inter alia, if any person discharge solid waste in ways other than the time and place prescribed by the Local Body, to park any kind of transportation vehicle in the road or any public place during the time prescribed by the Local Body for carrying out cleaning or collection of solid waste or during the cleaning time, or to refuse to remove the vehicle from such place; to keep, throw, stack or discharge any kind of hazardous waste on the road or in any public place causing adverse effects to public health except in places prescribed by the Local Body.

5.1.4 Solid Waste Management Rules 2070 (2013 AD)

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

5.1.5 Labour 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 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.

5.1.6 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.

5.1.7 Public Road Act, 2031 (1974)

Section19 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.

5.1.8 Forest Act, 2049 (1993)

The forest Act, 1993 recognizes the importance of forests in maintaining a healthy environment. The act requires decision makers to take into account of all forest values, including environmental services and biodiversity, not just the production of timber and other forest commodities. The basis of the act's approach to forest and forest products is 'resource oriented' rather than 'use oriented'. Section 23 empowers the government to delineate any part of the national forest that has a special environmental, scientific or cultural importance as a protected forest. Section 49 of the act prohibits reclaiming lands, setting fires, grazing, removing or damaging forest products, felling trees or plants, wildlife hunting and extracting boulders, sand and soil from the National forest without the prior approval. The act opens avenues to carry out IEE of the development proposal if they are to implemented in the forest areas and/or pass through the forest areas. Section 68(1) of the Act empowers the government to permit the use of any part of Government managed forest, community forest,

leasehold forest, if there is no alternative except to use the forest area for the implementation of a project of national priority without significantly affecting the environment.

5.1.9 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.

5.1.10 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).

5.1.11 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.

5.1.12 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.

5.1.13 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.

5.1.14 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, child having not attained the age of 14 years is strictly prohibited to be engaged in 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 form the father, mother or guardian of the child.

Policies and Plans

5.1.15 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.

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

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

5.1.17 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.

5.1.18 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.

5.1.19 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 neighbouring 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.

5.1.20 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.

5.1.21 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 Bungaad 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 mitigation 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.

5.1.22 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.

5.1.23 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.

5.1.24 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.

5.1.25 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.

Manuals/Guidelines/ Directives

5.1.26 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.

5.1.27 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.

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

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

5.1.29 Environmental Management Guidelines, GESU/DOR, 1999

Environmental Management Guidelines, GESU/DoR, July, 1999 was prepared - as part of the program undertaken by GON and the World Bank under the Road Maintenance and Rehabilitation Project. The guideline was prepared to help in operational practices for all road maintenance, rehabilitation and construction activities under DOR. The Guideline outlines environmental mitigation measures to be incorporated into DOR projects, procedure for public participation, and socio-economic considerations. The guideline proposed

environmental safeguard measures into twelve issues including (i) Quarries; (ii) Borrow Pits; (iii) Spoil and Construction Waste Disposal; (iv) Work Camp Location and Operation; (v) Labour Camp Location and Operation; (vi) Earthwork/Slope Stabilization; (vii) Use of Bitumen; (viii) Stockpiling of Materials; (ix) Explosive, Combustible and Toxic Materials Management; (x) Setting Up and Operation of Stone Crushing Plants; (xi) Water Management; (xii) Air & Noise Pollution. This guideline also outlines implementation methods for undertaking mitigation measures for activities related to these issues.

5.1.30 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.

5.1.31 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.

Standards

5.1.32 Nepal Bridge Standard 2067 BS

Department of Roads (DOR) has formulated the bridge standards with a view to establish a common procedure for design and construction of road bridges in Nepal. Bridge standards has classified bridges as follows;

Culvert: Length up to 6 m

Minor Bridge: When length ≤ 50 m (with span ≤ 25 m)

Major Bridge: When span >25 m or length >50 m (with smaller spans)

Special Bridge: Bridges that require special design considerations, whose construction features (e.g. concrete girder bridges with >50m span, steel trusses > 100m span, arch bridges, suspension bridges, cable-stayed bridges and other nonstandard bridges)

As per EPR, 1997 the bridge that falls under major bridge category should undergo IEE study before implementation.

5.1.33 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

(Source: MoPE, 2012)

Maximum threshold limit of noise for several machineries

Instrument	Maximum threshold limit (dB)
Water pump	65
Diesel generator	90
Loudspeaker, other entertainment instrument	70

(Source: MoPE, 2012)

5.1.34 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 *(Source: MoPE, 2012)*

Parameters	Units	Averaging Time	Concentration in Ambient Air, maximum
TSP (Total Suspended Particulates)	µg/m^3	Annual	-
		24-hours*	230
PM_{10}	µg/m^3	Annual	-
		24-hours*	120
Sulphur Dioxide	µg/m^3	Annual**	50

Parameters	Units	Averaging Time	Concentration in Ambient Air, maximum
		24-hours*	70
Nitrogen Dioxide	µg/m^3	Annual	40
		24-hours*	80
Carbon Monoxide	µg/m^3	8 hours*	10,000
Lead	µg/m^3	Annual**	0.5
Benzene	µg/m^3	Annual**	5
PM2.5	µg/m^3	8-hours*	40
Ozone	µg/m^3	8-hours*	157

5.1.35 Nepal Road Standard 2070 BS

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

5.1.36 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.

5.1.37 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 newe 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.

5.1.38 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.

International Conventions and Treaties

5.1.39 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

This chapter provides the information regarding the existing environmental setting of the project area in terms of physical, biological, socio-economic and cultural domains of the project area. The existing environmental condition of the project area was important in determining and analysing the likely environmental impacts resulting from the project implementation.

6.1 Physical and Cultural Environment

6.1.1 Physiography and Topography

The land around the bridge has gentle slopes with stable features on both banks. The river valley is having gentle slopes nearby the project area. The elevation at the proposed bridge location is 551 amsl. The Right bank is steeper than left bank. The proposed bridge location is located at 0.7 km u/s of Bungaad and Bheri river confluence. The gradient of stream around the proposed bridge site is less than 5%.

6.1.2 Geology

The bridge site is geologically located in the Midland Group, Western Nepal Himalaya. The Midland Group is geologically subdivided into the Ranimatta Formation and Naudanda Quartzite. The proposed bridge site is located in the rocks of the Ranimatta Formation. The Ranimatta Formation is comprised of quartzite and phyllite. Major geological structures like faults and the thrust (MBT) can find not around the location of the bridge.

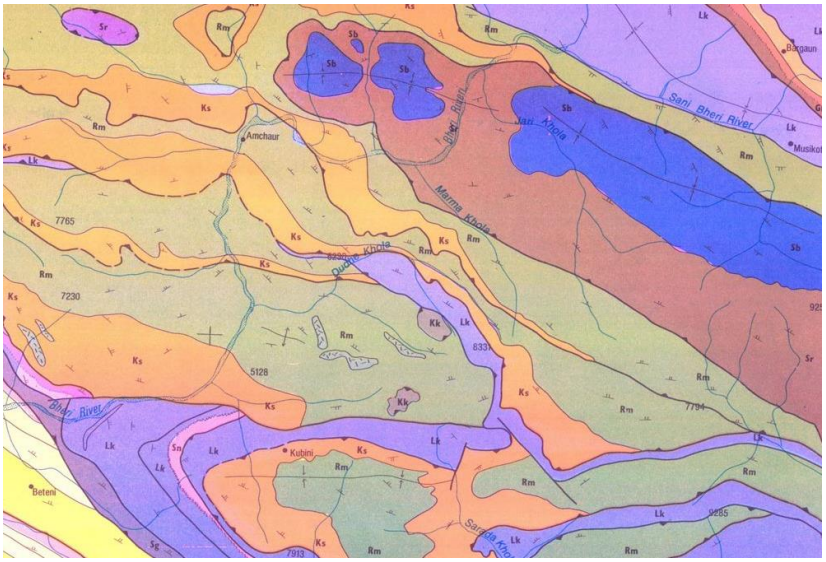

Figure 6-1: Regional Geology of the Project Area (Source: Department of Mines and Geology)

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 both banks. The wedges formed by the intersection of the joints and foliation plane seem to be unstable and other wedges are very stable so the project area is found to be relatively stable. Nature of the soil along the banks shows there is required of protection walls on both banks.

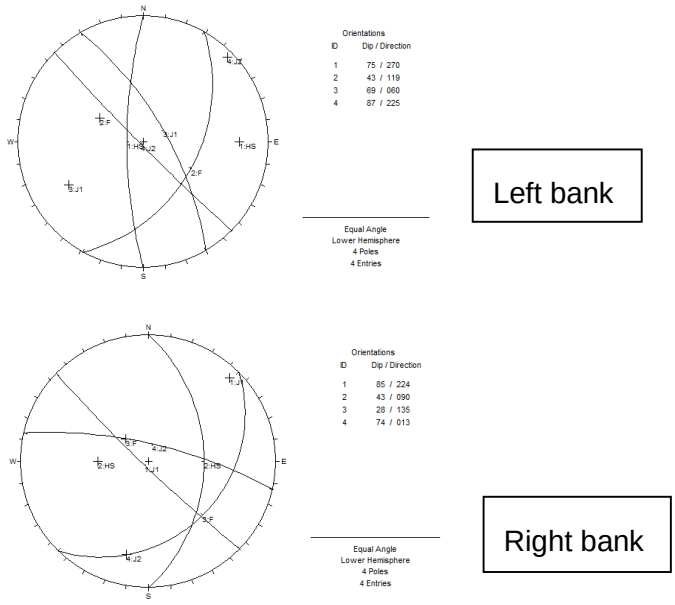

Figure 6-2: Stereographic Projection of Proposed Bridge Site Area

6.1.4 Soil Types

The surface soil of the bridge area consists of mainly alluvial soil deposits at riverbed and soil found in the river terraces. The alluvial deposits are mainly found in the riverbeds of the Bungaad. The thicknesses of alluvial deposits are more than 5 m. The alluvial deposits are composed of boulders, cobbles, pebble and sands. Boulder, cobbles and pebbles are mainly phyllite and quartzite from the Lesser Himalaya (0.5 to 1 m in diameter). The nature of the surface soil is characterised by lack of calcareous cementing material so the surface soils are loose in nature.

6.1.5 Land use

Both banks of Khola are dominated with settlements and agricultural land. The other lands in the nearby of the bridges are barren land, river flood plain with sand and water body and roads. Market of Salli Bazar and Devasthal are the major settlements nearby the project vicinity. The land use map of the project area is given in Figure 6-3.

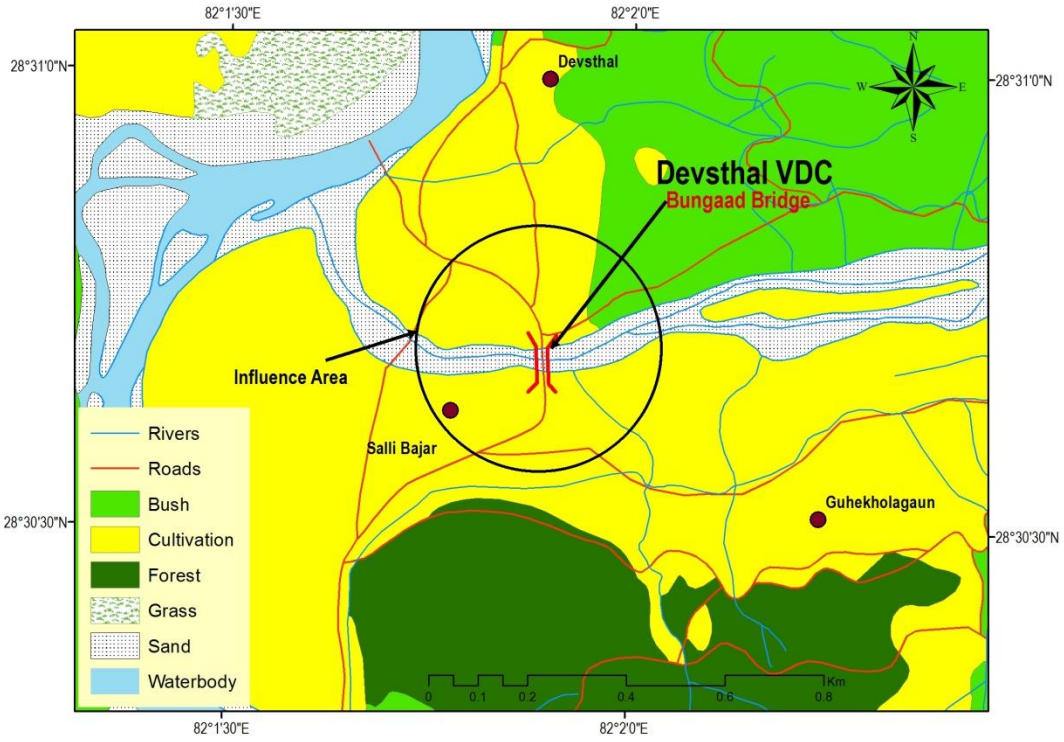

Figure 6-3: Land Use Map of the Project Area

6.1.6 Climate

Tropical climate is found around the proposed project site. Average temperature during winter ranges between 3^0c to 14^0c whereas during summer the temperature ranges between 14^0c to 36^0c. Average annual precipitation around the project area recorded at Salyan Station is about 1110 mm. (*Source: District Profile Salyan, 2070*)

6.1.7 Hydrology

Bungaad is ephemeral with large seasonal variability in its discharge. It is one of the tributaries of Bheri River and make confluence at almost 1.5 km d/s from the proposed bridge location. The catchment is oval shaped having steep slope and small drainage network. The catchment area of Bungaad upto the proposed bridge location is 131.6 km^2.The head water begins from an elevation of 2450 m and the bridge site is located at 577 m altitude. The main channel length delineated from Topo map is 22.62 km. The average slope of main channel is 0.0347.

The bridge site has low stream bed gradient which is why during monsoon, the adjoining areas are prone to flooding. The left bank of the Bungaad is highly vulnerable to flooding during monsoon season. Maximum discharge of Bungaad has been estimated to be 444 m^3/s (100 years' design flood) and minimum discharge is 0 m^3/s. (Source: Draft Design Report of Bungaad, 2015)

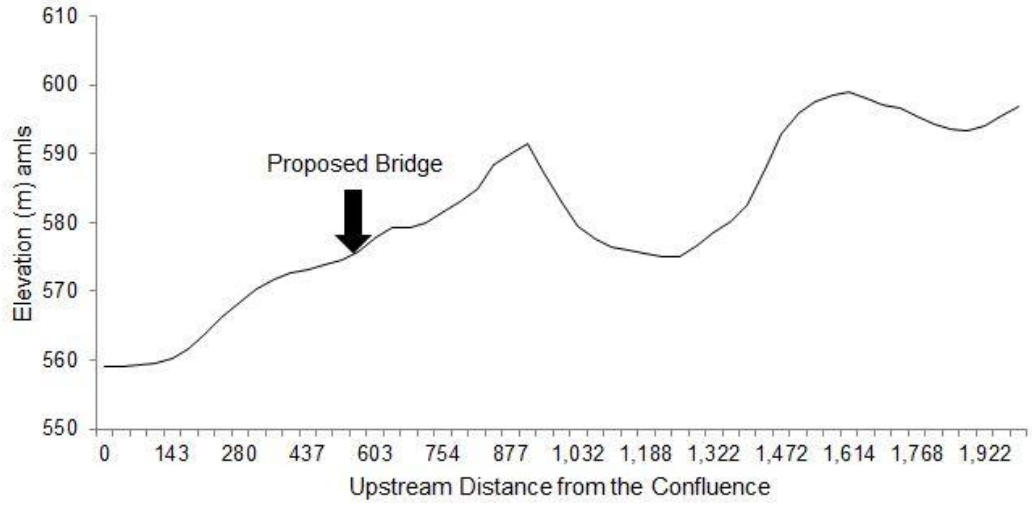

Figure 6-4: Stream Bed Profile of Bungaad around Proposed Bridge

6.1.8 Seismicity

The proposed area located far from remarkable thrust i.e., MBT and MCT. So, the activity of the fault movement is considered minimal. 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.

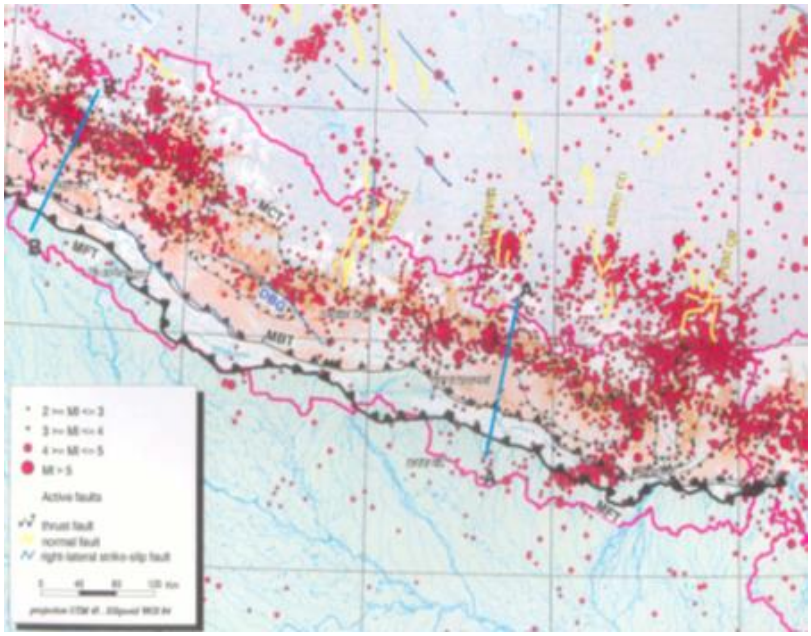

Figure 6-5: Epicentre of Earthquakes in the Nepal Himalaya

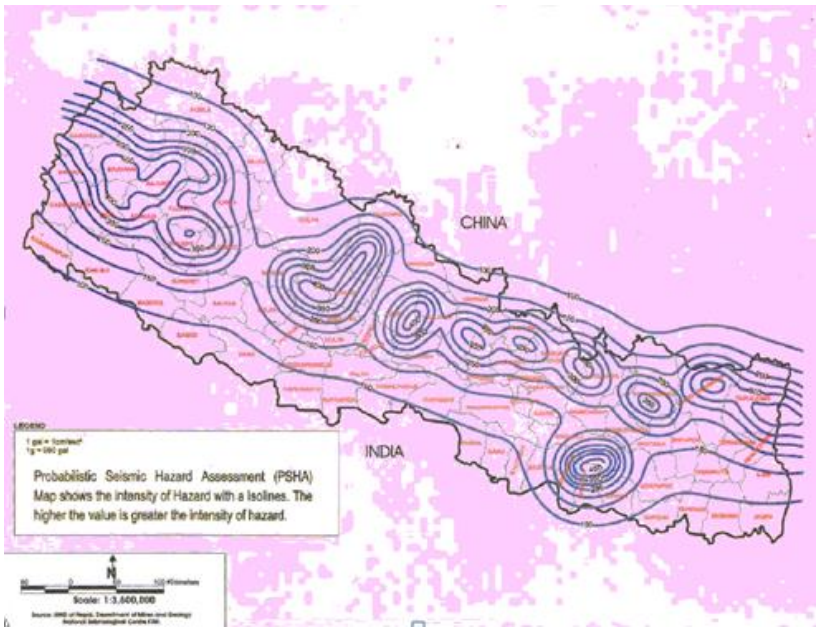

Figure 6-6: Seismic Hazard Map of Nepal

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).

6.1.9 Air Quality

There are no major sources of air pollution around the vicinity of the project area. Movement of vehicles, some cottage industries of Salli Bazaar, rice mills and motor workshops operated in Salli Bazaar, quality of road stretch from proposed road to reach the existing suspension bridge and newly constructed bridge at Bheri River, and crusher plant being operated on the right bank of Bheri River almost 3 km away from the proposed bridges are the major sources of air pollution around the proposed bridge location. Dust (Particulate matter) and vehicular exhaust are the major air pollutant of the area. However ambient air quality of area is found to be within the National Ambient Air Quality Standards.

6.1.10 Water Quality

Water quality of the sources around the proposed bridge location is generally fair. Bungaad (Stream) remains dry during some part of the year. Agricultural runoff, washing and bathing activities in Bungaad, soil erosion, wastes released from the market generally degrade the quality of water in Bungaad. Suspended particulates and organic waste are the major water pollutant released from or nearby the project area.

6.1.11 Noise Quality

The noise level of the project area is generally found to be within the permissible limit. Business activities in Salli Bazaar and vehicular movement are the major noise emitting sources around the project area.

6.1.12 Public Structures

A small bridge that is being used for crossing bikes, motor bikes and people, irrigation canal and electricity poles are the public structures found around the project area. However, different public infra-structures including Krishna Mandir of Devasthal, Health centre, police post, schools are major public structures found around the DIZ of the proposed project.

Figure 6-7: Bridge within Direct Impact area (30 m u/s from the proposed bridge location) of the Proposed Bridge

6.2 Biological Environment

6.2.1 Floral Diversity

The project area mainly consists of sub-tropical vegetation. The project area does not lie in the forest area. There are no tree species within the immediate vicinity of the bridge construction site, however, scattered tree species within DIZ (within 500 m radius of the project site) includes Bakenu (*Melia azederach*), Simal (*Bombax ceiba*), Bel, Mango (*Magnifera indica*), Kimbu (*Morus sp*.) trees are found around the project area. Shrubs and herbs found around the proposed bridge area includes Kera (*Musa paradisiaca),* Bayar (*Zyziphus mauritiana*), Sisno *(Urtica dioeca),* Ajambari *(Kalanchoe pinnata),* Besharam *(Ipomea carnea*), Dubo (*Cynodon dactylon*), Kuro (*Bidens pilosa*), Kans (*Saccharum spontaneum*), Gandhe (*Ageratum conyzoides*) The construction of bridge and approach road will not affect any of the large tree species, however, some river side bushes need to be removed.

6.2.2 Forest Management

There is no any strip of forest around the project's direct impact area. However, government managed forest and community forest are found in the project influence area, i.e., in Devasthal VDC. Mayur Pankhi Community Forest (C.F), Hariyali Brikshya C.F and Shrikrishna C.F are being managed by community in the project VDC.

6.2.3 Horitcultural Crops

Mango (*Magnifera indica*), Nibuwa (*Citrus limonum*), Aaru (*Prunus persica*), Kagati (*Citrus aurantifolia*), Banana (*Musa paradisia*), Gauva (*Psidium guajaya*), Katahar (*Artocarpus heterophyllus*), etc. and fodder trees like Bhimal (*Grewia optiva*), Kutmero (*Litsea monopetala*), Ipil Ipil (*Leucaena leucocephala*), etc. are observed in the DIZ of the proposed project. Besides, people grow numerous other crops, vegetables, pulses and fruits for household utilization or selling in the market and those form quite a long list.

6.2.4 Faunal Diversity

Mammals:

The project area lies nearby the settlement and Bazaar area, the area is not significant habitat of wildlife species however, few occasional wildlife species was reported by locals to be found around the project area includes: Jackel (*Canis aureus*), Rhesus Macaque (*Maccaca mulata*), Grey Mongoose (*Herspestes edwardsi)* etc.

Birds:

Birds reported to be found around the project area includes, Bhangera (*Passer domesticus*), Parewa (*Columba palumbus*), Teetra (*Francolinus fracolinus),* Kalo Chil *(Milvus migrans),* Khairo Giddha *(Gyps fulvus),* Theuwa *(coracias benghalensis), Bakulla (Egretta garzetta) etc.*

Herpetofauna:

The common herpeto-fauna reported in the project area were Common Rat Snake (*Ptyas mucosus)*, Mountain Keel back *(Amphiesma platyceps)*, White Lipped Pit Viper *(Trimeresurus albolabris),* Common Garden Lizard *(Calotes versicolor), Hemidactylus spp* (House Gecko), Asian Toad *(Bufo melanonostictus)*, Paha (*Paa minica), Syhadra frog (Limnonectes syhadrensis*) are the common herpeto fauna reported to found around the project area.

Fishes:

Bungaad is not productive in terms of fish production as it is an ephemeral river. However, during flowing condition some fishes were reported to be found in the stream. The mainly observed fish species includes Buduna (*Garra annandalei)*, *Acrossocheilus hexajgonolepis* (Katle), *Barilies scharca* (Fageta). The people in the area rarely conduct fishing in Bungaad, fishing in Bheri which is about 600 m. d/s from the project implementation site is frequently observed.

6.2.5 Rare, Threatened and Protected Species of Flora and Fauna

There is no strip of forest within 500 m (DIZ of the proposed project) of the project However, none of the rare, threatened and protected species of flora and fauna will be affected by the project implementation. The list of plants and animals under GoN protection category, IUCN red list category and CITES Appendices are listed in Table 6-1.

Table 6.1: List of Flora and Fauna of Protection and Conservation Significance

S.N	Local Name	Scientific Name	Categories		
			GoN	IUCN	CITES
Fauna					
5	Jackal (Syal)	*Canis aureus*		LC	
Herpetofauna					
1	Dhaman	*Ptyas mucosus*			II

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 Environment

6.3.1 Project influence Area

The project is being implemented in ward no. 9 of Devasthal VDC. The project influence area has been considered as the Project Implementation VDC.

6.3.1.1 Demographic Characteristics

The total population of the project affected VDC i.e., Devsthal VDC is 4785 residing in 1002 households with household size 4.78. The female population is higher than the male population constituting sex ration 88%.

Table 6.2: Demographic characteristics of the project influence area.

VDC	Households	Population			Household Size	Sex Ratio
		Total	Male	Female		
Devsthal	1,002	4,785	2,235	2,550	4.78	88

Source: CBS, 2011

6.3.1.2 Ethnic Composition

Chhetree (57.4%) is the dominant caste/ethnic group followed by Kami, Magar, Bramhan Hill, Thakuri. Kami comprises 15.2% followed by Magar that constitute 9.8% of the total population.

Table 6.3: Ethnic composition of the Project Influence Area

Ethnic composition	Number	Percentage
Chhetree	2726	57.4
Bramhan-hill	214	4.5
Magar	464	9.8
Tharu	15	0.3
Newar	32	0.7
Musalman	50	1.1
Kami	723	15.2
Damai/Dholi	224	4.7
Thakuri	171	3.6
Sarki	31	0.7
Majhi	30	0.6
Badi	38	0.8
Others	35	0.7
Total	4753	100

Source: CBS, 2011

6.3.1.3 Literacy Rate

The literacy rate of the project VDC is 64.27% where male literacy rate is 76.52% and female literacy is 53.72%. The literacy rate of the project affected VDC is given in Table 6-3.

Table 6.4: Literacy Rate of Project VDC

VDC	Population Above 5 Years	Population Who Are			Literacy Not Stated	Literacy Rate
		Can Read and Write	Can Read Only	Cannot Read and Write		
Both Sex	4,220	2,712	105	1,398	5	64.27
Male	1,946	1,489	46	409	2	76.52
Female	2,274	1,223	59	989	3	53.78

Source: CBS, 2011

6.3.1.4 Sanitation and Drinking Water Facilities

The sanitation status of project affected VDC is poor which can be reflected with the figure that only 30% of the household have the toilet facility. Out of the total households having toilet facility 23.5% have the flush toilet whereas 6.4% have the ordinary toilet.

Table 6.5: Availability of Toilet Facility in Project VDC

VDC	Total Households	Households without toilet facility	Households with toilet facility of		Not Stated
			Flush Toilet	Ordinary Toilet	
Devsthal	1,002	701	235	64	2
Percentage		70	23.5	6.4	0.2

Source: CBS, 2011

Main source of drinking water in the project VDC is tap water which accounts 66.6% of the total households in the area. Second main source is river/stream and its percentage accounts 21.4 followed by spout water. Households using well for drinking purpose is very low in number.

Table 6.6: Main Source of Drinking Water in Project VDC

VDC	Household	Main Source of Drinking Water					
		Tap/ Piped Water	Tube well/ Hand pump	Uncovered Well/ Kuwa	Spout Water	Rivers/ Stream	Not Stated
Devsthal	1,002	667	1	4	114	214	2
Percentage		66.6	0.1	0.4	11.4	21.4	0.2

Source: CBS, 2011

6.3.1.5 Housing Pattern

Scattered settlements is the characteristics of the project VDC except in few market areas like Salli Bazaar, Devasthal etc. Most of the houses in project affected VDCs are made up of mud bonded brick stone on outer wall which accounts for 91.4% of the total houses in the area. Roof of the most house are made up of mud accounting 38.9% followed by galvanized iron accounting 32.6%. Other roofing materials used in the houses of the area includes tile/slate, thatch straw, RCC, wood planks. The details of households using materials for roof and wall is given in table 6-7 and 6-8.

Table 6.7: Materials used for outer wall in Houses of Project VDC

VDC	Households	Type of Water Wall					
		Mud bonded brick/ Stone	Cement Bonded/ Brick Stone	Wood Planks	Bamboo	Other	Not Stated
Devsthal	1,002	916	75	7	1	2	1
Percentage		91.4	7.5	0.7	0.1	0.2	0.1

Source: CBS, 2011

Table 6.8: Materials used for Roofs in Project VDC

VDC	Total	Roof of the House							
		Thatch Straw	Galvanized Iron	Tile/ Slate	RCC	Wood Plank	Mud	Other	Not Stated
Devsthal	1,002	69	317	151	63	8	390	1	3
Percentage		6.9	31.6	15.1	6.3	0.8	38.9	0.1	0.3

Source: CBS, 2011

6.3.1.6 Household by Ownership

Most of the houses in project VDC is owned which accounts for 79.1% and significant numbers are rented accounting 20.1%. The ownership of housing unit in project VDC is given in following table.

Table 6.9: Ownership of Housing Unit in Project VDC.

VDC	Total	Ownership of Housing Unit			
		Owned	Rented	Institutional	Others
Devsthal	1,002	793	201	3	5
Percentage		79.1	20.1	0.3	0.5

Source: CBS, 2011

6.3.1.7 Energy Use

Firewood is the major source of energy for cooking where more than 90% of the households are using this source. Households using LPG accounts for only 7.2%. Other alternative source of energy for cooking includes dung cake, kerosene and biogas. The source of energy used for cooking in the project affected VDC is given in following table.

Table 6.10: Energy Used for Cooking in Project VDC

VDC	Household	Fuel Usually Used for Cooking						
		Wood/ Fire wood	Kerosene	LPG	Dung Cake	Bio gas	Others	Not stated
Devsthal	1,002	904	5	72	6	2	11	2
Percentage		90.2	0.5	7.2	0.6	0.2	1.1	0.2

Source: CBS, 2011

6.3.2 Direct Impact Zone (DIZ)

The Direct Impact Zone has been delineated as project implementation site, the adjacent land plots, built up structures, houses and property within 500 m from the project site. Bungaad lies in nearby Salli Bazaar which is one of the major market centre of Salyan District. The Direct impact area includes Gairi Bazaar, and most part of Salli Bazaar and Devasthal. There are about 260 households in DIZ of the proposed project. Altogether 21 (8% of the estimated total households within DIZ) households were surveyed to understand the socio-economic status of the DIZ of the proposed project.

6.3.2.1 Demographic Condition

The total population of the surveyed households was 103 where male and female population was 48 and 53 respectively, constituting sex ratio 87.2. The household size of was found to be 4.9 (*Source: Households Sample Survey, 2016*).

6.3.2.2 Ethnic Composition

Sampled households revealed that, Chhetree (31.1%) is the dominant ethnic group in the DIZ of the proposed project, followed by Thakuri (22.3%), Dalits (21.1%), Bramhan-hill (12.6%), Magar (9.7%) and Muslim (2.9%). The Ethnic composition of the project area is given in following table.

Table 6.11: Ethnic composition in DIZ of Project

Ethnic composition	Population	Percentage
Chhetree	32	31.1
Thakuri	23	22.3
Dalits	22	21.4
Bramhan-Hill	13	12.6
Magar	10	9.7
Muslim	3	2.9
Percentage	103	100.0

Source: Households Sample Survey, 2016

6.3.2.3 Religious Composition

The majority of the people in the DIZ of the proposed project are Hindu which accounts 97.1% of the total population, whereas the Muslim population constitutes 2.9%. (*Source: Household survey, 2016*).

6.3.2.4 Age Distribution

The percentage of economically active population (age group between 15-60 years) in DIZ is 53.4%. The percentage of children accounts for 38.8% and the percentage of senior citizen accounts for 7.8% in DIZ of proposed project.

Table 6.12: Age Distribution within DIZ of the Project

Age Distribution	Population	Percent
Below 5 Years	9	8.7
6-14 Years	31	30.1
15-60 Years	55	53.4
Above 60 Years	8	7.8
Total	103	100.0

Source: Households Sample Survey, 2016

6.3.2.5 Education and Literacy Status

The literacy status of the DIZ of the proposed project area is found to be good enough as 88.3% of the sampled population were literate.

Table 6.13: Literacy Status of DIZ of the proposed project

literacy	Population	Percent
Literate	83	88.3
Illeterate	11	11.7

Source: Household Sample Survey, 2016

Among the literate population, most have attained primary level education. Less than 10% of the surveyed population has attained education level more than Bachelor Degree. The educational attainment of the surveyed DIZ population is given in following Table.

Table 6.14: Educational Attainment of People of DIZ of Proposed Project

Education Attainment	Population	Percent
Primary	32	38.6
Lower Secondary	19	22.9
Secondary	15	18.1
Higher Secondary	9	10.8
Bachelor	5	6.0
Master's above	3	3.6
Total	83	100

Source: Households Sample Survey, 2016

6.3.2.6 Energy Use

Most of the household of the DIZ depend on fuel wood as a main source of cooking energy. Among the surveyed households, 66.6% of the households use fuel wood as main source of cooking energy and remaining 33.4% of the households use LPG as the main source of cooking energy. Electricity is the main source of lighting energy in all of the surveyed households. (*Source: Household Sample Survey, 2016*).

6.3.2.7 Occupation

The majority of the sampled population of DIZ are involved in agricultural activities (32.7%), followed by student (29.1 %). Other occupational activities followed by the people of DIZ includes business, wage labor, foreign employment, services etc. The occupational status of the DIZ of the project area is given in following table.

Table 6.15: Occupational Status of the People of DIZ of Proposed Project

Occupation	Population	Percent
Agriculture	18	32.7
Business	7	12.7
Services	3	5.5
Foreign Employment	4	7.3
Student	16	29.1
Wage Labor	4	7.3
Others	3	5.5
Total	55	100

Source: Household Sample Survey, 2016

6.3.2.8 Migration Pattern

Majority (61.9%) of the sampled households have migrated into the area since more than 25 years. 14.3 % have been residing in the years for more than 2 generations, and the remaining 23.8% of the households have immigrated into the area recently (within 10 years). Temporary outmigration by the people of the area account for 14.5% of total population of the sampled household in the area. Temporary outmigration by the people of the area. (*Source: Household Sample Survey, 2016).*

6.3.2.9 Health and Sanitation

The health condition of the people of the area is generally fair as only 10.7% of the people have suffered different forms of sickness during a past year. Among the sick population most of them have suffered general ailment like common cold with fever (45.5%), Diarrhoea (27.8%), typhoid (18.2%) and 9.1% heart disease.

90.5% of the sampled households have toilet facility in their yard and remaining 9.5% household still practice open defecation. The common place for open defecation is the river bank and nearby open field. (*Source: Household Sample Survey, 2016).*

6.3.2.10 Drinking Water Facility

Major source of drinking facility available in the DIZ of the proposed project is water tap which accounts for 85.7% and remaining 14.3% still use spring source. Among the surveyed households, 13.8% of the household have private water tap and remaining 86.2% use community water tap. The water availability in the area is very poor as the water in the tap is provided for less than 2 hours a day during dry period. (*Source: Household Sample Survey, 2016).*

6.3.2.11 Perception of the People of DIZ about the Project

52.4% of the surveyed population in the area were found to be acquainted about the implementation of the project. People in the area were highly positive towards the project. They believed that construction of project will benefit for the local people in conducting normal daily activities and smooth mobility. The scepticism of the people was on the compensation modality of the affected land and properties. The people of the area think that except few section of the irrigation canal none of the adverse impact will occur on natural and physical resources of the area. The people suggested that the proposed bridge should be constructed as soon as possible putting low pressures on local infrastructures and private properties.

6.3.2.12 Religious, Cultural and Historical Sites

Within direct impact area of the proposed sub-project, Krishna Mandir of Deveastahal is the significant religious and cultural sites. Krishna Mandir is one of the ancient and popular temple of the area. During Krishna Janmastami, the feast (Mela) take place in which large number of people of Salyan and adjoining district participate.

6.3.3 Project Affected Families (PAFs)

6.3.3.1 Demographic Composition

The construction of bridge affects 12 households. Altogether, 60 family members will be affected in which the numbers of female are greater than male. The average family household size is 4.67.

Table 6.16: Demographic condition of PAPs

Name of bridge	Affected HHs	Male	Female	Total	HHs size
Bungaad	12	27	33	60	4.67

Source: Draft RAP of Bungaad Bridge, 2015

6.3.3.2 Ethnic Composition

Of the total housheholds likely to be affected by the project, 6 households belong to Chhetree and Thakuri, 4 households belong to Dalits, 1 Janajati and 1 Sanyasi. The ethnic composition of the PAFs of the proposed project is given in following table.

Table 6.17: Ethnic composition

Ethnic composition	Households	%
Chhetree/Thakuri	6	50.00
Janajati	1	8.33
Dalit	4	33.33
Sanyasi	1	8.33
Total	12	100.00

Source: Draft RAP of Bungaad Bridge, 2015

6.3.3.3 Age Distribution

Among the project affected population, majority (56.67%) are economically active and about 44.33% populations are dependent which indicates that these age group populations are economically inactive and dependent for their livelihood. The age distribution within PAFs households is given in following table.

Table 6.18: Age Distribution of PAFs

Age Distribution	Population	%
Below 5 Years	3	5.00
6-15	19	31.67
16-60	34	56.67
Above 60 Years	4	6.67
Total	60	100.00

Source: Draft RAP of Bungaad Bridge, 2015

6.3.3.4 Education and Literacy Status

The literacy status the population belongs below 5 years' age group was not considered. About 91% are literate. About 18% populations have received informal education and can read and write only. Majority of the affected population, 60% are in Secondary level only one and one persons have to be found up to above Master's Degree.

Table 6.19: Education Status of PAPs

Education	No.	%
Illiterate	5	8.77
Literate	10	17.54
Class 1-5	18	31.58
Class 6-10	17	29.82
SLC	2	3.51
Intermediate	3	5.26
Bachelor	1	1.75
Master's above	1	1.75
Total	57	100.0

Source: Draft RAP of Bungaad Bridge, 2015

6.3.3.5 Occupation of Affected HHs

The affected households are engaged in different occupation. Majority of them are school going students. Of the total affected households about 26.58 percentages are engaged in business operating nearby bridge location. The table below shows the occupational division of affected households.

Table 6.20: Occupation of PAPs

Occupation	No.	%
Agriculture Own Land	8	17.39
Adhiya Agriculture	2	4.35
Govt. Services	2	4.35
Private Services	3	6.52
Business	12	26.09
Animal Farming	3	6.52
Student	7	15.22
Nothing	4	8.70
Foreign Employment	5	10.87
Unemployed	0	0.00
Total	**46**	**100.0**

Source: Draft RAP of Bungaad Bridge, 2015

6.3.3.6 Sources of income

The households were asked the major sources of income of the affected households. They depend in multiple source of income. Among them, business, foreign employment and sales of livestock is the main source of income.

Table 6.21: Major Sources of Income of PAPs

Major source of Income	Households	%
Wages (Local)	0	0.00
Wages (Out)	2	16.67
Sale of House and Livestock	1	8.33
Loan		
Services	4	33.33
Business	4	33.33
Foreign Employment	1	8.33
Others	2	16.67
Total	**12**	**100.00**

Source: Draft RAP of Bungaad Bridge, 2015

6.3.3.7 Food Sufficiency Level

The project affected households 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 affected households no any households have food sufficient for whole year. The table below shows food sufficiency level among affected households.

Table 6.22: Food Sufficiency Level of PAPs

Food Sufficiency Level	HHS	%
Below 3 Months	5	41.67
3-6 Months	2	16.67
6-9 Months	2	16.67
9-12 Months	0	0.00
Total	**12**	**100.0**

Source: Draft RAP of Bungaad Bridge, 2015

6.3.3.8 Measures to Meet Food Deficit

The survey reports that none of the affected households have food sufficient for whole year. While asking them about the ways to meet food requirements they reported that services business and wage labours are secondary sources of income which supplement income for food grain.

6.3.3.9 Level of Income

Agriculture is the major sources of income among the affected HHs. The range of income shows that gradually increase from 50,000- 150000 per year. Most of all of the affected households earn NRs 50,000 to 150,000 per year. The table below shows the income level of affected households.

Table 6.23: Level of Income of PAPs

Income Range	Households	Percentage
Below 50,000	1	8.33
50,000-100,000	2	16.33
100,001-150,000	5	41.66
151,000-200,000	4	33.33
200,001-300,000	0	0.00
Above 300000		
Total	12	100.00

Source: Draft RAP of Bungaad Bridge, 2015

6.3.3.10 Level of Expenditure

There seems similarity between income and expenditure of affected households. Among the affected household, expenses are in 50,001 to 100,000 per year. The table below shows the expenditure pattern of affected households.

Table 6.24: Expenditure Items of PAPs

Expenditure Level	Households	Percentage
Below 50,000		
50,000-100,000	3	25.00
100,001-150,000	3	25.00
151,000-200,000	5	41.66
200,001-300,000	1	8.33
Above 300000	0	0.00
Total	12	100.0

Source: Draft RAP of Bungaad Bridge, 2015

6.3.3.11 Health and Sanitation

Mostly members of PAFs visit Surkhet and Nepalgunj for better treatment but minor cases are treated in village based service centers. Healthpost located in Devasthal is the nearest health facility received by the affected households.

6.3.3.12 Source of Water

The water source is local springs. Out of the total affected HHs 83 percent households used a community tap and remaining others used a different sources of spring. They have community taped and spring water from source to their yard.

6.3.3.13 Toilet Facility and Defecation Practice

Open defecation practice is highly prevailed in bridge construction site. But 75% of the affected households 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.

6.3.3.14 Gender Situation

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

CHAPTER 7: ASSESSMENT OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Several impacts are identified, predicted and evaluated considering the project activities on the existing condition on physical, chemical, biological and socio-economic environment condition of the project area. The impacts are both beneficial as well as adverse. The impacts are analysed with quantified information of changes, alternation and losses based on the characteristics of existing condition and sensitivity of environmental aspects. This chapter also includes the mitigation measures proposed for the identified and predicted impact. Mitigation measures are either preventive, corrective, compensatory or benefit augmentation measures. The possible beneficial and adverse impacts from the project during its construction and operation stage are discussed below:

Beneficial Impacts

Construction Stage

- **Employment Generation**

An estimated 3200 man-days unskilled and 660 man-days skilled manpower are required for the construction of the project. The workforce will be utilized on contract or daily basis for the period of about 18 months based on the project requirement. *This impact will be of medium magnitude, local in scale and short term in duration.*

Augmentation Measures: 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 given 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 knowledge.

Enhancement of Technical skills

The project will provide the skills and technical know-how especially on masonry and associated works during construction of the project. The workforce will have opportunity to gain skills in construction techniques, small engineering structures and bioengineering works and river training works. The knowledge and skills gained by the unskilled workers could apply on other projects of similar nature. *This impact will be of medium magnitude, local in scale and long term in duration.*

Augmentation Measures:

Capacity building trainings will be provided to both skilled and unskilled workforces. Regular training and guidance to the employee will be provided during the project construction period. As local people are also used in construction activities they will be directly benefited to gain skills in construction technologies.

- **Enhancement of Local Economy**

Several numbers of construction crew will come into the project area during project construction. In order to meet the increased consumptive demands of local goods and services, the number of groceries, shops, restaurants, and hotels will be increased and agricultural production including diary and other forms of production in and around the project area is likely to be increased. Increase in local market will increase the income level of the local people. *The envisaged impact will be of low in magnitude, local in extent and long term in duration.*

Augmentation Measures: Priority will be given to the local product and services required for construction activities without putting pressures on local demands.

- **Increase in Awareness**

The project will organize environmental awareness program to aware the local people. The awareness program will mainly highlight the following issues:

- ✓ Discuss the demerits of solid waste and sewage disposal around the bridge abutments and how they cause corrosion over metal and cement surface.
- ✓ Solid waste management technique at household level
- ✓ Discuss the demerits of extracting construction materials within the 500m u/s and d/s of bridge.
- ✓ Training related to the conservation of forest and biodiversity.
- ✓ Other relevant environmental issues related to sub-project.

The envisaged impact will be of medium in magnitude, local in extent and long term in duration.

Mitigation Measures: A three-day awareness raising program will be conducted by the project. The participant will be mainly from the local people belonging to PAFs and the people of DIZ area. For this a notice seeking participant will be pasted 2 weeks before the program in different places within DIZ of the proposed project.

Operation Stage

- **Improved Mobility**

Vehicles Crossings through Bungaad stream during monsoon period is very difficult due to lack of bridge over it. The construction of new bridge over Bungaad stream will ensure all weather mobility within this section of CJ road. *The envisaged impact will be of high magnitude, regional in extent and long term in duration.*

Augmentation Measures: During the operation of the bridge, regular and routine, emergency and if required major maintenance will be conducted.

- **Saves Time and Money**

Along the CJ road, there are several river and stream crossing which are not facilitated with Bridge, one of them is over Bungaad Bridge near Salli Bazaar of Salyan District. People

moving to and back from Jajarkot, various places of eastern Surkhet, Dolpa, and Rukum have to change the vehicles during monsoon period, which is putting unnecessary burden of time and money to the people of the area. Construction of bridge over Bungaad bridge will eliminate the extra burden of time and money of the people around the area. *The impact will be moderate magnitude, regional in extent and long term in duration.*

Augmentation Measures: No separate augmentation measures for this impact has been proposed.

- **Reduced Traffic Congestion**

During monsoon period, the stagnation of vehicles on both bank of the stream often happens, which is creating traffic queues. After the construction of bridge this problem will be largely reduced as smooth crossing of vehicles will be ensured. Similarly, standard double lane carriageway width and footpath will ensure the road safety for both pedestrian and passengers. *The impact will be of medium magnitude, local in extent and long term in duration.*

Augmentation Measures: Traffic signs and signals indicating "No parking" will be placed on around the bridge sites. The project will provide the solar lighting system in the bridge axis and around the approach road.

Adverse Impacts

7.2.1 Physical Environment

Construction Stage

- **Change in morphology, longitudinal profile of river bed and hydrological character of regime of river**

The construction of the bridge does not require the diversion of the flow and construction of piers is also not applicable for this project. The construction of the bridge will be carried out during the dry season when the water flow of the river will be minimal, which will have flow pattern of the stream. However, excavation works during construction of abutment, and improper management of spoil can affect the natural flow of the stream. Since the construction works of the project is of small nature, and the appropriate drainage will be ensured to maintain natural flow of the stream, *the envisaged impact will be of medium magnitude, site specific in extent and short term in duration*

Mitigation Measures: Required flood plain areas be only used; unnecessary disturbances to the flood plain areas will not be done. Sand and gravel will not be quarried from the river bed nearby (at least 500 m u/s and d/s of the bridge axis) the project site. The project has plan to acquire construction materials from Bheri River and confluence of Bungaad and

Bheri Confluence at least 0.6 km away from the bridge construction site. Channel and bank protection activities will be used and allowable materials and potential alternative solutions that allow for natural channel processes will be deployed. Natural flow of the stream will be ensured through proper drainage facility during project construction.

- **Land use Change**

The project requires land for different purposes. Some of the land parcel is required for about 0.17 ha of land is required permanently for the project to upgrade approach road and bridge. Out of which 0.06 ha belongs to the private land and remaining 0.11 ha belongs to public land. Similarly, 0.13 ha is required temporarily for the project. The details of land requirement for the project is given in table below. Since the project being small in nature the construction of bridge does not require large land area. *The impact due to change in land use is of low magnitude, site-specific and long term*.

Table 7.1: Land Requirement for the Project

Project Structures	Land Requirement (ha)	Land Types	Remarks
Bridge Axis	0.04	Flood Plain, Government Land	Permanently Required
Approach Road	0.17	Private land (0.06 ha and 0.11 ha Government Land	Permanently Required
Temporary Camps	0.032	Government land	Temporarily Required
Stockpiling of Construction Materials	0.0763	Government Land	Temporarily Required
Spoil Disposal Site	0.0190	Government Land	Temporarily Required

Mitigation Measures: Only required land will be acquired for construction purpose. Agricultural land, will be avoided for temporary use. Rehabilitation of the temporary used land will be done. Permanently acquired private land will be compensated. Rental payment will be made for the use of temporary land from private belongings. Agricultural land for temporary use will not be utilized. Temporarily used land will be rehabilitated to its previous condition after the work completed. Reinstatement of temporary used land will be done.

- **Management and operation of quarries and river bed extraction**

Locally available construction materials such as sand, stone and gravel can be acquired from the flood plain of Bheri River and confluence of Bheri and Bungaad. Possible site for acquiring river bed materials is 600 m d/s from the proposed bridge location nearby the Bheri-Bungaad confluence. The site can be accessed with small sized trucks and tractors during dry period. There are also other possible options to acquire construction materials from the flood plain of Bheri River. The possible river bed extraction site has been providing in **Annex.** The required quantity of such materials is relatively low as the proposed project is comparatively of small nature. Use of excavator will be done while extracting river bed materials. By removing sediment from the active channel bed, in-stream mines interrupt the continuity of sediment transport through the river system, disrupting the sediment mass balance in the river downstream and inducing channel adjustments (usually incision) extending considerable distances beyond the extraction site itself. Use of excavator during river bed extraction will cause air pollution, water pollution due to leakage of fuels and lubricants and compression of river bed materials, which alters the flood plain characteristics. *The envisaged impact will be of high magnitude, site specific in nature and medium in duration.*

Mitigation Measures: Consent from local authorities (VDC offices and DDC office) will be taken prior to the use of quarry and burrow pit site. The river bed materials will be extracted by taking necessary permission from the local bodies. River bed materials will only be extracted by paying necessary royalty to the local body. 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. Permitted mining volume will only be acquired. Extraction of riverbed materials from active channel will not be done. Removal of riparian vegetation will be avoided. The excavator will be used only when required. Washing and cleaning of excavator in river water will be avoided. Excavator operator will be well informed about the safe operating procedures to be adopted while extracting river bed materials. The maximum depth of floodplain extraction will be above the channel thalweg. Side slopes of floodplain excavation will range from 3:1 to 10:1. Extracted materials will be transported through available access road.

- **Generation of Construction waste and Spoil**

The excavation of soil for the foundation of the bridge and approach road will generate about 5969 m^3 spoils during excavation works for foundation, approach road and river training works. Out of the generated spoil, 2385 m^3 can be reused as common backfilling materials.

The top level of the bridge is in higher elevation than existing road lever so it is necessary to increase the road level by using filling material with compaction in ordinary moisture content having suitable gradient from 180m far from the bridge in left bank and 130m from right bank along the approach road. Remaining 3584 m^3 of spoil has to be safely disposed. The random and improper disposal spoil can be detrimental, as the runoff during rainy season would wash the materials causing water pollution in the nearby water bodies *Hence, the impact will be of high magnitude, site specific in extent and medium term in nature.*

Mitigation Measures: Wherever 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. For this project spoil will be disposed of in river bank adjacent to the structures proposed for river training works (as per design). The recommended spoil disposal site has been presented in **Annex 6.** Disposal of spoil on fragile slopes, farmland, marshy land, forested areas, natural drainage path, canals and other infrastructures will be prohibited. Spoil disposal site will be provided with proper drainage, vegetation and adequate protection against erosion and runoffs. 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:

- 3-meter-high gabion structures (proposed as per design) will be built along the bank of river prior to the spoil disposal so that the spoil would not get contaminate with the river water.
- After the spoil is filled up, benching toe wall and bioengineering will be done. As soon as the spoil disposal gets completed the site will be planted with trees. Altogether 60 trees have to be planted around the spoil disposal site.

- **Water pollution**

The 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 surfaces for approach road and foundation to the river. This would increase the turbidity and contribute the water pollution of Bungaad Stream. Similarly, wastes released from construction camps if remains unmanaged, it will have its ultimate fate to the water bodies resulting in pollution. *This impact is envisaged to be medium in magnitude, local in extent and short term in duration.*

Mitigation Measures*:* Disposal of soil, sludge and other waste directly into water bodies 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.

- **Road Diversion**

The construction of Bungaad Bridge does not involve the use of road diversion as the existing crossing can be utilized for this purpose. The construction of bridge will be almost 5 m u/s of the existing crossing; no separate diversion is required during the construction. *The envisaged impact is insignificant for this project.*

- **Contamination of soil (Due to leakage of waste fuels, grease and lubricants, Paints)**

The transportation of the hazardous materials during the construction of bridge can be leaked into the ground which can contaminate affected land surface. Spent fuels, grease and lubricants if not managed properly can also causes land degradation. This can lead to impair the growth of vegetation and affect the productivity of the nearby agricultural land. However, intensity of vehicular use will be relatively low as the size of the proposed sub-project is comparatively small. *The envisaged impact will be of low magnitude, site specific and short term in duration.*

Mitigation Measures: Storage of chemicals including hazardous materials will be done on safe place and the storage facility will be sealed. The facility will be well protected from strangers and scavengers. Paints wile applied only where required. Accidental leakage of paints and chemicals will be strictly regulated. Contaminated containers, packaging materials and worn plastic will be disposed of in separate spoil disposal areas. Containers will be recycled/reused or managed properly. Accidental leakage of fuels, grease, lubricants and other hazardous materials will be recovered soon and managed safely in designated area.

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

Construction materials like sand, gravel, rod, cement, chemicals required during construction are to be stockpiled. The leakage, mishandling and misuse of these materials could result in degradation of land and water quality. Improper designation and management of stockpiling area can lead to soil and water pollution, and even to the degradation of aesthetic of the project area. *This impact will be high in magnitude, site specific and short term in duration.*

Mitigation Measures: The stockpiling site has been proposed on barren land away from agricultural land. The storage facility will be at least 50 m away from the agricultural land and water sources. Construction materials will be covered with tarpaulin to prevent from scattering from wind and water and other agents. The stockpiling site will be used only after

the prior consent from the respective owner or authority. Adequate fencing will be provided to protect the stockpiled materials from scavengers and livestock. Material stockpiling site will be rehabilitated to its previous condition.

- **Environmental issues associated with Labour camp**

The construction camps near the proposed bridge location will generate the domestic wastes such as organic 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. The camp site has been proposed on barren land almost 50 m u/s from the proposed bridge location on the right bank of Bungaad. *Thus, the impact is of medium magnitude, site-specific and short-term in nature.*

Mitigation Measures: Bio-degradable waste will be disposed in a separate pit away from the water bodies. The pit will be reinstated along with the labor camp after the work ceases. Liquid waste will be disposed in a separate ditch and disinfectant (Chlorination) will be continuously spread to avoid contamination. Haphazard littering of solid waste by construction crews will be restricted, for this a strict code of conduct will be implemented. Separate toilet facility will be constructed near the construction camp with the facility of septic tank. Provision of clean dirking water will be made at the construction camp.

- **Air pollution**

Vehicular movement, excavation works, bitumen heating and quarry site operation will result in different forms of air pollutants. Since the proposed project is of small nature, the intensity of such works will be low. As most of the construction work will be carried out in dry season, dust emission can be expected to be high. Smoke & Dust will also affect the road/bridge site, vegetation, local people and workers. During windy conditions such dust can be blown *The envisaged impact will be of medium magnitude, site, local in extent and short term in duration.*

Mitigation Measures: Construction equipment and vehicles will be regularly maintained. Water will be sprinkled along access road at least two times a day to reduce the dust emission. Construction materials will be properly covered during conveyance and stockpiling. Workers will be provided face mask during construction works.

- **Noise Pollution**

The present noise level of the area is fair. During the construction period, operation of machines, excavators, power tiller, movement of transporting vehicles, trucks and construction equipment will increase the existing noise level. The project area is nearby the settlements however, it is relatively far from the sensitive community areas like schools and

hospitals. *The envisaged impact will be, low in magnitude, site specific in nature and short term in duration.*

Mitigation Measures: Concrete mixer, vibrator, etc. will be maintained in proper condition. Sound producing equipment will be preferred to use only in daytime. Earplug will be provided to the worker involved in equipment operations.

- **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. Similarly, smoke and dust emission, noise generated during the operation of the machines and generators can also causes the different injuries and health impact to the workers. The workers camp if not provided sufficient hygiene; workers may suffer different types of diseases. *The envisaged impact is moderate, site specific and short term in duration*.

Mitigation Measures: Construction workers will be prior informed about job hazards, emergency procedures and any other relevant safety measures. Safety equipment such as helmets, boots, gloves, safety belts, safety glasses and masks will be provided to the workers working in the construction sites. Contractor will arrange the First Aid Kit Box and standby medicine for workforce during working period and emergency situations. Warning signs, posts, barriers and guards will be installed to restrict access of unauthorized persons to construction sites. Only authorized person will be allowed to operate heavy machinery and equipment. Temporary drinking water supply and latrine pit will be established at site. Labor camp will be provided with good quality of beds, well ventilated rooms, good water quality for drinking purpose. Dust control will be done by spraying water on access road and other construction areas.

- **Bridge Safety**

The bridge will be constructed nearby the existing road in which numbers of vehicles ply. During construction period potential disruption of vehicles and obstruction to access is likely increasing the risk of accidents and even collapse of partly constructed bridge structures. Vehicular movements, improper drainage management will pose concerns of bridge safety during construction. *The envisaged impact will be medium in magnitude, site specific in nature and short term in duration*

Mitigation Measures: Fencing and lighting of construction and staging areas will be done, recognized safety practices for the utilization of heavy equipment, and the movement of construction materials will be implemented to avoid accidents. Lane blockages, and vehicles

entrance locations will be well signed. Appropriate passage for drainage will be ensured through properly designed temporary draining structures.

- **Fire hazard (Use of combustible materials)**

Various combustible like petroleum products including petrol, diesel, kerosene, LPG, will be used for various purposes during project construction. Mishandling of these materials and accidental release can result fire and related hazards. The project area is nearby the significant market area i.e., Salli Bazaar, improper management of combustibles may result in disasters. However, the project is not within the forest area and litters deposition is very low in the area. *The impact is considered moderate in magnitude, Local in extent and short term in duration.*

Mitigation Measures: Combustibles will be placed in safe place in sealed containers. Unauthorized entry to the site will be prohibited. Deposition of rags, litters, papers, plastics will be avoided and they will be managed soon after their release. Gaseous fire suppression will be used i.e., use of Clean Agent Fire Suppression (CAFS) will be done in different areas such as camp site, materials stockpiling sites, equipment and vehicles parking yards. A total of 8 CAFS will be used during construction. The construction workers will be well informed about the fire safety precaution to be taken during the start of the construction works.

- **Flooding and Associated Risk**

Because of the nature of having flatter area along the left bank flooding is a regular phenomenon in the Bungaad often threatening the people living nearby areas. However, maximum discharge during monsoon can reach upto 444 m^3/s and remains totally dry during the driest months. The large fluctuation in the seasonal discharge is the characteristic feature of the Bungaad. Upstream left bank is more prone to flooding. During the construction of the proposed bridge, appropriate flow diversion will be made. The issues are the prevalent issue and will not be increased due to project activities. However, for the sustainability of the bridge itself and reducing the flooding impact on nearby settlements and agricultural land is the biggest concern of the project. *The envisaged impact will de high in magnitude, site specific in extent and long term in duration.*

Mitigation Measures: River training works will be conducted along both banks in u/s and d/s of the proposed bridge construction site. The gabion structures supplemented with spoil disposal site and plantation along the area will be done to reduce the impact of flood in the area. The river training works will be U/s Left bank -65m; U/s Right bank -5m; D/s Left bank -20m D/s Right bank -20m. The drawing of river training works is given in **Annex 5.**

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

The proposed project is of small sized and do not require significantly large amount of construction materials as in road. Construction materials like sand, gravel and stone will be sourced locally from Bheri River (600 m d/s from the proposed project), while rod, cement, etc. should be transported from Surkhet/Nepalgunj. The major issues associated with the transportation of construction materials are the traffic congestion and air pollution. *This impact will be of low significance, local and short-term in nature.*

Mitigation Measures: The construction materials will be transported by covering it with traupalin. Vehicles carrying construction materials will not be parked nearby the sensitive public places and market areas.

- **Use of bitumen**

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 medium in magnitude, local in extent and short term in duration.*

Mitigation Measures: Safe site for bitumen heating and storage will be identified. Bitumen heating will be done at least 100 m away from the nearby settlements and public places. Bitumen storage will not be done on nearby fertile land and water sources. The excess bitumen will not be discharged into the drain structure while overlaying on the sub-base material. Use of bitumen will be on time other than the rainy condition. Workers will be provided with necessary protective equipment such as face mask, gloves etc.

- **Impact On Public Infrastructures**

The construction of bridge will adversely affect the about 15 m section of Nara Irrigation Scheme located at right bank of Bungaad, including hume pipes used for crossing motor vehicles through the canal. Similarly, upgrading of approach road is likely to affect 3 electricity poles. The total command area of Nara Irrigation scheme is about 6.2 ha. *The envisaged impact is direct, high in magnitude, local in extent and short term in duration.*

Mitigation Measures: Prior consent will be taken from the user's community before the irrigation canal is disturbed. Alternative alignment of the canal will be fixed, and constructed prior to the commencement of construction works.

Operation and Maintenance Stage

- **Air pollution, Noise and Vibration**

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 increase in movement of the vehicles would create the noise and vibration. The vibration induced by the resonance of traffic noise can have negative impact on people and structures nearby the bridge location. However, the project location site is not among the busiest section therefore, number of vehicles plying through the bridge will be relatively lower. *The impact is low, local and long term in nature*.

Mitigation Measures: This is the residual impact so mitigation measures has not been proposed. However, speed limit will be placed on both banks of the bridge which will help in attenuating noise resulting due to high speed vehicles.

- **Backwater Effect During Floods**

The operation of the bridge would not block the flow of the water as the bridge is with single span without pier. Erection of abutment will not have any impact on the natural flow of the Bungaad stream. This impact will insignificant for the proposed project.

- **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.*

Mitigation Measures: The storage facility will be at least 50 m away from the agricultural land and water sources. Construction materials will be covered with tarpaulin to prevent from scattering from wind and water and other agents. The stockpiling site will be used only after the prior consent from the respective owner or authority. Adequate fencing should be provided to protect the stockpiled materials from scavengers and livestock.

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

There is a possibility of gathering of commercial activities and settlements from vicinity to road alignment. There is abundant public land around the project area and these land could be encroached by the new comers. There could be the possibility of erecting new and haphazard settlements nearby the bridge location. This practice could disturb the traffic, promote encroachment of the RoW (Right of Way), increase possibility of accidents, decline the aesthetic value, and reduce the overall capacity of road. If such practices are not

controlled by enforcing specific legal actions. *The impact will be medium in magnitude, long term in nature and local in extent.*

Mitigation Measures: The project will coordinate with the local authority i.e., VDC, DDC to regulate the activities of roadside encroachment.

7.1.2 Biological Environment

Construction Stage

- **Loss of Vegetation**

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

- **Impact on Wildlife**

Since the proposed site for the construction of Bungaad Bridge is not a wildlife movement corridor and trees are not necessary to be felled, there is no direct impact of the proposed project on wildlife and biodiversity. On the other hand, if the construction crew cut the tress from the nearby forest to meet their cooking energy requirement, it would pose threats on the wildlife and biodiversity of the area. Likewise, involvement of construction crews in illegal hunting of wild life species will pose risk to wild life. Since the project area is not around the forest area the wildlife mobility is very rare in the area. *This impact is envisaged to be low magnitude, local and short term in duration.*

Mitigation Measures: Illegal hunting, harassment to wildlife will be strictly controlled. Construction activities will be confined to day time. Construction fuel requirements will be supplemented through alternative sources other than fuel wood. A code of conduct will be enforced to construction workers through contractor that prohibit illegal, collection, sale, distribution of wildlife and plant product.

- **Impact on aquatic lives**

Resuspension of sediment in the water column is likely to occur as a result of dredging action at the sediment-water interface, transfer of the sediment to a transporting vessel, leakage from the vessel, and disposal of the sediment. Resuspension of the sediments causes increased turbidity which may adversely affect aquatic life by clogging gills, decreasing visibility, and preventing oxygen diffusion. However, since the increased turbidity is expected to be short term and only cover a limited area, the impact will be less significant. Similarly, Bungaad is ephemeral stream, water in the stream flows only during monsoon periods only within the bridge location, the stream is not significant habitat for wildlife and aquatic habitat. *This impact is envisaged to be low in magnitude, local and short term in duration.*

***Mitigation Measures**:* The river channel will be disturbed only in required extent. Spoil will be safely managed soon after their generated. Haphazard disposal of garbage into the stream channel will be regulated. Chemicals used in construction activities will be handled carefully and stored in fallow land away from the riverbeds. Illegal fishing activities by the construction crews will be regulated.

Operation and Maintenance Stage

- **Barrier Effects on Aquatic animals**

As the abutment and foundation of the Bungaad Bridge will be located at the bank (flood plain) of the Bungaad and no piers will be constructed within the river channel, there would be insignificant barrier effect on the movement of aquatic animals.

7.2.3 Socio-economic and Cultural Environment

Construction Stage

- **Social Conflicts**

For the construction of the Bungaad Bridge, local people would be given high priority to in the proposed project works. However, some specified workers would be sourced from other areas. Thus, their presence around the project area would cause dispute with local people. Likewise, the construction workers may involve in gambling, alcoholism etc., and eventually may get into conflict among themselves or with the surrounding people. *This impact is envisaged to be low in magnitude, local in extent and medium term in duration.*

Mitigation Measures: Code of conduct for the workforce will be strictly applied. Conduct regarding respect to local culture and customs and unnecessary relationship with the local people will be enforced.

- **Obstruction to social services and facilities**

During the construction phase, existing diversion is available for river crossing. Hence, the construction of the bridge would not have obstruction in vehicular movement. Likewise, no other social services and facilities like, electric poles, water taps, schools, etc. need to displace during bridge construction. However, if the construction camp requirements are fulfilled from the local resources like water supply, energy requirement it will pose certain pressure on social service facility. *This impact is envisaged to be low, site-specific and medium term in duration.*

Mitigation Measures: The contractor will manage some utilities like communication, lighting and cooking energy, drinking water supply, etc. within the camp so as to avoid the pressure on local services. Local people will be consulted to build consensus on sharing the community infrastructures such that it will not significantly affect the local people. The

contractor will be responsible for reconstruction and rehabilitation of damages due to their activities; any damage to existing road in project location, like formation of ditches, will be controlled and rehabilitated. The drinking water tap will be rehabilitated to the nearest safest location before damage incurred to it

- **Public grievance related to project construction**

The people of the area were highly positive towards the construction of bridge over Bungaad. 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.*

Mitigation Measures:

- **Loss of productive land**

The project will require 592.1 m^2 of private land of which most of the land belong to land utilized for dwelling and business purposes. Temporary land requirement for sub-project will not be taken from the private belongings as government barren land is abundant in the area. *The envisaged impact will be low in magnitude, site specific in extent and long term in duration*.

Mitigation Measures: The project will not utilize private agricultural land for temporary use. Stockpiling areas and spoil disposal areas will at least be 50 m away from the agricultural land. The

- **Land and property acquisition**

Altogether 12 households will lose 23 structures including residential cum commercial, toilet, pali and shed. About 592.1 m^2 of private land including different private structures will be affected. The affected seven strictures need to be relocated and built new strictures. The houses are for residential cum business purposes. The details of project affected persons PAPs has been provided in resettlement plan prepared for the sub-project. *The envisaged impact is high in magnitude, local in extent and medium term in duration.*

Mitigation Measures: Compensation to the affected households for their private property will be provided. Furthermore, displacement allowance will be given to those persons who have another house to live and to operate their business and require few months' time period to resettle in a new place. During the time of replacement, the household may lose their income due to disturbance in their business. The affected households those who displaced from the existing place and wants to go to another house either by constructing new house or in an old house, are subject to receive such allowances at lump-sum amount.

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

Out of the 12 households to be affected by the project 4 households belongs to Dalits, and 1 household belong to the indigenous community. These households will loss their different structures including houses used for business purposes. *The envisaged impact will be of moderate magnitude, local in extent and medium term in duration.*

Mitigation Measures: Affected indigenous people and dalits will be compensated as per the RAP prepared for the sub-project. Dalits, Indigenous and other marginalized communities will be prioritized during sub-project construction activities. Similarly, as per Resettlement Action Plan prepared for this project, the project has planned to provide ***"Income Restoration and Skill Development Training (IRSDT)"*** to the project affected households which will ultimately help in re-establishment of PAP's lost livelihood and creates new income generating activities. IPs and Dalits will be encouraged to participate in IRSDT trainings to be provided by the sub-project.

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

The construction of Bungaad Bridge is not likely to affect any of the cultural, religious and historical sites of the project area. The impact is insignificant for the project implementation.

- ***Child Labour Issue***

It is likely that children will be exploited by the contractors in the construction and related works. *The envisaged impact will of medium magnitude, short term in duration and local in extent.*

Mitigation Measures: Child labour use of any form during maintenance works should be strictly regulated. If it is found it should be treated with criminal guilt. The contractor will abide by Contractors Mitigation Plan prepared for the sub-project.

- ***Gender Discrimination***

As with various rural areas in Nepal, gender discrimination is prevalent. Discrepancy in wage distribution among male and female workers is also prevalent. Similarly, different forms of harassment to female workers by male counterparts. *The envisaged impact will be of medium magnitude, short-term in duration and local in extent.*

Mitigation Measures: Project will establish agreement with contractors to consider male and female equally for wage distribution for works of similar nature. Male workers will be instructed to respect their female counterparts. The contractor will abide by the Contractor Mitigation Plan prepared for the sub-project.

Operation and Maintenance Stage

- **Traffic accidents**

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

Mitigation Measures: Warning signs and speed breakers will be provided on both banks of the bridge.

Impact Analysis

Numerical Scale mentioned in National EIA Guidelines (1993) is used to analyze the impact of the proposed subproject. The numerical scale is presented in table below.

Table 7.2: Impact identification matrix

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

The combine score below 40 was considered as insignificant impact (IS); scores ranging between 40 and 79 as significant impact (S), scores ranging between 80 and 99 as very significant (VS) and the scores above 100 has been termed as highly significant impact (HS).

7.1.3 Beneficial Impacts

Table 7.3: Beneficial Impacts of the bridge project.

Aspect	Impact	Nature	Magnitude	Extent	Duration
Beneficial Impact	**Construction stage**				
	Employment Generation	Direct	M 20	L 20	ST 5
	Enhancement of technical skills	Direct	M 20	L 20	LT 20
	Enhancement of Local Economy	Indirect	L 20	L 20	ST 5
	Increase in awareness	Direct	M 20	L 20	LT 20
	Operational stage				
	Improved Mobility	Direct	H 60	R 60	LT 20
	Saves Time and Money	Direct	M 20	R 60	LT 20
	Reduced traffic congestion	Direct	M 20	L 20	LT 20

7.1.4 Adverse Impacts

Table 7.4: Adverse Impacts of the Bridge project

Aspect	Impact	Nature	Magnitude	Extent	Duration
Physical Environment	**Construction stage**				
	Change in morphology, longitudinal profile of river bed and hydrological character of river regime	Direct	L 10	SS 10	ST 10
	Land use change	Direct	L 10	SS 10	LT 20
	Land slide, slope stability and Soil erosion	Direct	L 10	SS 10	MT 10
	Management and operation of Quarries and river bed extraction	Direct	H 60	SS 10	MT 10
	Generation of Construction Waste and Spoil	Direct	H 60	SS 10	MT 10
	Water pollution	Direct	M 20	L 20	ST 5
	Contamination of Soil	Direct	L 10	SS 10	ST 5
	Stockpiling of Construction Materials	Direct	H 60	SS 10	ST 5
	Environmental Issues associated with labour camp	Direct	M 20	SS 10	ST 5
	Air Pollution	Direct	M 20	L 20	ST 5
	Occupational Health and Safety	Direct	M 20	SS 10	ST 5
	Noise Pollution	Direct	L 10	SS 10	ST 5

	Bridge Safety	Direct	M 20	SS 10	ST 5
	Flooding and Associated Risk	Indirect	H 60	L 20	LT 20
	Transportation of Construction Materials	Direct	L 10	L 20	ST 5
	Use of Bitumen	Direct	M 20	SS 10	ST 5
	Fire Hazards	Indirect	M 20	L 20	ST 5
	Waste Generated from construction camp	Direct	M 20	SS 10	ST 5
	Impact on Public Infrastructures	Direct	H 60	L 20	ST 5
	Operation and Maintenance Stage				
	Air Pollution, Noise and Vibration	Indirect	Lo 10	L 20	LT 20
	Stockpiling of Construction Materials during Maintenance	Direct	Lo 10	SS 10	ST 5
Biological Environment	**Construction stage**				
	Loss of Vegetation	Direct	Lo 10	SS 10	ST 05
	Impact on aquatic life	Direct	Lo 10	SS 10	ST 05
	Impact on wildlife	Indirect	Lo 10	L 10	ST 5
Socio-economic and Cultural Environment	**Construction stage**				
	Occupational Health and Safety of Workers	Direct	H 60	SS 10	ST 10
	Social Conflicts	Indirect	Lo 10	L 20	ST 5
	Obstruction to social service facilities	Direct	Lo 10	L 20	MT 10
	Public grievances	Direct	Lo 10	L 20	MT 10
	Loss of productive land	Direct	Lo 10	SS 10	MT 10

	Land and property acquisition	Direct	H 60	L 20	MT 10
	Impact on vulnerable indigenous people and Dalits	Direct	M 20	L 20	MT 10
	Child Labor use	Indirect	M 20	L 20	ST 5
	Gender discrimination	Indirect	M 20	L 20	ST 5
	Operation and Maintenance Stage				
	Congestion around the Bridge abutment	Indirect	M 20	L 20	LT 20

CHAPTER 8: ALTERNATIVE ANALYSIS

This chapter discuss on various alternatives proposed for implementation of Bungaad Bridge. The objective of carrying alternative analysis is to identify and recommend best technical, operational and environment friendly alternatives that ensures the implementation of the sub-project sustainably with minimum environmental and social damage.

Location Alternatives

Three different location alternatives were analysed during the design period of the proposed bridge project. First alternative where the bridge would be constructed almost 20 m u/s of the proposed location. The second alternative was to construct the bridge at the present proposed location and third option is to construct the bridge 10 m d/s of the proposed location. Among these three options, second option was adopted for proposing the bridge axis. Among the three location, option-2 is most feasible in terms of cost effectiveness. The length of the bridge and even the length of the approach road would be higher. This option also has less social damage in comparison to the other options. The proposed location also ensures the geologically stable and hydrological safe area for bridge construction.

Design and Construction Alternatives

The proposed bridge has single span without the need of piers. If piers would have to be constructed additional environmental damages including obstruction of river flow, water pollution and spoil generation would have increased. For design of the bridge, different alternatives have been considered. Following table 8-1 compares major possible bridge design compared for the project.

Table 8.1: Comparison of different bridge types

Simply supported RCC bridge	Steel truss bridge	RC Arch bridge
Most economical up to 25m. May be possible with higher grades of the conc. And steel for span greater than 25m	Economical for span greater than 30m	Cost yet to be finalized – may be economical
Local skill and technology easily available	Limited local skill and technology available	Local skill and technology not easily available
High cost of staging	Low cost of staging	High cost of staging and complicated framework

Lower construction and maintenance cost	Higher construction and maintenance cost	Lower construction and maintenance cost
Longer construction period	Shorter construction period	Longer construction period
Less control on the quality as the most of the work is carried out at site	Better quality ensured as the most of the components can be manufactured in the shop	Less control on the quality as the most of work is carried out at the site
Aesthetically pleasing	-Aesthetically not pleasing	-Aesthetically most pleasing

Considering the river bank, river channel type, bed & bank materials, availability of local skills and technology alignment of the existing road and durability & maintenance cost, RCC simply supported structure have been proposed

The construction of the proposed bridge will involve the environmental friendly approach in which labour and mechanized methods will be optimally applied. 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.

Time Schedule Alternatives

The construction period has been taken as 24 months considering the climatic and hydrological condition of the project area. Construction of foundation, collection of sand and aggregate from river beds will be constructed only during dry period to minimize the impact on water quality and aquatic ecology.

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.

No Project Alternative

Due to lack of motorable bridge over Bungaad, all weather vehicular movement is not possible along CJ road. Even though there are several places along CJ road where vehicular crossing during monsoon is not possible. The greater obstacle was at Bheri River where Bridge is almost constructed, otherwise, the vehicles have to cross through Ferry and people generally cross through suspension bridge. Similarly, across Bungaad, crossing during dry period is not the concern, but during wet periods it is the bigger problem. No action option will not ensure the all-weather mobility of the people to and from various parts of Surkhet and Jajarkot District. Construction of project will have some impact on environmental and social condition of the project area, however, most of the impact are of less significance and can be mitigated through cost effective mitigation measures. No action option would deprive the people from taking all weather transport facility along CJ road so this option was not considered.

Other matters

The other matters to be included to minimize the social and environmental impact would be to implement the Environmental Management Plan (EMP). The alternative for the environmental management system could be the establishment of Environmental Monitoring Unit at RSDP/GESU/DoR. The unit will conduct the environmental monitoring works in regular time interval. It will be better if the environmental monitoring unit comprises of the representatives of clients, consultant, contractor and the local authorities as required. Timely meeting shall be conducted where the compliance status and future necessities shall be discussed, and certain agreement could be decided.

CHAPTER 9: 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 Bungaad Bridge are presented in table 10-1.

Table 9.1: Institutions and their role in EMP implementation

Institution	Roles	Responsibilities	Remarks
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	Foreign cooperation project under the DoR, which coordinates with	✓ Coordination with the donor agencies to invest for the construction of	

Project (RSDP)	donors to invest for the road projects in Nepal	the road ✓ Execution of the road projects	
Geo-Environment and Social Unit (GESU)	Unit under the DoR responsible for technical advice for IEE	✓ Review, comment, and forward ToR and IEE for the approval by the concerned ministry (MoPIT)	
World Bank	Role in decision making for the execution of the project	✓ Responsible for overseeing DoR's project design, implementation of mitigation measures in accordance with their grant/loan conditions including environmental and social safeguards	
Design Consultant	Project design, environmental assessment and social assessment	✓ Prepare a detail engineering design for the project ✓ Prepare IEE report and get approval from the concerned ministry ✓ Prepare resettlement plan for the affected households ✓ Prepare Environmental and Social Management Plan	
Supervision consultant	Role in monitoring the compliance of environmental mitigation measures during construction as guided by	✓ Oversee the overall implementation of the EMP, provide expertise knowledge, suggestions and recommendations	

	the EMP	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	

Figure 10-1 shows the hierarchy of agencies responsible for EMP implementation of the proposed sub-project. The MoPIT being the concerned ministry remains at the highest position of the order and the implementing contractor will work at the base level.

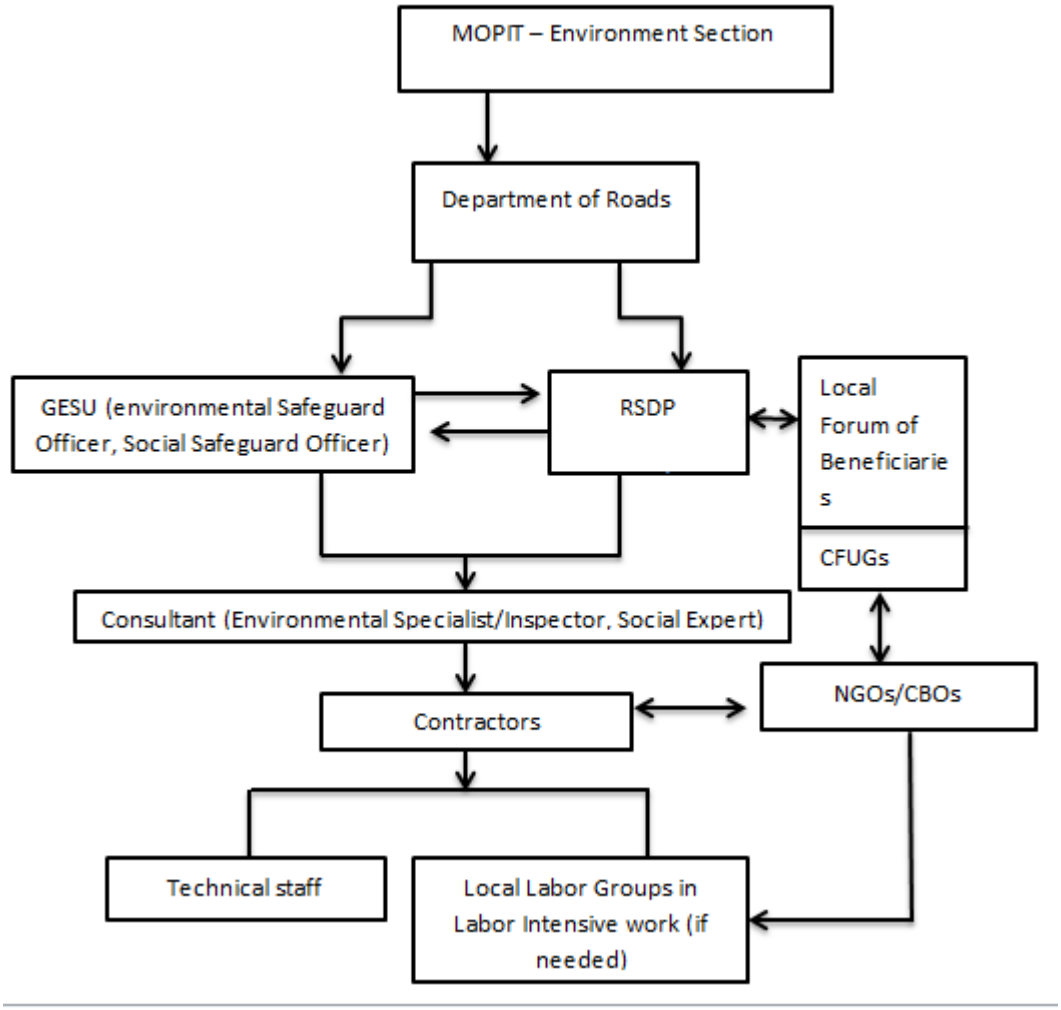

Figure 9-1: Agencies responsible for the implementation of EMP

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 generally 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 though 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 9.2: Specific monitoring indicators selected for the IEE document

Monitoring Field	Parameters Selected for the Monitoring
Waste management	▪ General condition of waste management site ▪ Sites and suitability for safe disposal or waste and garbage.
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 ▪ Blockage of waterways – extent and secondary impacts ▪ Water pollution incidents due to unsafe disposal of spoil ▪ 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 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

Socio-economic condition of PAFs	▪ Use of compensation money by affected households ▪ Restoration of business, income and employment opportunities by the displaced families ▪ Living condition of the households (better or worse than before project in terms of child education, child health, family income, food sufficiency, nutrition, etc.)
Socio-economic development around the project site	▪ 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

Table 9.3: Compliance monitoring parameters with respective indicators

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

	provision of safety equipment and measures, sanitation of labour	causes	construction phase		
Environmental protection measures, including pollution prevention, water and soil pollution, spoil and waste management, environmental and socially critical sites, protection of fauna and flora	Arrangement specified in the code of practice and in manuals relating to environmental protection; records and observations on pollution, waste management, spoil disposal. Training programmes for labourers to prevent impacts on wildlife sensitive habitats, forests and fuel wood use.	Site inspection, discussion with project management, consultants, and local people. Quantifying site-specific impacts, photos, laboratory tests where required. Existing patrol, control and enforcement mechanisms, enforcement records.	Before and during construction period	Consultant (for baseline survey) Contractor	Proponent, consultant
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, photographs, noise level meter record	Regular by contractor, once a month during construction by consultant	Contractor	Proponent, consultant

Water pollution	Visual inspection, open defecation and waste disposal around water sources near construction sites and labour camp	Site inspection, interview	Regular by the contractor, once a month by the supervision consultant	Contractor	Proponent, consultant
Public health and accident risk	Health and safety regulations, first aid and medical arrangements, contingency plan, safety awareness programme. Provision of toilet and waste management facility to the construction crew	Spot checks at camps and work sites, photos, accident records from Traffic Police, Training records and materials, road signs	Once in two months by consultants	Contractor	Project
Adequate technical and environmental supervision	Adequate number of technicians mobilized regularly at site. Ability to implement labour based bridge construction concept	Check number and type of technicians available at site. Skill of work carried out. Discussion.	During construction by contractor. Once a month by consultant	Consultant	Proponent
Clean up and reinstatement of the construction site, camps, quarries and	Decommissioned sites should not indicate any adverse and residual environmental impacts, and should be rehabilitated to the satisfaction of supervision	Site observation, comparative photos, consultation with land owners	At the end of construction period	Contractor	Proponent

burrow pits	consultant and land owners				

The parameters selected for the impact monitoring are as follows

Table 9.4: Parameters selected for the impact monitoring

Parameter	Verifiable Indicators	Verification Methods	Location	Schedule	Responsible Implementing Agency	Responsible Monitoring Agency
Disposal of Spoils	Initiated erosion, affected aesthetic value, affected forest and agriculture, initiated, erosion by local blocked drainage, hazard to downhill slope residents and agricultural lands	Site observation and interviews, photos, geo- referencing sites	At specific locations where such sites occur	During construction	Contractor	Proponent, Consultant
Quarrying of Conservation Materials	Initiated erosion, change in river regime, erosion by river systems, landslide due to quarrying,, water logging, waterborne diseases	Site observation, photos Records from local health centers	Quarry site areas	During construction	Contractor	Proponent, Consultant Health Posts
Water Quality	Turbidity and general status of nearby water bodies Some physio-chemical	Visual inspection, sampling and laboratory analysis of water quality	Nearby water bodies	During Construction and operation	Contractor	Proponent, consultant

	properties like pH, DO, conductivity, other chemical parameters	parameter				
Air Quality	Atmospheric dust	Visual inspection	At construction sites and at sensitive spots (Schools, hospitals)	During construction and operation	Contractor	Proponent, consultant
Forest and vegetation	Numbers of trees, presence of group vegetation, signs of illicit logging and extraction of NTFPs	Observation, DFO record, photos, stake-holder interviews	In and around the construction sites, markets	During construction and operation	Contractor	Proponent, consultant
Socioeconomic condition of PAFs	Use of compensation money by affected households, Restoration of business, income and employment opportunities by the displaced families, Living condition of the households (better or worse than before project in terms of child education, child health, family income, food sufficiency, nutrition, etc.)	Site observation and household surveys, assets survey of PAFs	Project affected area	During construction and operation	Contractor	Proponent, consultant
Change in	Numbers of people employed	Records kept by the	Project Area	Twice a year during	Contractor, Consultant,	Proponent

Economy	by the project during construction Numbers of women in work forces Changes in land use pattern	project management, discussion with people		construction and operation		
Trade and Commerce	Number of shops increased or decreased, rental of houses and land spaces	Records, interview, observations, photos	Project Area	Throughout project	Consultant	Proponent, VDC
Industries	Establishment of industries in the vicinity of Project Area	Records and interview, photos	Project Areas/Zone of influence	Throughout project	Consultant	Proponent, VDC,
Occupational Safety and Hazard	Type of number of accident occurred during construction, Adequacy of occupational safety measured provided Compensation provided in case of fatal accidents or invalidity	Observation, photos, spot checks, Contractors and health centre records interview with laboures	Project Area	During construction	Contractor	Proponent, Consultant Health Authorities

9.1 Environmental Management Plan

The complete sets of environmental enhancement and mitigation measures have been formulated for the sustainable implementation of Bungaad Bridge. The environmental management plan ensures the involvement of all the parties that are directly and indirectly associated with the implementation of Bungaad 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 9.5: Framework for benefit enhancement measures

Beneficial Environmental Impact	Affected Location	Benefit Augmentation Measure	Enhancement Cost	Responsible Agency	
				Implementing Agency	Supervising Agency
Enhancement of Skills		Pre-construction orientation to the senior level bridge engineer and mid-level bridge engineer and unskilled workforce	PS. Nrs 50,000	Contractor	Supervision consultant/DoR
Improved mobility	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	PS 30,000 (@10, 000 per day)	Project Implementation	Supervision consultant/DoR

		trainings related to solid waste management, river bank safety, 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)		agency (RSDP)	
Reduced Traffic congestion	Entire project area	Unnecessary stoppage of vehicles will be reduced by placing no parking zone around the bridge axis.	No additional Cost	Contractor	Supervision consultant/DoR
Safe and Upgraded Transportation facilities	Project area	Regular and routine, emergency and if required major maintenance will be conducted.	Cost will be decided later based on the maintenance requirements.	Project	Supervision consultant/DoR

Table 9.6: Framework for adverse impact mitigation measures

	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
Site clearance for bridge construction	Land Use change	• Only required land will be acquired for construction purpose. • Agricultural land will be avoided for project use • Reinstatement of	Bridge construction area	Pre-construction	PS 50, 000 for reinstatement of temporary used land	Contractor	Supervision consultant/DoR

		temporary used land will be done					
Management and Operation of Quarries and River Bed Extraction	Environmental and social damage associated with quarry site operation	• Consent from the local stakeholders and authority will be taken prior to the opening of new quarry. • Unstable sites, erosion prone areas, dense forested areas, settlements, fertile farm land will be avoided for quarry operation • In case of river bank quarry, only the materials deposited during the previous year will be collected without disturbing the sedimentation cycle of the river. • Excavator operator will be well informed about the safe operating procedures to be adopted while extracting river bed	Around the quarry site	During quarrying	PS 80,000 for reinstatement of river bed extraction site	Contractor	Supervising consultant/DoR

		materials. • The maximum depth of floodplain extraction will be above the channel thalweg. Side slopes of floodplain excavation will range from 3:1 to 10:1. Extracted materials will be transported through available access road. • Reinstatement of river bed extraction site will be done					
Bridge Construction	Generation of spoil	• 5-meter-high gabion structure will be 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 60^0 on the river side.	Spoil disposal area	During construction	Cost for construction gabion structures have been included in project design. Cost for plantation of 60 trees and their management		

		• As soon as the spoil disposal gets completed the site should be planted with trees. Altogether 60 trees have to be planted around the spoil disposal site. • Spoil disposal site will be maintained so that greenery will be developed and also works as flood control structures			Nrs. 26520. Management of Spoil disposal site PS Nrs 600,000		
Bridge construction, camp site operation, spoil disposal and quarry site operation	Water pollution	• Spoils generated during the excavation will be disposed-off safely in the designed spoil disposal site. • Separate toilet facilities will be provided to the construction crew with proper septic tank facility. • Liquid waste generated within the camp site will be disposed safely without releasing into the water	Bridge construction area, spoil disposal site and quarry site	During construction and quarrying	No additional cost required	Contractor	Supervision constultant/DoR

		bodies. • Accidental spillage of the oil, grease and other chemicals substance will be captured immediately without allowing them to get contaminate the water bodies					
Chemical Handling during construction	Contamination of soil due to leakage of spent fuels, grease and lubricants, paints	• Storage of chemicals including hazardous materials will be done on safe place and the storage facility will be sealed. • The facility will be well protected from strangers and scavengers. • Paints wile applied only where required. Accidental leakage of paints and chemicals will be strictly regulated. • Contaminated containers, packaging materials and worn plastic will be disposed of in separate	Bridge and approach road construction area, materials stockpiling areas	During construction	No additional cost required	Contractor	Supervision consultant/DoR

		spoil disposal areas.					
Materials stockpiling	Air and water pollution, degradation of agricultural land	• The storage facility will be at least 50 m away from the agricultural land and water sources. • Construction materials will be covered with tarpaulin to prevent from scattering from wind and water and other agents. • The stockpiling site will be used only after the prior consent from the respective owner or authority. • Adequate fencing will be provided to protect the stockpiled materials from scavengers and livestock. • Material stockpiling site will be rehabilitated to its previous condtion.	Materials stockpiling areas	During construction	PS Nrs. 50,000	Contractor	Supervision constultant/DoR

Labour camp operation	Water pollution, land pollution, disease prevalence	• Bio-degradable waste will be disposed in a separate pit away from the water bodies. • The pit will be reinstated along with the labor camp after the work ceases. • Liquid waste will be disposed in a separate ditch and disinfectant (Chlorination) will be continuously spread to avoid contamination. • Haphazard littering of solid waste by construction crews will be restricted, for this a strict code of conduct will be implemented. • Separate toilet facility will be constructed near the construction camp with the facility of septic tank. • Provision of clean dirking water will be made at the	Around the camp site	During construction	180,000 (Included in BOQ)	Contractor	Supervising consultant/DoR

		construction camp.					
Construction works, use of vehicles, machineries and equipment	Air pollution	• Construction equipment and vehicles will be regularly examined and maintained in proper condition. • Water will be sprinkled along access road at least two times a day to reduce the dust emission. • Proper protection works like fencing by GCI sheets or walls will be done at excavation and disposal site. • Construction materials will be properly covered during conveyance. • Enforcing vehicle speed limit using signals and speed breakers. Workers will be encouraged to use masks. •	Construction areas, quarry operation sites, approach road and spoil disposal areas	During construction	No additional cost required	Contractor	Supervising consultant/DoR

Use of heavy machinery, and vehicles	Noise pollution	• Sound producing equipment will be preferred to use only in daytime. • Earplug will be provided to the worker involved in equipment operations. • Crusher plant will be kept at area away from settlement.	Bridge construction area	During construction	No additional cost required (included in design cost)	Contractor	Supervision consultant/DoR
Construction works	Bridge Safety	• Fencing and lighting of construction and staging areas will be done, recognized safety practices for the utilization of heavy equipment, and the movement of construction materials will be implemented to avoid accidents. • Lane blockages, and vehicles entrance locations will be well signed. Appropriate passage for drainage will be ensured through	Bridge construction area	During construction	PS 50,000	Contractor	Supervision consultant/DoR

		properly designed temporary draining structures.					
Chemical handling	Environmental issues associated with the mishandling of chemical substances and fire hazards	• 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	PS NRs. 20,000 for fire extinguisher (fiver 4kg, cylinder, at the rate of 4000/cylinder)	Contractor	Supervision consultant/DoR
Construction activiites	Occupational health and Safety	• The workers will be provided with helmets, masks, muffles depending on the nature of the construction work. • Drinking water facility and temporary pit latrine will be established at construction sites to control open	Construction area	Commencement of bridge construction	PS (Nrs. 90,000)	Contractor	Supervising consultant/ DoR

		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.					
Use of bitumen	Air pollution	• Safe site for bitumen heating and storage will be identified. • Bitumen heating will be done at least 100 m away from the nearby settlements and public places. • Bitumen storage will not be done on nearby fertile land and water sources.	Construction area	Commencement of bridge construction	PS (Nrs. 20,000)	Contractor	Supervising consultant/ DoR

		• The excess bitumen will not be discharged into the drain structure while overlaying on the sub-base material. • Use of bitumen will be on time other than the rainy condition					
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.	Material stockpiling site	During construction period	No additional cost	Contractor	Supervision consultant/DoR

		• Construction materials will be further encircled with side barriers and covered to avoid mix up with deleterious materials.					
Project Construction	Relocation of public infrastructures (15 m section of irrigation canal and 3 electricity poles are likely to be relocated)	• Prior consent will be taken from the users community before the irrigation canal is disturbed. Alternative alignment of the canal will be fixed, and constructed prior to the commencement of construction works.	Bridge construction site	During pre-construction period	PS Nrs 400,000 (Included BoQ)	Contractor	Supervision consultant/DoR
Project construciton	Flooding and associated risk	• River training works will be conducted along both banks in u/s and d/s of the proposed bridge construction site. • The gabion structures supplemented with spoil disposal site and plantation along the area will be done to reduce the	Project site	During pre-construction period	Cost included in design	Contractor	Supervision consultant/DoR

		impact of flood in the area. • The river training works will be U/s Left bank - 65m ; U/s Right bank -5m; D/s Left bank -20m D/s Right bank -20m. The drawing of river training works is given in Annex as per design of the proposed project.					
Use of combustible materials	Fire hazards	• Combustibles will be placed in safe place in sealed containers. Unauthorized entry to the site will be prohibited. Deposition of rags, litters, papers, plastics will be avoided and they will be managed soon after their release. Gaseous fire suppression will be used i.e., use of Clean Agent Fire Suppression (CAFS) will be done in different areas such as camp site,	Materials stockpiling area vehicles parking area and bridge constructio n area	During construction	Included in mitigation measures for chemical handling	Contractor	Supervision consultant/DoR

		materials stockpiling sites, equipment and vehicles parking yards. A total of 8 CAFS will be used during construction.					
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 required	-	-
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 required	DoR	DoR
Biological Environment:							
Bridge construction	Loss of vegetation	• Construction activity does not require the cutting of tree. • However to develop greenery along the approach road the sub-project will plant 40 trees	Bridge construction area	During construction period	Cost has been provided in plantation cost	Consultant	Supervision consultant/DoR

		along the approach road corridor					
Bridge construction	Impact on wildlife	• Illegal hunting, harassment to wildlife and fishing will be strictly controlled. • Construction activities will be confined to day time. • Construction fuel requirements will be supplemented through alternative sources other than fuel wood. • A code of conduct will be enforced to construction workers through contractor that prohibit illegal, collection, sale, distribution of wildlife and plant product.	Nearby forest	During construction period	No additional cost required	Consultant	Supervision consultant/DoR
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	Around construction site	During construction period	No additional cost	Contractor	Supervision consultant/DoR

		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					
Socio-economic and Cultural Environment:							
Bridge construction	Occupation health and safety of workers	• The workers will be provided with helmets, masks, muffles depending on the nature of the construction work. • Drinking water facility and temporary pit latrine will be	Construction area	During Construction period	No additional cost required	Contractor	Supervision consultant/DoR

		established at construction sites to control open defecation and pollution of water bodies by the workers. • Workers will be provided with first aid and health facilities. There will be provision for group accidental insurance for the workers. • First aid training will be provided to field staffs like observers, social mobilizers and supervisors.					
Bridge construction	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	Around construction area	During construction period	No additional cost required	Contractor	Supervision consultant/DoR

		vehicles.					
Bridge construction	Accidental Risk	• 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.	Around construction area	During construction period	No additional cost required	Project/contractor	Supervision consultant/DoR
Bridge construction	Impact on private and public properties	• 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	• Project will form, activate, and maintain Grievance Redress Mechanism around the project area.	Around the construc	During pre-construction and constructio	No additional cost	Project/Contractor	Supervision consultant/project

	construction	• 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.	tion area	n stage			
Bridge construction	Land and property acquisition, compensation, resettlement and rehabilitation	• Project has prepared a separate resettlement plan (RP) which address the issues related to the land and property acquisition, compensation, resettlement and rehabilitation	Around project area	During pre-constructio n stage	Cost included in resettlemen t plan (RP)	Project	Project/local stakeholders/local government authority
Operation of bridge	Road accident	• Project will install required delineators, safety signs, etc. as per the requirement.	Around the project	During operation stage	No additional cost	Contractor	Supervision constultant/DoR

		• Installation of sign boards at accident-prone spots and busy spots.	area		required		

Cost for Execution of EMP

9.1.1 Details of specific cost

a) Land, properties acquisition, resettlement and rehabilitation cost

Resettlement plan for the sub-project have been prepared. A total of 12 households including 23 private structures will be affected. For this RP has allocated Nrs. 1,870,000.00. Similarly, RP has proposed Nrs 450,000 for Income restoration and Skill development trainings. ***These cost has already been included in RP prepared for the sub-project.***

A. Compensation & Rehabilitation			
I. Estimated compensation for private structures (including dismantling cost)	Number	23	1,020,000.00
II. House displacement allowance	Number	12	120,000.00
III. Transportation allowance	Number	12	120,000.00
IV. Business displacement	Number	12	120,000.00
V Dalit allowance	Number	4	40,000.00
Vi Training	2 event		450,000.00
Total			1,870,000.00

b) Income Restoration and Skill Development Training (IRSDT)

One member of each affected households will be provided income restoration measures under the **Income Restoration and Skill Development Training (IRSDT)** program according to the requirements of the ESMF. RSTD include trainings on income generating activities which will be delivered through trainings and other 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 consultation some list of training is listed below and this training will deliver as per their need basis during construction phase.

Table 9.7: Proposed IRSDT Cost

S.N.	Name of Trainings	Targeted Participants		Duration	Start date	Cost (NRs)
		Male	Female			
1	Mobile repairing	7	10	15 days	During construction	100,000
2	Motorcycle Repairing Training	7	3	45 day	During construction	350,000
	Total	**5**	**4**		**450,000**	

c) Cost of tree plantation

Tree plantation will be mainly done for the restoration of spoil disposal site, road side plantation Altogether the plantation of 120 trees has been proposed in this report. Out of 80 trees will be planted in river corridor nearby the gabion structures constructed for river trainings, where surplus spoil will be disposed of. 40 trees will be planted in approach road corridor.

Table 9.8: cost of tree plantation

Activities	Cost in Rs.	Remarks
Plantation of 80 saplings, including site preparation, pitting and mulching	12,000	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	2,520	Assuming 30% mortality
Tools	2,000	Lump sum
Tending and maintenance for 5 years	10,000	Lump sum
Sub-total	***26,520***	

d) 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 9.9: 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

e. Total Cost for EMP Implementation

The breakdown of cost for the implementation of Environmental Management Plan is presented in table 9-10. The cost included in RAP has not been mentioned in the following table.

Table 9.10: Total cost of implementation of EMP

S.N.	Activities	Cost	Remarks
1	Mitigation measure under physical environment	1,590000.00	
2	Tree Plantation	26520.00	
4	Environmental Monitoring	980,000.00	
Total Cost of EMP implementation		2,596,520.00	

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

Stage 1: *Complaints of PAPs on any aspect of compensation, relocation, or unaddressed losses will be settled in first instance verbally or in written form in field based project office. The concerned personnel to settle the issues at local level can discuss the complaint in an informal meeting with the PAP. The community consultation, involvement of social and resettlement experts will be helpful in this regard. It will be the responsibility of the LCF and Project In-charge to resolve the issue within 15 days from the date of the complaint received.*

Stage 2: *If no understanding or amicable solution reached or no response from the project office, the PAP can appeal to the CDC. While lodging the complaint, the PAP must produce documents to support his/her claim. The CDC will provide the decision within 15 days of registering the appeal.*

Contractors Mitigation Plan

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

i. Onsite Facilities

- **Hiring of Workforce**
  - Priority should be given to local workforce for sub-project construction
  - If possible, at least 33% women are to be employed
  - Use of child labour should be strictly regulated
  - Priority should be provided to Dalits, Janajatis and minorities
  - The Contractor should publish notice informing the requirements of workforce (different job position) for construction purposes in VDC
  - Construction staff should have employment contracts.

- The Contractor should provide the education and training of construction workers regarding construction technology, environmental protection and occupational health and safety.

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

ii. Code of Conduct

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

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

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

Prohibited acts
• Harm wildlife and livestock villagers adjacent areas; • Hunting and harassment of wildlife • Unnecessary picking and harm to plant • Fishing in the rivers • Buy meat of wildlife • Collection of wildlife body parts and plants • Affect or destroy objects of historic or architectural value;

- Outdoor lighting of fire;
- Working hours drinking;
- Mechanical maintenance (oil and lubricant supply) outside the designated area;
- Dumping outside the designated area;
- Dangerous driving on local roads;
- Impact on nearby residents;
- Leakage of pollutants, such as: Oil, paints, lubricant
- Littering of waste;
- Incineration;
- Involving in prostitution, gambling and other social violation
- Go outside without permission

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

iii. Health and Safety

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

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

iv. Storage of Fuel, Oil and Hazardous Substances

- Separate storage facility for paints, fuel, oil and hazardous substances should be established;
- Unauthorized entry to the site should be prohibited;
- Machineries and equipment should be maintained in the designated site;

- The maintenance site should be at least 100 m away from the water sources;
- The leakage of oil, paints, lubricants should be immediately recovered and safely disposed of;
- Provision of fire extinguisher and fire safety should be made on the storage facility.

v. Waste Water Management

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

vi. Solid waste Management

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

vii. Noise Management

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

viii. Air Pollution Abatement

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

ix. Material Stockpiling

- Material stockpiling should be done on designated site at least 10 m away from the drainage lines and on the surface having less than 10^0 slopes.
- Stockpiling sites should be devoid of vegetation, shrubs;
- Materials should be covered with tarpaulin to avoid dispersion and scattering of materials;
- Unauthorized entry to the stockpiling site should be regulated.
- Stockpiling site should be rehabilitated after the work completed.

x. Spoil Disposal

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

xi. Quarry Site and River Bed Extraction

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

CHAPTER 10: CONCLUSION AND RECOMMENDATION

There are 13 different river and stream crossings where bridge construction is essential for ensuring all weather mobility along Chinchhu-Jakarkot road, among them construction of Bungaad Bridge is one proposed for construction. Proposed Bungaad bridge is RCC simply supported type. The bridge will be constructed at Devasthal VDC of Salyan District. Construction of bridge will facilitate in achieving various social services for the people of Salyan, Surkhet, Jajarkto districts. Construction of Bungaad bridge will have long term impact on the overall development of the area. The implementation of the proposal is also expected to bridge several immediate short term benefit like employment generation, skill enhancement, increase in local economy.

The implementation of the sub-project will also have some environmental impacts on physical, biological, socio-economic and cultural domains of the area. The project does not fall on any of the environmentally, historically, and culturally sensitive areas. The implementation of the proposal will not cause removal of trees. Impact on private land and property, spoil generation, impact due to river bed materials extraction, impact on irrigation canal, electricity poles. camp site operation, air pollution and water pollution are some of the anticipated significant impacts resulting from the project implementation. Most of the identified impacts are of temporary in nature and limited to project specific area and are reversible in nature. The IEE study of the proposal have proposed cost effective and easily implementable mitigation measures. The implementation of the EMP proposed for the sub-project will not have large cost and resource liability. In addition, scope of proposed bridge construction does not surpass any of the threshold mentioned by EPA, 1997 and EPR, 1997 (First amendment, 1999) and other relevant acts and rule. So, IEE is sufficient for implementation of project.

Implementation of safeguard measures described in Environmental Management Plan is essential for the sustainability of the proposed project. Similarly, all the social and environmental issues related to project should be settled down before implementation of project works. The active participation of all the agencies responsible for implementing the EMP is recommended.

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Annexes:

Annex 1: Approved TOR

नेपाल सरकार

भौतिक पूर्वाधार तथा यातायात मन्त्रालय

(वातावरण तथा सामाजिक शाखा)

पत्र संख्या:
०७२/०७३/२.३
च नं : ६०४

३४४
मिति : ०७२/०९/२६

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

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

उपरोक्त सम्बन्धमा भू-वातावरण तथा सामाजिक शाखा, सडक विभाग प्रस्तावक रहेको **Bungaad Bridge (Chhinchu-Jajarkot Road), Salyan** 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 ।

(शोभा भण्डारी)
समाजशास्त्री

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

चलानी नं-१०८/२.२.२/०७२/७३

श्री वैदेशिक महाशाखा
बबर महल, काठमाडौं ।

विषयः Bungaad Bridge (Chhinchu –Jajarkot Road) को IEE को ToR स्वीकृत भएको सम्बन्धमा ।

उपरोक्त सम्बन्धमा त्यस महाशाखा अर्न्तगत Bungaad Bridge (Chhinchu –Jajarkot Road) Salayan को IEE को ToR भौतिक पूर्वाधार तथा यातायात मन्त्रालयको प.सं.०७२।०७३।२.३ च.नं. ६०४ मिति २०७२।१२।२८ को पत्रानुसार नेपाल सरकार (सचिवस्तर) को मिति २०७३।९।२६ को निर्णयानुसार शर्त सहित स्वीकृत भएको व्यहोरा अनुरोध गरिन्छ ।

संलग्नः १. भौतिक पूर्वाधार तथा यातायात मन्त्रालयको पत्र छाँयाप्रति - १ थान
२. स्वीकृत ToR - २ प्रति

विजय कुमार महतो
इंकाई प्रमुख
विजय कुमार महतो
इकाई प्रमुख/भू.वा.ड.ई.
भू-वातावरण तथा सामाजिक शाखा

बोधार्थः (आवश्यक कार्याथको लागि)

श्री M/S Kunhwa Engineering and Consulting Co. Ltd Korea in association in the form of Sub Consultancy with ERMC Pvt. Ltd., Nepal
Baneshwor,Kathmandu (संलग्नः १. भौतिक पूर्वाधार तथा यातायात मन्त्रालयको पत्र छाँयाप्रति - १ थान
२. स्वीकृत ToR - १ प्रति)

Annex 2: Public Notice

नेपाल सरकार
भौतिक पूर्वाधार तथा यातायात मन्त्रालय
सडक विभाग
योजना तथा डिजाईन माहाशाखा
भू-वातावरण तथा सामाजिक शाखा

प्रारम्भिक वातावरणीय परिक्षण सम्बन्धि सार्वजनिक सूचना

(प्रथम पटक प्रकाशित मितिः २०७२/१२/१८)

प्रस्तावकको नामः भू-वातावरण तथा सामाजिक शाखा, सडक विभाग
प्रस्तावको नामः बनगाढ पुल

विश्व बैंकको सहयोगमा नेपाल सरकार, भौतिक पूर्वाधार तथा यातायात मन्त्रालय, सडक विभाग अर्न्तगत सडक क्षेत्र विकास आयोजनाले छिन्चु-जाजरकोट सडक खण्डमा पर्ने बनगाढ खोला माथि निर्माण गर्न प्रस्ताव गरेको ३६.२ मी. लम्बाई (१X३५ 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-आफ्ने राय सुझाव दिन हुनको लागि सोहि नियमावलीको नियम ७ (२) अनुसार यो सार्वजनिक सूचना प्रकाशन गरिएको छ।

जिल्लाको नामः सल्यान
प्रभाव पर्न सक्ने गा.वि.स.को नामः देवस्थल गा.वि.स.
क्षेत्रहरुः (१) भौतिक वातावरण (२) जैविक वातावरण
(३) सामाजिक तथा आर्थिक क्रियाकलापहरु (४) साँस्कृतिक वातावरण

उक्त प्रस्ताव कार्यान्वयन बाट प्रभाव पर्न 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 ठेगानाः	**परामर्शदाताः**
भू-वातावरण तथा सामाजिक शाखा, सडक विभाग, पाटन, ललितपुर, नेपाल टेलिफोन नं.: ९७७-०१-५२६०६९६ फ्याक्स नं.: ९७७-०१-५५२९१०६ इमेलः gesunit@dor.gov.np	**Kunhwa Engineering and Consultancy Co., Ltd, Korea** In association in the form of sub consultancy with **ERMC (P) Ltd., Nepal** १२६/२३, पुजा प्रतिष्ठान मार्ग, मध्य-बानेश्वर, काठमाडौं, फोन नं: ०१-४४७१८८४, फ्याक्स नं: ०१-४४७९३६१ पोष्ट बक्स नं: १२४१९, काठमाडौं इमेलः safe@ermc.wlink.com.np

Annex 3: Deeds of Enquiry

श्री

गाउँ विकास समितिको कार्यालय

सल्यान

पत्र संख्या :- ०८२/८३
चलानी नम्बर :- ३०४

मिति २८८२/१२/२४

विषय :- जानकारी गराइएको बारे ।

श्री भौतिक पुर्वाधार तथा यातायात मन्त्रालय
सडक विभाग, बबेकोटि महाशाखा

प्रस्तुत विषयमा लॉहा कार्यालयको प.सं. ८२/८३ च.नं. ३३८ मिति २८८२/१२/१८ गतेको प्राप्त पत्रानुसार यस क्षेत्रस्थित गा.वि.स. अन्तर्गत पर्ने बगाड खोला मा प्रस्तावित बगाड खोला पुलको प्रारम्भिक वातावरणीय परिक्षण को लिखित जिल्लाका प्रकाशित दैनिक सार्वजनिक सूचना यस गा.वि.स.को सूचना पाटीमा टाँस गरेको जानकारीको लागी अनुरोध छ ।

बालाराम बास्तोला
२८/१२/२४

बालाराम बास्तोला
गा.वि.स. सचिव

प्रारम्भिक वातावरणीय परिक्षण सम्बन्धि सूचना टाँसको मुचुल्का

आज मिति २०८२-१२-२३ गते ~~बिहिवार~~ शुक्रवार को दिन यस देवस्थल गा.वि.स./न.पा. वडा नं ९ स्थित ~~बालेबजार~~ गरीबजार भन्ने ठाँउमा वनगाउ पुलको प्रारम्भिक वातावरणीय परिक्षण गर्ने क्रममा सम्पूर्ण सरोकारवालाहरुलाई प्रस्तावित पुल निमार्ण गर्दा त्यस क्षेत्रको भौतिक, जैविक, आर्थिक सामाजिक तथा सांस्कृतिक वातावरणमा पर्न सक्ने असर तथा ति असरहरु न्यूनिकरण गर्न अवलम्बन गर्न सकिने सम्भावित उपयहरु बारे आफ्ना राय सुझावहरु पठाउन आवहान गर्दै मिति २०७२/१२/१८ को राष्ट्रिय दैनिक राजधानिमा प्रकाशित १५ दिने सार्वजनिक सूचनाको छाँया प्रति हामी निम्न सरोकारवालाहरुको उपस्थितीमा टाँस गरिएको व्यहोरा सही हो भनि यो मुचुल्कामा हस्ताक्षर गर्दछौं ।

क.स.	नाम/थर	ठेगाना	पेशा	हस्ताक्षर
१	दिपेन्द्र सोनी	देवस्थल-९ गरीबजार	व्यापार	
२	देश्राज शाही	देवस्थल-९ गरीबजार	व्यापार	
३	लाल बहादुर शाही	देवस्थल-९ गरीबजार	कृषक	
४	पुष्कर वि.क.	देवस्थल-९ गरीबजार	शिक्षक →	
५				
६				
७				
८				
९				
१०				

Annex: 4 Recommendation Letter

श्री
गाउँ विकास समितिको कार्यालय
देवस्थल, सल्यान

पत्र संख्या :- ०७१/०७२
चलानी नम्बर :- २०६

मिति २०७२/१२/२४

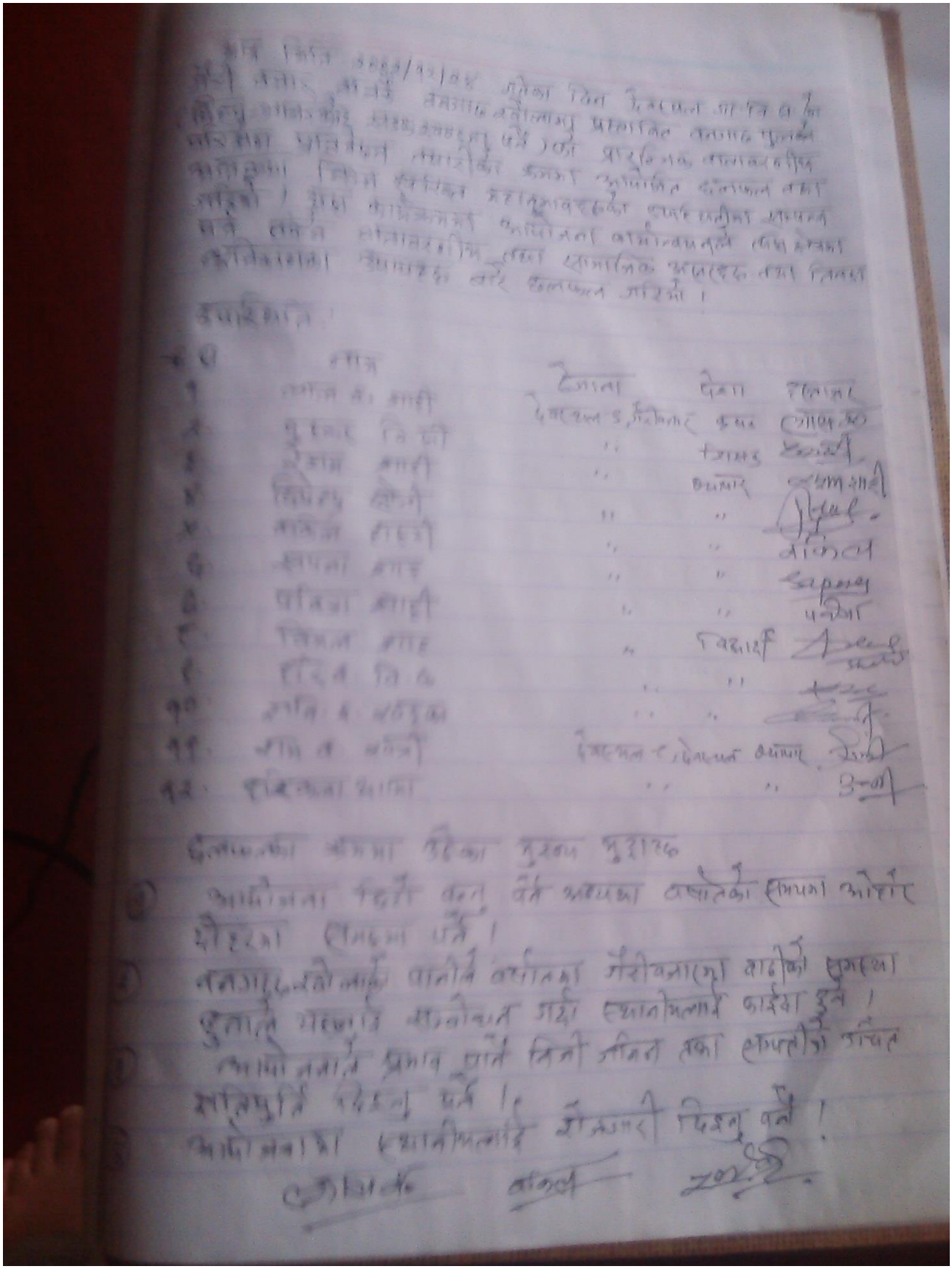
विषय :- सिफारिस ।

श्री भौतिक पूर्वाधार तथा यातायात मन्त्रालय,
सडक विभाग, वैदेशिक महाशाखा

प्रस्तुत विषयमा यस देवस्थल गा.वि.स. को छिन्चु-जाजरकोट सडक अन्तर्गत पर्ने बनगाड खोलामा प्रस्तावित बनगाड खोला पुल कार्यान्वयन गर्दा हुन सक्ने वातावरणीय प्रभावहरु न्यूनीकरण तथा रोकथामका उपायहरु अवलम्बन गर्दै त्यस क्षेत्रको वातावरणीय स्वच्छतामा हानी नपुर्‍याउँदै उक्त योजना कार्यान्वयनको लागि सिफारिस गरिएको व्यहोरा अनुरोध छ ।

(हस्ताक्षर)
०७२/१२/२४
बालाराम बस्नेत
गा.वि.स. सचिव

Minutes of Public Consultation



Annex 6: Relevant Drawings

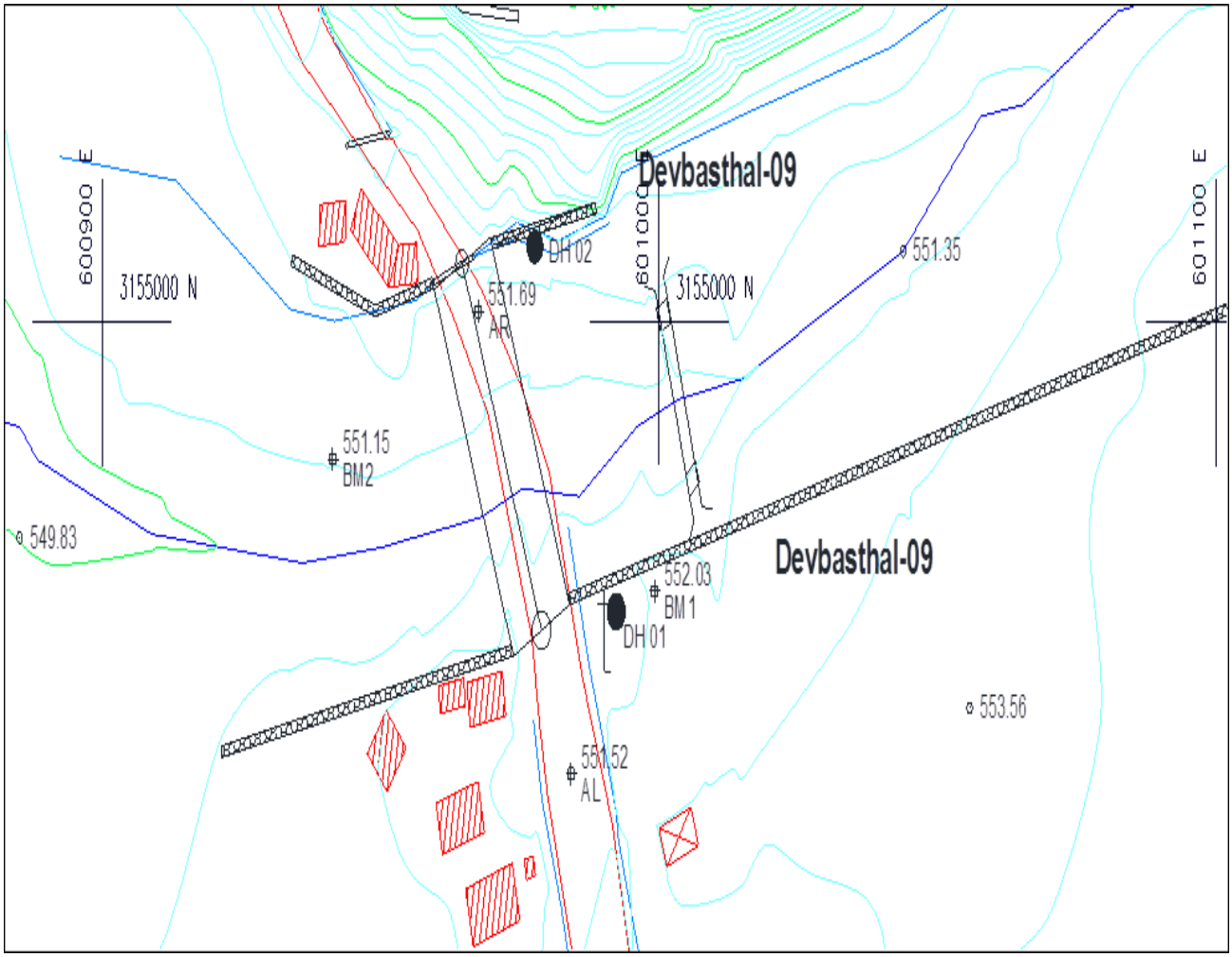
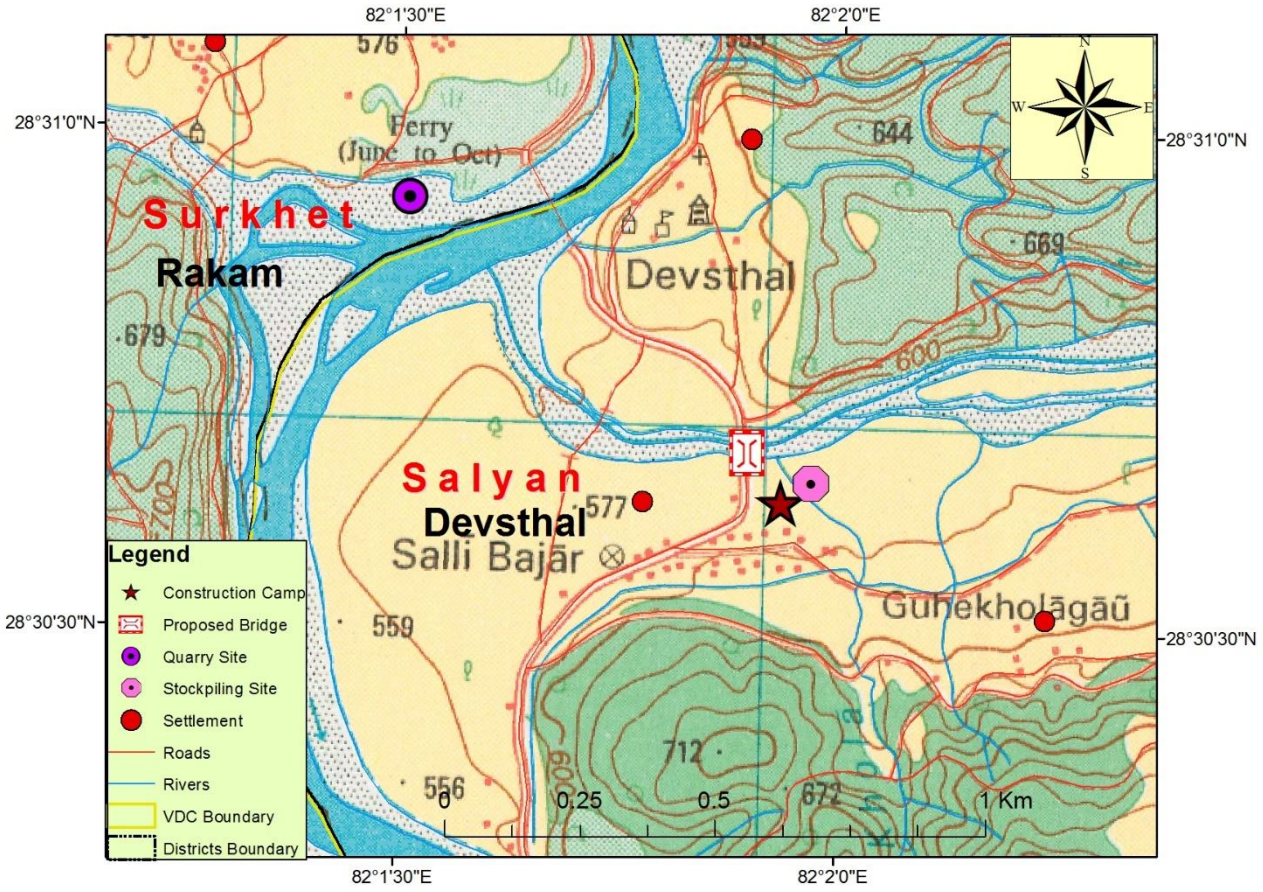


Figure: Proposed River Training Works

Proposed Camp site, Spoil Disposal Site, Material Stockpiling Area

Topographical Map with Various Project Components



Annex 7: Filled Sample Checklist

घरधूरी सर्वेक्षण प्रश्नावली

१. आधारभुत विवरण:

क.सं.	प्रश्न	उत्तर
१.१	प्रश्नावली नं	
१.२	अन्तरवार्ताको मिति २०६२-१२-२९	
१.३	जिल्ला ~~[illegible]~~ तनहुं	
१.४	गाविस [illegible]	
१.५	वडा नं ५	
१.६	घर / घरधनीको नाम [illegible]	
१.७	उत्तरदाताको नाम [illegible]	
१.८	उत्तरदाताको लिङ्ग	पुरुष ✓ महिला
१.९	घरमुलीको नाम [illegible]	
१.१०	घरमुलीको लिङ्ग	पुरुष ✓ महिला
१.११	जात / जाती (उपयुक्त एक मात्र उत्तरमा गोलो लगाउनुहोस्)	ब्राहमन क्षेत्री ✓ ठकुरी जनजाती दलित अन्य -खुलाउनुहोस्)
१.१२	धर्म : (उपयुक्त एक मात्र उत्तरमा गोलो लगाउनुहोस्)	हिन्दु ✓ बौद्ध मुस्लिम क्रिश्चयन अन्य -खुलाउनुहोस्)
१.१३	परिवारको प्रकार (उपयुक्त एक मात्र उत्तरमा गोलो लगाउनुहोस्)	एकात्मक परिवार ✓ संयुक्त परिवार विस्तारीत परिवार

२ घरधुरी विवरण

२१ पारिवारिक विवरण

क्र.सं.	घरपरिवारका सदस्यहरुको घरमुलीसंगको नाता	लिङ्ग		उमेर (पुरा भएको उमेर)	शिक्षा (५वर्ष माथि)	पेशा (१४ वर्ष भन्दा माथि)	हाल घरमा भएको /नभएको	
		पु	म				भएको	नभएको
१	[illegible]	१	(२)	२८	४	[illegible]	१	२
२	[illegible]	१	(२)	३	[illegible]	[illegible]	१	२
३	[illegible]	(१)	२	८	३	[illegible]	१	२
४		१	२				१	२
५		१	२				१	२
६		१	२				१	२
७		१	२				१	२
८		१	२				१	२
९		१	२				१	२
१०		१	२				१	२
११		१	२				१	२
१२		१	२				१	२
१३		१	२				१	२
१४		१	२				१	२
१५		१	२				१	२
१६		१	२				१	२
१७		१	२				१	२
१८		१	२				१	२
१९		१	२				१	२
२०		१	२				१	२

संकेतहरु :

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

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

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

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

३ बसाई सराई

क.सं	प्रश्न	उत्तर
३.१	तपाईका परिवार (घर्खा) कहिले देखि यस ठाउँमा बस्दै आउनुभएको हो ?	पुर्खा पुस्ता भन्दा अघिबाट (५० वर्ष) / एक पुस्ता भन्दा अघिबाट(२५वर्ष) / ताजासनै (१० वर्ष भन्दा कम)
३.२	यदि तपाई बसाई सरेर आउनुभएको हो भने कृपया तपाईको पुर्खाको ठाउँ तोक्नुहोस् ?	जिल्लाको अर्को गा.वि.सहरु / छिमेकी जिल्ला / अन्य जिल्ला
३.३	के तपाईको परिवारका कुनै सदस्य कामको सिलसिलामा बसाई सर्नु भएको छ?	छ / छैन

३.४	यदि छ भने बताउनुहोस्	कामको लागि स्थान/ठाउँ							के बसाई सराई वार्षिक चलन हो?	
	क्रम संख्या	जनको संख्या लिङ्ग		जिल्ला भित्र	जोडिएको जिल्ला	अर्को जिल्ला	भारत	विदेश	हो	होईन
		पुरुष	महिला							

४. परिवारमा विरामी

क.सं	प्रश्न	उत्तर
३.७१	गएका १२ महिनामा तपाईको कुनै सदस्य विरामी हुनु	थियो

	भएको थियो?	..... १ थिएन् २

४.१ यदि थियो भने, परिवारका सदस्य कस्ता रोगवाट बिरामी भएका थिए र कुन समयमा ? कृपया बुलाउनुहोस्।

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

४. शौचालय सुविधा

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

५. खानेपानीको सुविधा

क.सं	श्रोतहरु	प्रयोग गरेका मूख्य तिनवटा श्रोतहरु		प्रयोगका आधारमा प्राथमिकिकरण गर्नु होस्
		छ	छैन	

क्र.स	स्रोतहरु	प्रयोग गरेका मूल सिंचाइका स्रोतहरु		प्रयोगका आधारमा प्राथमिकिकरण गर्नु होस्
		छ	छैन	
१	धारा (निजी धारा)	१	२	
२	धारा (सार्वजनिक)	(१)	२	
३	कुवा / मूल / ढुङ्गेधारा	१	२	
४	अन्य (खुलाउनुहोस्)			

६ आयोजना सम्बन्धि

६.१ तपाईलाई यस आयोजना बारे जानकारी छ ?

छ ✓ छैन

६.२ यदि छ भने कुन माध्यमबाट पहिलो पटक पाउनु भयो ?

६.३ यस आयोजना बनाउँदा तपाईलाई कुन प्रकारको हानी नोक्सानी पुग्नेछ ?

- जग्गाको क्षती ✓
- भौतिक संरचनामा क्षती ✓

६.४ यस आयोजनाले यस क्षेत्रको भौतिक, जैविक, सामाजिक, आर्थिक तथा सांस्कृतिक वातावरणमा के

कस्तो असर पर्ने देख्नुहुन्छ ?

६.५ यस आयोजनाले यस क्षेत्रमा पहुँचको के कस्तो सामाजिक तथा भौतिक संरचनामा असर गर्छ ?

६.६ यो आयोजनाले यस क्षेत्रमा रहेको माटो, जोखर, तथा अन्य सांस्कृतिक सम्पदाहरुमा असर पुऱ्याउने देख्नु हुन्छ ?

६.७ यो आयोजनाले के कस्तो फाईदा पुऱ्याउने देख्नु हुन्छ ?

६.१ आयोजना बारे तपाईको राय सुझावहरु के के छन् ?

Annex 8 : Name of the PAFs

S.N	Cod No	Structure Owner Name	Address	Ward No	Distance from bridge(in M)	Description of Structure	No of Storey	Present Use	Area in Sqft	Type of structure	Built Year	Remarks
1	104	Tikaram Kami	Devasthal	9	12	Stone & Mud motar with zinc sheet	1	Res+ Commercial	240	Pakki	2068	
2			Devasthal	9	12	Stone & Mud motar with zinc sheet	1	Pali	504	Pakki	2068	
3			Devasthal	9	12	Stone & Mud motar with zinc sheet	1	Toilet	36	Pakki	2068	
4	105	Aishwarya Bika	Devasthal	9	15	Stone & Mud motar with zinc sheet	2	Res+ Commercial	390	Pakki	2072	
5	106	Lal Ba. Shahi	Devasthal	9	10	Stone & Mud motar with zinc sheet	2	Res+ Commercial	340	Pakki	2066	
6			Devasthal	9	10	Stone & Mud motar with zinc sheet	2	Toilet	42	Pakki	2066	

7			Devasthal	9	10	Stone & Mud motar with zinc sheet	1	Res+ Commercial	42	semi modern	2070	
8	107	Puskar B.C	Devasthal	9	9	Stone & Mud motar with zinc sheet	1	Pali	232	Kachhi	2064	
9			Devasthal	9	9	Stone & Mud motar with zinc sheet	2	Res+ Commercial	406	Pakki	2064	
10			Devasthal	9	9	Stone & Mud motar with zinc sheet	2	Toilet	48	Pakki	2064	
11	108	Pabitra Shahi	Devasthal	9	9	Stone & Mud motar with zinc sheet	2	Res+ Commercial	280	Pakki	2060	
12			Devasthal	9	9	Stone & Mud motar with zinc sheet	1	Res+ Commercial	70	Kachhi	2070	
13	109	Sarswati Giri	Devasthal	9	10	Stone & Mud motar with zinc	2	Res+ Commercial	858	Pakki	2058	

						sheet						
14			Devasthal	9	10	Stone & Mud motar with zinc sheet	2	Toilet	36	Pakki	2058	
15	110	Kalu Kuwar	Devasthal	9	10	Stone & Mud motar with zinc sheet	2	Res+ Commercial	384	Pakki	2058	
16	111	Meghraj Giri	Devasthal	9	9	Stone & Mud motar with zinc sheet	2	Res+ Commercial	700	Pakki	2058	
17	112	Ambar Bdr. Shahi	Devasthal	9	9	Stone & Mud motar with zinc sheet	2	Res+ Commercial	700	Kachhi	2055	
18	113	Yam Bdr. Budha	Devasthal	9	7	Stone & Mud motar with zinc sheet	2	empty house	132	Pakki	2056	
19			Devasthal	9	7	Stone & Mud motar with zinc sheet	2	Res+ Commercial	396	Pakki	2063	

20			Devasthal	9	7	Stone & Mud motar with zinc sheet	2	Toilet	36	Pakki	2058	
21	114	Nim Bdr. Damai	Devasthal	9	12	Stone & Mud motar with zinc sheet	2	Res+ Commercial	121	Pakki	2061	
22			Devasthal	9	12	Stone & Mud motar with zinc sheet	2	Toilet	42	Pakki	2072	
23	115	Arjun Kumar Bishwarkarma	Devasthal	9	17	Stone & Mud motar with zinc sheet	2	Res+ Commercial	338	Pakki	2062	

Annex 9: Photographs

Photo 1: Quarry Site

Photo 2: Settlement area

Photo 3: Water pump for water supply in the settlement

Photo 4: Irrigation canal along the river

	
Photo 5: Bridge for individuals and two wheelers	Photo 6: Consultation with local people

	
Electricity poles Likely to be Affected	Pedestrian and Motorbike Crossing U/S of the proposed bridge location

	
Irrigation Canal U/S of the Proposed Bridge Location	Existing Water use in Bungaad

Comments Incorporation Matrix