Government of Nepal

Ministry of Physical Infrastructure and Transport

Singhadurbar, Kathmandu

Nepal

Initial Environmental Examination of Kane Gadh Bridge

(Surkhet- Jumla Road), Dailekh District, Karnali Province

Submitted through:

Geo-Environmental and Social Unit,

Planning and Design Branch,

Department of Roads,

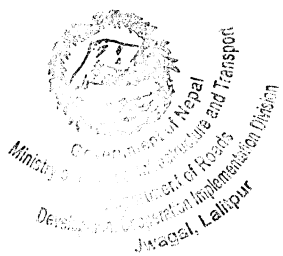
Chakupat, Lalitpur, Nepal

Tel: 01-5005520

Email:gesunit@dor.gov.np

Prepared By:	Proponent:
M/s Kunhwa Engineering & Consulting Co. Ltd., Korea *In association in the form of sub consultancy with* **ERMC (P) Ltd., Nepal** Mid-Baneshwor, Kathmandu Tel.: 977-1-447-1884	**Road Sector Development Project Additional Financing (RSDPAF II)** **Development Cooperation Implementation Division(DCID)** **Department of Roads** **Jwagal, Lalitpur**

June, 2019



नेपाल सरकार
भौतिक पूर्वाधार तथा यातायात मन्त्रालय
(वातावरणीय तथा सामाजिक शाखा)

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फोन नं. ४२११८८०
४२११९३१
४२११९५५
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सिंहदरबार, काठमाडौं,
नेपाल

पत्र संख्या ०७५।०७६।२.३
चलानी नं.: १४९३

मिति : २०७६/२/३०

विषय: प्रारम्भिक वातावरणीय परीक्षणको प्रतिवेदन स्वीकृति भएको सम्बन्धमा ।

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

प्रस्तुत विषयमा तहाँ विभागबाट स्वीकृतिको लागि पेश भै आएको **Kane Gadh Bridge (Surkhet-Jumla Road), Dailekh** को प्रारम्भिक वातावरणीय परीक्षण (IEE) को परीमार्जित प्रतिवेदन नेपाल सरकार (सचिवस्तर) को मिति २०७६/२/२९ को निर्णयानुसार तपशिल बमोजिमको शर्त सहित स्वीकृत भएको व्यहोरा अनुरोध छ ।

- प्रारम्भिक वातावरणीय परीक्षण (IEE) को परीमार्जित प्रतिवेदनमा लिखित निर्माण एवं संचालनका समयमा हाल पहिचान/आङ्कलन भएका प्रभावहरुका अलावा अन्य प्रभावहरु देखिएमा अनुकुल प्रभाव अधिकतम गर्ने तथा प्रतिकुल प्रभाव न्यून गर्ने उपायहरु गर्ने र सो को लागि एवं वातावरण व्यवस्थापन योजना अन्तर्गत उल्लेखित कार्यहरुको प्रभावकारी रुपमा कार्यान्वयन गर्न सो प्रतिवेदनमा उल्लेखित अनुमानित बजेट नपुग भएमा पनि बजेटको व्यवस्था गरी सम्पूर्ण कार्यहरु गर्नुपर्ने छ ।

- वातावरणीय अनुगमनको क्रममा वातावरण संरक्षणका उपायहरुको कार्यान्वयनको स्थिति र प्रस्ताव निर्माण तथा कार्यान्वयनको अवस्थामा देखिएका अन्य वातावरणीय प्रभावहरु एवं तिनको व्यवस्थापन गर्न गरिएको प्रयासहरु लगायत आयोजना कार्यान्वयन गर्दा सम्बन्धित निकायहरुको सहभागिता सुनिश्चित भएको तथा प्रस्ताव कार्यान्वयनको क्रममा अन्य प्रचलित कानून आकर्षित भएमा तिनको पूर्ण पालना भएको पक्ष समेत झल्किने गरी प्रस्ताव कार्यान्वयन अवधिभर प्रस्तावकले वार्षिक अनुगमन प्रतिवेदन तयार गरी यस मन्त्रालयलाई पठाउनु पर्नेछ ।

2076/2/30

(शोभा भण्डारी)
समाजशास्त्री

कार्यकारी सारांश

१.० प्रस्ताव

प्रस्तावित कानेगाड पुल सुर्खेत-जुम्ला सडकका (११९+०००)➔ (१४०+०००) च्यानेज अन्तर्गत दैलेख जिल्लाको राकम कर्णाली, आठविस नगरपालिका-४, दैलेख, कर्णाली प्रदेश को शेरबदा बजार र खानि बजार गाउँको सिमाना हुँदै बग्ने कानेगाड खोलामा पर्दछ। प्रस्तावित आयोजना क्षेत्र समुद्री सतहबाट ७०३ मी. मा पर्दछ। यस आयोजनाले दैलेख जिल्लालाई मात्र नभई कालिकोट, जुम्ला, मुगु र डोल्पा लगायतका कर्णाली प्रदेशका जिल्लाहरुलाई सडक मार्फत जोड्ने काम गर्दछ। यस कानेगाड पुल निर्माणको तयारी गर्ने प्रस्तावकको नाम र ठेगाना निम्न अनुसार रहेको छ।

सडक क्षेत्र विकास आयोजना एडिसनल फाईनसिङ - II (RSDPAF II)

विकास सहायता कार्यान्वयन शाखा (DCID)

सडक विभाग, ज्वागल, ललितपुर

द्वारा

भू-वातावरण तथा समाजिक शाखा,

योजना तथा डिजाइन शाखा ,

सडक विभाग,चाकुपाट, ललितपुर

२.० प्रस्तावको विवरण

प्रस्तावित कानेगाड पुलको कुल लम्बाई २१.२ मी.को हुनेछ भने यसको चौडाइ ११ मी. को हुनेछ। पक्की ढलान गरेर निर्माण गरिने उक्त पुलको दँयापट्टि- ७० मि. र बाँयापट्टि- ७० मि. गरी १४० मी. पहुच मार्ग निर्माण हुनेछ। भौगोलिक रुपमा २९°०३'१८.९६८" उत्तर अक्षांश र ८१°२७'३४.५२५"-पूर्व देशान्तरमा अवस्थित यस आयोजना निमार्णका लागि कुल लागत ६२,८०५,५७७.७४ रुपैया रहेको छ।

३.० प्रस्तावको सान्दर्भिकता

कर्णाली नदीको सहायक नदी कानेगढ खोला मूल उद्गम स्थल २७१९ मी. उचाईमा पर्दछ। प्रस्तावित पुल दैलेख जिल्लाको राकम र शेरबदा गाउँको सिमाना हुदै बग्ने पुलले जुम्ला, हुम्ला, कालिकोट र दैलेख जिल्लाको पहुँच बढाएको छ। विशेषत केही समयअघि नेपाली सेनाले कर्णाली राजमार्ग अन्तरगत ट्रयाक (पर्चा) खोलेर मुगु र हुम्ला जिल्लाको मानिसलाई जुम्ला जोडेको थियो। सडक एकल लेन कालो शिर्ष सडक रहेको छ। यथास्थानमा रहेको पुल (वेलि ब्रिज) ले यातायातका भारी उपकरण र मेसिनेरीको परिवहन सिमित गरेको छ। वेलि ब्रिजको कुल लोड असर क्षमता १५ टन मात्र छ। यस सन्दर्भमा, प्रस्तावित पुलले सुर्खेत-जुम्ला राजमार्गका मात्र नभई कर्णाली क्षेत्रका सम्पूर्ण मानिसहरुलाई अत्यधिक प्रतिक्षारत सडकको पहुँच प्रदान गर्दछ। यसबाहेक प्रस्तावित पुल डबल लेन स्ट्यान्डर्डको हुने हुदाँ आममानिसमा यातायातको सुविधा सजिलो, सहज र सुरक्षित हुनेछ।

४.० प्रस्तावको रेसनालिटि

वातावरण संरक्षण नियमावली, २०५४ को अनुसुची १ को नियम ३ अनुसार आयोजना निमार्णको कूल पूजी ५ करोड देखि २५ करोड सम्म भएमा ती आयोजनाको प्रारम्भिक वातावरणीय परिक्षण गर्नु पर्ने र सम्बन्धित मन्त्रालयबाट पारित हुनुपर्ने कानूनी प्रावधान रहेको छ। सो प्रावधानभित्र रहेर वातावरण संरक्षण नियमावली, २०५४ को अनुसुची ५ को नियम ७ अनुसार प्रस्तावित काने गड खोला पुलको प्रारम्भिक वातावरणीय परीक्षणको प्रतिवेदन तयार गरिएको छ। र उक्त प्रस्ताविक आयोजनाले वन-जङ्गल र संरक्षित क्षेत्र छुदैन।

५.० प्रारम्भिक वातावरणीय परिक्षणको उद्देश्य

यस प्रारम्भिक 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 न्यूनीकरण गर्ने उपायहरु पहिल्याउनु हो।

६.० कार्यविधि

यो अध्ययन प्रतिवेदन वातावरण संरक्षण नियमावली २०५४ को प्रावधान अनुसार तथा यसै प्रस्तावको मिति २०७३/१२/३१ स्वीकृत कार्यसूची (Terms of Reference) मा उल्लेख गरिए अनुसार तयार पारिएको हो। यसका लागि सान्दर्भिक ग्रन्थहरुको पुनरावलोकन तथा आयोजना प्रभावित क्षेत्रको निर्धारण गर्ने कार्य गरिएको छ। अध्ययन टोली द्वारा सामूहिक रुपमा २०७४ साल बैशाख महिनामा स्थलगत सर्वेक्षण गर्ने, आवश्यक सूचनाहरु संकलन गर्ने र स्थानीय समुदाय र सरोकारवालाहरु सँग समूहगत छलफल, परामर्श गर्ने कार्य गरियो। स्थलगत अध्ययन पश्चात् सरोकारवालाहरूको जानकारीको लागि राष्ट्रिय दैनिक आर्थिक अभियान मिति २०७४ साल बैशाख २१ गते सार्वजनिक सूचना प्रकाशित गरियो।

७.० विद्यमान वातावरणीय अवस्था

प्रस्तावित पुल कर्णाली प्रदेशको पहाडी भेगमा पर्दछ। आठबिस नगरपालिका-४, राकम कर्णाली, दैलेख मा पर्ने यस पुल कानेगाड खोला र कर्णाली नदीको दोभान भन्दा १ की. मी. माथि कानेगाड नदीमा पर्दछ। उक्त पुल निमार्ण क्षेत्र वरपर मुख्य गरी खोलाले बगाएर ल्याएको ढुङ्गा, माटो प्रशस्त रुपमा देख्न सकिन्छ। खोलाको सतह र हाल विद्यमान सडक विच करिव ३० मी. अन्तर भएको हुनाले त्यस क्षेत्रमा वाढीको न्यून सम्भावना रहेको छ। यसै गरी प्रस्ताव कार्यान्वयन गरिने क्षेत्र वरपर हाल कुनै किसिमको प्राकृतिक प्रकोपको जोखिम समेत नरहेको देखिन्छ। उक्त क्षेत्रमा सरदर १७०० मीमी वर्षात हुने गर्दछ। उक्त क्षेत्रमा भूकम्पको दृष्टिले मध्यम किसिमको जोखिम रहेको पाइन्छ। खेती योग्य जमिनको रहेको आयोजना कार्यान्वयन क्षेत्र नजिकै १ वटा सार्वजनिक धारा र २ वटा सिचाई नहर रहेको छ।

सिसौ, साल, सल्ला, खयर लागयतका वनस्पतीहरुको वाहुलियता रहेको बिलाने- सालकोट सामुदायिक वनबाट नजिकैको दूरीमा उक्त क्षेत्रमा पुल निमार्णका क्रममा कुनै पनि रुख कट्न नपर्ने देखिन्छ । आयोजना क्षेत्र वस्ती नजिकै भएको हुनाले वन्य जन्तुहरुको वासस्थान आयोजना क्षेत्र भन्दा केही पर रहेको छ । स्थानिय वासिन्दाहरुसँग अर्न्तक्रिया बाट प्राप्त तथ्याङ्क अनुसार आयोजना क्षेत्र वरपर स्याल, बँदेल, लंगुर, रातो बाँदर, आदी जस्ता वन्य जन्तुहरु पाइन्छ । चराहरुको सन्दर्भमा आयोजना क्षेत्र वरपर सानो तिरतिरे, कालिज, च्याखुरा आदी प्रजातिका चराहरु पाइन्छ ।

कानेगाड नदीमा पाइने माछाहरुमा चुच्चे असला, बुच्चे असला, तिते, ठेड, आदी पर्दछन् ।

जतिय हिसाबले क्षेत्री, ब्राहम्ण, माझी र दलित जातिको बासेबास रहेको उक्त क्षेत्रमा शिक्षा, स्वाथ्यको राम्रो प्रवन्ध रहेको छ । यद्यपी तुलनात्मक रुपमा हेर्ने हो भने पुरुषको तुलनामा महिलाहरु निकै कम साक्षर रहेको पाइन्छ । आयोजना क्षेत्रका स्थानिय वासिन्दाहरु सौर्य उर्जामानै निर्भर रहेको पाइन्छ । सडक सञ्जाल राम्रो भएका कारण केही घरधुरीहरुमा खाना पकाउन ग्यासको समेत प्रयोग हुने गर्दछ । सञ्चारको विषयमा उक्त क्षेत्रमा हाल नेपाल टेलिकम्को सि.डी एम.ए फोन र रेडियो जडि मात्रमा प्रयोगमा आएको पाइन्छ ।

शिक्षाका दृष्टाले आयोजना प्रभावित परिवारका सदस्यहरुको अधिकतम शिक्षा प्रमाणपत्र तह रहेको छ । व्यापार र वैदेशिक रोजगारी आयोजना प्रभावित परिवारको मुख्य अयश्रोत हो र त्यस वापत वार्षिक १००,००० देखि ५००,००० आम्दानी हुने गर्दछ । आयोजना प्रभावित घरहरुमा शौचालय प्रयोगको अवस्था अव्यवसतित भएको पाइन्छ । आयोजना क्षेत्र वरपरनै लैङ्गीक भेदभाव विद्यमान छ र विकासको पहुँचका हिसाबले महिलाहरु निकै पछी रहेका छन् ।

८.० वातावरणीय प्रभावहरु

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 कर्णाली विकासको सम्भावनाका ढोका खुल्नु सकारात्मक विषय हुन ।

नकारात्मक प्रभावहरुमा आयोजना कार्यान्वयन हुदाँ आयोजना निमार्णबाट ६ व्यक्तिगत संरचना (प्रभावित दुईवटा घर धुँरी) र ४ किता निजी जग्गा (४घर धुँरी) अधिकरण गर्नुपर्ने देखिन्छ। साथै एक सार्वजनिक धारा, दुई सिचाई नहरमा समेत असर पर्ने देखिन्छ । पुल निर्माण तथा सडक सुधारका क्रममा भित्ताहरु काट्दा वढ्न जाने 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, तथा सामाजिक कलह, दुर्घटनाका सम्भावनहरु, पेशागत स्वास्थ्य तथा सुरक्षाका सवालहरु, आदी पर्दछन् ।

९.० वातावरणीय प्रभाव न्युनिकरण तथा वातावरणीय व्यावस्थापन योजना

वातावरणीय प्रभाव न्युनिकरण गर्नका लागि यस प्रतिवेदनमा विभिन्न उपायहरु पहिल्याएको छ । जसमा प्राकृतिक 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 उपायहरु यस प्रतिवेदनमा उल्लेख गरिएको छ ।

आयोजना सँग सम्बन्धित कमदारहरुले स्थानिय 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 प्रस्तावित कानेगाड खोला 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. २८,७५,३६२.४०/- प्रस्ताव गरिएको छ । यसका साथै, सामाजिक व्यवस्थापन खर्च; भूमि अधिग्रहण तथा पुनर्वास खर्च बापत जम्मा रु. १,२१,७६,४००/- र उत्पादनमुलक तथा सीपमूलक तालिम बापत रु. ४,५०,०००/- प्रस्ताव गरिएको छ ।

१०.० निष्कर्ष

प्रस्तावित कानेगाड पुललाई कर्णाली विकासको मुख्य द्वारको रुपमा त्यस क्षेत्रका वासिन्दाहरुले लिएका छन् । उक्त पुल निमार्ण गर्दा वातावरणमा नकारात्मक प्रभावहरु कम पर्न र सो प्रभाहरुलाई प्रतिवेदनमा उल्लेख गरिएको उपायहरु अवलम्बन गरेमा सजिलै समाधान गर्न सकिने हुनाले यस पुल निर्माण प्रस्ताव यथाशिघ्र अघि बढाउन प्रारम्भिक वातावरणीय परीक्षण पर्याप्त छ ।

Executive Summary

1.0 The proposal

The Kane Gadh Bridge is proposed over the Kane Gadh Khola which is located along the Surkhet-Jumla Road at chainage (119+000) ➔ (140 + 000) at the boundary of two village i.e Sherabada and Khani bazzar of Aathabish Municipality-4, Rakam Karnali of Dailekh District, Karnali Province. The proposed location is 703 m above the mean sea level. The proposed bridge not only connects district but also links the people of Kalikot, Jumla, Humla and Dolpa through road network. The details of the proponent of the proposed project are as follows:

Road Sector Development Project Additional Financing (RSDPAF II)
Development Cooperation Implementation Division (DCID)
Department of Roads, Jwagal, Lalitpur
Through
Geo-Environmental and Social Unit (GESU)
Planning and Design Branch,
Department of Roads, Chakupat, Lalitpur

2.0 Details of the Proposal

The length of the proposed Kangad Bridge is 21.2 m while its breadth is 11m. The Kane Gadh khola is the tributary of Karnali River and make confluence with Karnali River approximately 1 km downstream distance from the project site. The construction of permanent concrete bridge over the Kane Gadh Khola requires construction of 140m approach road (70 m on either side of the bridge), which is more upgrading of existing road. The geographical location of the proposed bridge is 29°03'18.968"N and 81°27'34.525"E. The total cost for the construction of the proposed project is NRs. 62,805,577.74.

3.0 Relevancy of the Proposal

The Kanegad Khola is one of tributaries of Karnali River with the elevation 2719 m at its origin. The proposed Kanegad Bridge is located at the border of Rakam and Serabada village of Dailekh district and provides access to the people of Humla, Mugu, Jumla,

Kalikot and Dailekh district. In particular, Nepal Army has recently opened a tract along the Karnali Highway which connects the people of Humla and Mugu to Jumla. The road is single lane black top road. The existing bridge over the Kanegad Khola is Bailey bridge which limits the transport of heavy equipment and machineries. The total load bearing capacity of existing Bailey bridge is only 15 tons. In this regard, the proposed bridge not only serves the people residing along the Surkhet-Jumla Highway, rather it provides the highly awaited road access to the entire people of Karnali Province. Furthermore, the construction of the proposed bridge at double-lane standard even assures the year around safety of the passengers during the travel.

4.0 Rationality of the Proposal

As per the mandate on the EPR, 1997, according to Schedule-1 pertaining to Rule-3, project ranges from 5 Crore to 25 Crore have to do Initial Environmental Examination (IEE) and get subsequent approval from concern ministry. In staying to this provision, Initial Environmental Examination (IEE) of Kane Gadh Bridge Report is prepared in accordance with the Rule-7 and Schedule-5 of EPR 1997. And the proposed project doesnot include forest and Consrvation areas.

5.0 Objectives of IEE

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

6.0 Methods adopted for IEE study

The IEE report has been prepared based on the mandate of EPR. For this Terms of Reference had been prepared and approved by the MoPIT dated on Chaitra 31, 2073 (April 13, 2017). Then after literature review, field visit (on May 2017) to collect environmental baseline after publication of public notice dated on 2074/01/21 (May 4, 2017) was done on Arthik Abhiyan National Daily. 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.

7.0 Existing Environmental Condition

The proposed location for the implementation of Kane Gadh Bridge lies in the Mountain region of, Karnali Province. The proposed location is about 1 km upstream from the confluence of Kane Gadh Khola and Karnali River. Mostly alluvial deposits are available around the proposed bridge location. The existing road and settlement is about 30 m above the river channel and thus the chance of flooding is very low in case of Kane Gadh Khola. The hills on either side of the Kane Gadh Khola are relatively stable and the probability of natural disasters is low. The rainfall on the area is around 1700 mm. From the earthquake perspective the area is less vulnerable. Agricultural and Settlement land dominates the land use of the area and one public tap and two irrigation canal are the public structures that lies near the bridge axis.

Sisau, Sal, Pine, Khair etc. are the dominant vegetation observed in the Belaney Salkot Community forest near the proposed location. During construction no trees needs to be cut down. The location for the construction of the bridge lies near the settlement and thus, the area is not the habitat of the wildlife. An interaction with the local people suggests that Jackal, Boar, Langur, Monkey etc. are the wildlife observed around the forest of project affected Municipality. Similarly, birds like Kalij, Chakhura etc. are common in that area. Asla, Sahar, Thed etc. are the common fish species observed in the Kane Gadh Khola.

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

The highest education received the members of project affected families is Intermediate Level. Business and Agriculture are the main occupation of the members of project affected families and they earn about NRs. 1, 00,000 to 5, 00,000 per month from their regular occupation. The status of toilet use is very poor around the project affected area. Women are vulnerable in this area. Discrimination between the sexes can be seen.

8.0 Environmental Impacts

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

Adverse environmental impact include, the proposed bridge affects 6 structures owned by 2 house owners and 4 land parcels owned by 4 house owners including one public tap and two irrigation canal during the construction of bridges belonging to private owner will be acquired during the construction of the proposed bridge. The risk due to excavation of hill slope for the construction of the bridge, 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, social issues associated with land acquisition, possibility of accidents, issues associated with occupational health and safety, etc.

9.0 Environmental Impact Mitigation and Environmental Management Plan

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

instruments, improvement and conservation of religious and cultural sites, etc. in the IEE report.

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. 28,75,362.40 has been allocated. Similarly, the Total Social Management/ Mitigation cost for Land Acquisition, Resettlement & Rehabilitation Cost (NRs.1,21,76,400.00) and Income Restoration & Skill Development Training for Affected HHs (NRs. 4,50,000.00) NRs. 12,626400.00 has been allocated.

10.0 Conclusion

The project have very minimal environmental impacts that can be mitigated through the mitigation measures proposed in this document and the construction of the Kane Gadh Bridge will open all the possibility for the overall development of Karnali Province. Thus, it has been concluded that IEE is sufficient for the project to undergo construction with the implementation of all the mitigation measures.

Acronyms and Abbreviations

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

IRC	:	Indian Road Congress
IRDST	:	Income Restoration and Skill Development Training
IUCN	:	International Union for Conservation of Nature
J	:	Joint
KII	:	Key Informant Interview
LC	:	Least Concern
LCF	:	Local Consultative Forum
LCLA	:	Local Community Liaison Assistant
LPG	:	Liquid Petroleum Gas
MoFE	:	Ministry of Forests and Environment
MoPIT	:	Ministry of Physical Infrastructure and Transport
NEPAP	:	Nepal Environmental Policy and Action Plan
NGO	:	Non-Governmental Organization
N-M	:	Narayanghat-Mugling
NT	:	Near Threatened
PAH	:	Polycyclic Aromatic Hydrocarbons
PAP	:	Project Affected Person
PSC	:	Pre-Stressed Concrete
PWD	:	Public Works Directive
RAP	:	Resettlement Action Plan
RCC	:	Reinforce Cement Concrete
RSDPAF	:	Road Sector Development Project Additional Financing
RSDP	:	Road Sector Development Project
SLC	:	School Leaving Certificate
SPSS	:	Statistical Package for the Social Sciences
SRN	:	Strategic Road Network
TMT	:	Thermo Mechanically Treated
ToR	:	Terms of Reference
VOC	:	Volatile Organic Compounds

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CHAPTER 1: NAME AND ADDRESS OF THE PROPONENT

1.1 Proponent

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

Road Sector Development Project Additional Financing (RSDPAF II)

Development Cooperation Implementation Division (DCID)

Department of Roads, Jwagal, Lalitpur

Through

Geo-Environmental and Social Unit (GESU)

Planning and Design Branch

Department of Roads, Chakupat, Lalitpur

1.2 Consultant

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) Terms of Reference (TOR) for IEE as per task A 402 assigned for Consultants and accordingly the consultants has prepared the IEE report of the proposed bridge. 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*: 977-04479361*

*Email:****safe@ermc.wlink.com.np,***

Web: www.ermcnepal.com

Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads
Development Cooperation Implementation Division
Jwagal, Lalitpur

1.3 Study Team Composition

The following team members were involved during this IEE study of the Bridge project.

S.N.	Name	Position	Qualification
I.	Ashok K.C.	Team Leader(IEE)/ Environment Expert	MSc. Environmental Science
II.	Chintamani Sharma	Sociologist	M.A Rural Development
III.	Manish Pratap Singh	Civil Engineer	BSc. Civil Engineer
IV.	Dr. Prakash Das Ulak	Engineering Geologist (National)	Ph.D in Sedimentology of the Siwalik Group of Nepal Himalaya (Geology)

CHAPTER 2: SUMMARY OF THE PROPOSAL

2.1 Introduction

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

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

In this regard, construction of Kane GadBridge was proposed along the chainage of (119+000)→(140+000) along Surkhet-Jumla Road. The proposed bridge has total length of 21.2 m with a single span. This Initial Environment Examination (IEE) has been prepared so as to incorporate environment and social safeguard measures in the design for new construction of Kane Gadh Bridge.

2.2 Objectives of Terms of Reference (ToR)

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

2.3 Objectives of IEE

The objectives of IEE are as follows:

- Identify and predict the major issues (positive and negative) that may arise as a result of proposed works on physical, biological, socio-economic and cultural environment of the project area
- Identify further enhancement measures for positive impacts and compensatory mitigation measures for the significant adverse impacts
- Develop Environmental Management Action Plan and develop a practical Environmental Monitoring Plan
- Make sure that IEE is sufficient for the proposed project.

2.4 Rationality of IEE

As per the mandate on the EPR, 1997, according to Schedule-1 pertaining to Rule-3, project ranges from 50,000,000 to 250,000,000 have to do Initial Environmental Examination (IEE) and get subsequent approval from concern ministry. In staying to this provision, Initial Environmental Examination (IEE) of Kane Gadh Bridge Report is prepared in the accordance with the Rule-7 and Schedule-5 of EPR 1997.

2.5 Relevancy of the Proposal

The Kane Gadh Khola is one of tributaries of Karnali River with the elevation 2719m at its origin. The proposed Kane Gadh Bridge is located at the border of Rakam and Serabada village of Dailekh district and provides access to the people of Humla, Mugu, Jumla, Kalikot and Dailekh district. In particular, Nepal Army has recently opened a tract along the Karnali Highway which connects the people of Humla and Mugu to Jumla. The road is single lane black-top road. The existing bridge over the Kane Gadh Khola is Bailey bridge which limits the transport of heavy equipment and machineries. The total load bearing capacity of existing Bailey bridge is only 15 tons. In this regard, the proposed bridge not only serves the people residing along the Surkhet-Jumla Highway, rather it provides the highly awaited road access to the entire people of Karnali Province. Furthermore, the construction of the proposed bridge at double-lane standard even assures the year around safety of the passengers during the travel.

2.6 Impact on Land Use

The land use pattern comprises Grassland (0.04 ha), Agriculture land (0.08 ha), Barren land (0.154m) and River Side Land (0.05m) used for temporary and permanent purpose .The construction of Kane Gadh Bridge and 70 m approach road on either side of the bridge requires about 0.204 ha (0.154m+0.05m) as in table 3.6 of land belonging to various land use categories permanently such as barren hill slope (Serbada Side) River and Flood Plain for construction. The hill slope around on the front side of the bridge (Serabada side) is very steep and excavation over such slope should be done with special attention with the immediate implementation of mitigation measures.

Table 2.1: Impact on Land Use

Project Components	Land Use	Land Requirement	Area(ha)
Approach Road and Bridge axis and river training	Barren Hill slope (Serbada Side) , River and Flood Plain	Permanent	0.154

Construction Yard and Stockpiling Area	Grassland (left side of the Surkhet-Jumla Road, about 200m from the proposed bridge)	Temporary	0.04
Construction Camp	Grassland, Agriculture Land (left side of the Surkhet-Jumla Road, about 200m from the proposed bridge)	Temporary	0.08
Spoil Disposal	River Bank (First one is 200 m u/s from the existing Bailey Bridge on the left bank of Kane Gadh Khola, while the second one is 1km d/s from the existing bridge on the right bank of Karnali River)	Permanent	0.05

Source: Field Survey, 2016

2.7 Adverse Impacts on Environment, Impact on Human Life, and Population Pressure

Construction of Kane Gadh Bridge (Surkhet-Jumla Road) will definitely have impacts on Environment, Human life and Population. From field visit and experts judgment it is seen that some short term adverse impact will occur within construction areas. Some of the impacts are listed below:

- Change in morphology, longitudinal profile/river bed and hydrological character of regime of river and inundation in the upstream section
- Change in land use and loss of productive soil
- Landslides, slope destabilization and soil erosion
- Environmental issues associated with sand and gravel extraction
- Spoil and construction waste disposal
- Road diversion and related issues
- Contamination of soil (Due to leakage of waste fuels, grease and lubricants)
- Stockpiling of materials/issues related to stockpiling yard
- Air and noise pollution
- Environmental issues associated with work camp

- **Occupational health and Safety**
- **Impacts associated with the transportation of construction materials**
- **Impact associated with bridge safety during project construction**
- **Disturbance to wildlife and biodiversity**
- **Damage to aquatic habitat, and barriers to fish/aquatic movement**
- **Social Conflicts**
- **Accidental risks**
- **Loss of productive land**
- **Land and property acquisition, compensation, resettlement and rehabilitation**

Table 2.2: No. of HHs to be affected during the implementation of proposal

S.N.	Location of Affected House and Households Name and Address	Chainage	Number of HHs
1.	Affected House Namsara Majhi at Kane Gadh Khola, Khani Bazar at Ch.119+140 on Rakam Karnali, Aathabish Municipality- 4, Dailekh of Surkhet to Jumla road Section	Ch.119+140	2
2.	Affected House of Lal Bahadur Shahi at Kane Gadh Khola, Khani Bazar at Ch.119+140 on Rakam Kamali, Aathabish Municipality- 4, Dailekh of Surkhet to Jumla road Section	Ch.119+140	

(Source: Updated RAP, February, 2018)

2.8 Damage to be suffered by local goods and objects

It is seen that there is direct impact to be suffered by local goods and objectives. Only two irrigation canal and one public water tap will be affected during the bridge construction time.

Table 2.3: List of Public/Community items that will be affected during construction

S.N.	Public structure	Distance from the project area(m)	Numbers of User's Households
1.	1 Public tap	200	50-55 HHs
2.	2 Irrigation canal	200	Above 300 ropani

(Source: RAP, 2015)

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CHAPTER 3: DESCRIPTION OF THE PROPOSAL

3.1 Type of Proposal

This is a construction of a minor bridge proposal which length is ≤ 50 m (with span ≤ 25 m) but the total project cost for the construction range between 50,000,000 to 250,000,000 (i.e. NRs. 62,805,577.74). So, as per the mandate on the EPR, 1997, according to Schedule-1 pertaining to Rule-3, project ranges from 50,000,000 to 250,000,000 have to do Initial Environmental Examination (IEE) and get subsequent approval from concerned ministry. In staying to this provision, Initial Environmental Examination (IEE) of Kane Gadh Bridge Report is prepared in the accordance with the rule-7 and Schedule-5 of EPR 1997.

3.2 Salient Features

The salient features of the proposed bridge are presented in the Table 3.1.

Table 3.1: Salient Features of the Project

Name of the Project	Kane Gadh Bridge
Province No.	6
Province	Karnali
District	Dailekh
Municipality	Aathabish Municipality- 4, Rakam Karnali of Dailekh District (Former Rakam Karnali VDC-4, Dailekh)
Name of the Road	Surkhet-Jumla Road
Chainage of the Bridge site	(119+000)→(140+000)
Geographical Location	29°3'18.968"N, 81°27'34.525"E
Classification of Road	Highway
Approach Road	70 m on either side of Bridge
Type of Road Surface	Bituminous
Terrain / Geology	Hilly
Structure	
Total length of the Bridge	21.2 m
No of span	1 x 20.0 m
Total width of the bridge	11 m
Width of Carriage way	7.5
Width of Footpath with railing	1.5
Spacing between existing and proposed bridge	10m (center to center)
Type of Structure	
Type of Superstructure	RCC T Beam Bridge
Type of Bearing	Elastomeric
Type of Abutment	RCC(Cantilever)
Foundation	Open

Design Data	
Live Load	IRC class 70R, Class A
Net bearing capacity of soil	500 KN/m^2
Design Discharge	282 m^3 /sec
Grade of Concrete	
In superstructure	M 35
In substructure	M 25
In foundation	M 25
Grade and quantity of reinforcing steel: TMT having characteristic strength of 500 N/mm^2	
Environmental Cost (EMP Cost)	NRs. 28,75,362.40
Social Cost	NRs. 1,26,26,400.00
Total Project Cost	NRs. 62,805,577.74 (Excluding EMP Cost and Social Cost)

(Source: Design Report of Kane Gadh Bridge, 2016)

3.3 Location of Proposal

- **Location of Proposal in topographical map**

The proposed sub-project i.e. Kane Gadh Bridge lies along the Surkhet-Jumla road at chainage 119+140. Kane Gadh Bridge has been proposed at Khani Bazar of **Rakam Karnali, Aathabish Municipality- 4, Dailekh District, Karnali Province**. The geographic location of the proposed bridge is 29°03'18.968" N and 81°27'34.525" E and the elevation is 703 m above mean sea level.

The topography near the proposed bridge location is characterized by the presence of steep river valley topography with higher gradient on both side of the river bank. The land use pattern around the project reveals the presence of agricultural, residential and barren land in the dominant proportion. One of the famous market place (Rakam) is present near the proposed bridge. The location map (figure 3.1), topographical map (figure 3.2) and Google map (figure 3.3) is shown below:

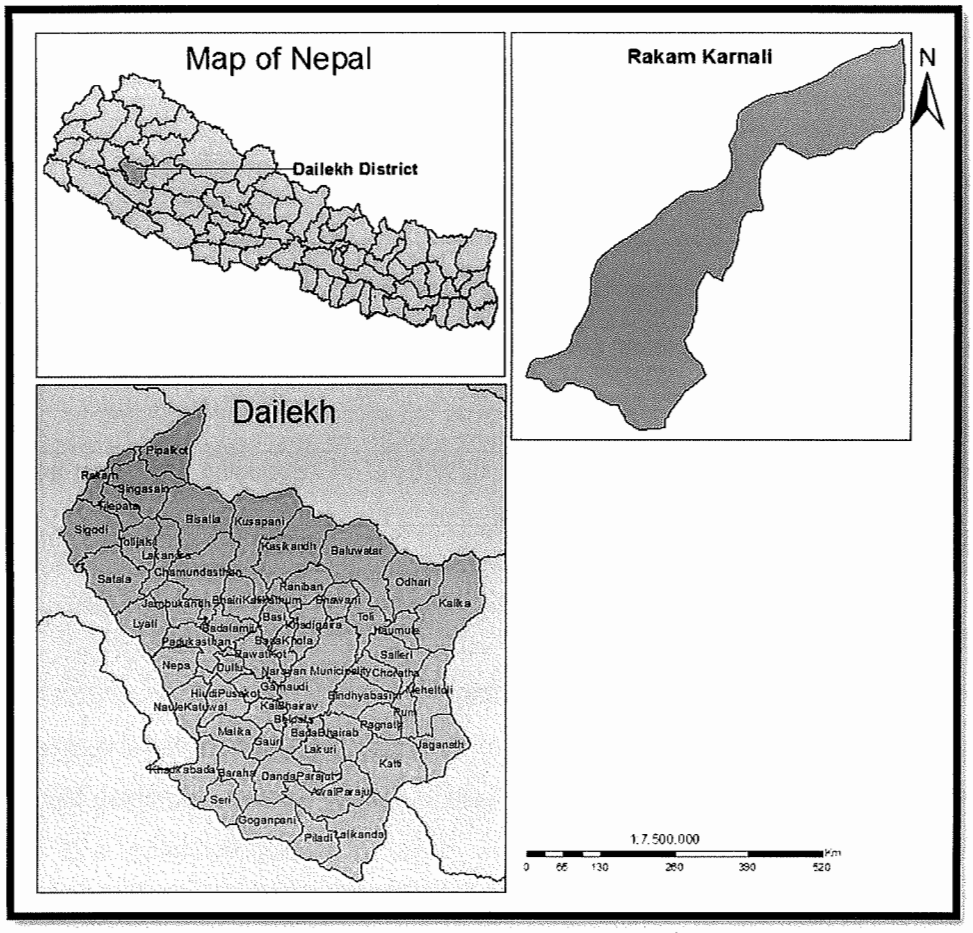

Figure 3.1: Location map of Proposed Project (Source: - GIS 10.3)

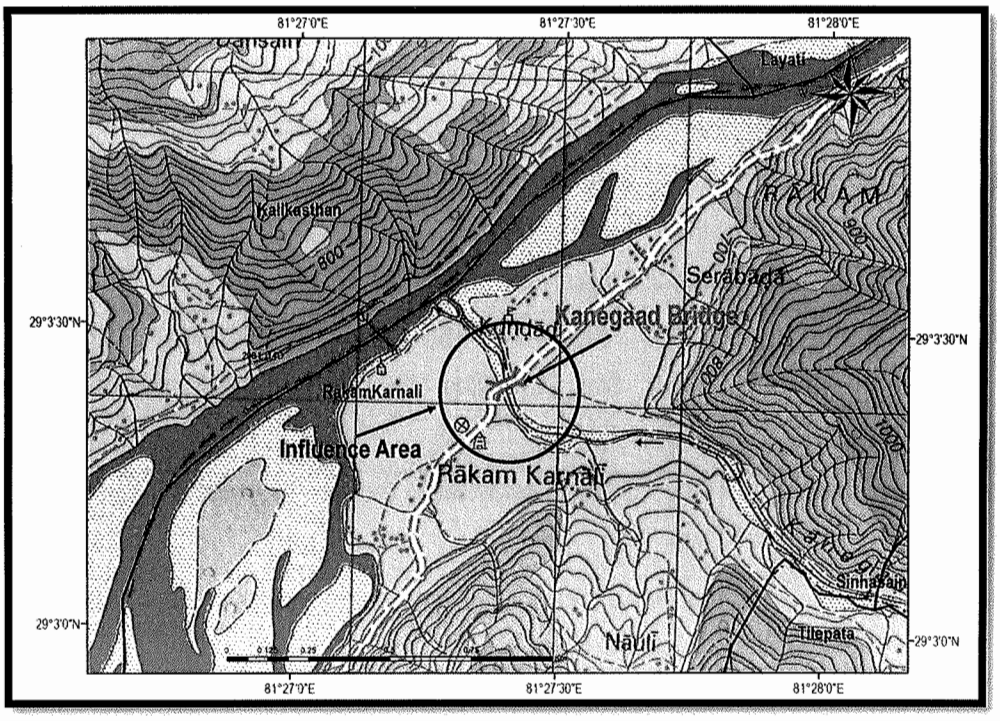

Figure 3.2: Topographical Map Showing Study Area and Project Impact Area
(Source: - GIS 10.3 on the Topographical maps, Department of Survey)

➢ Alignment map of proposal in topographical map

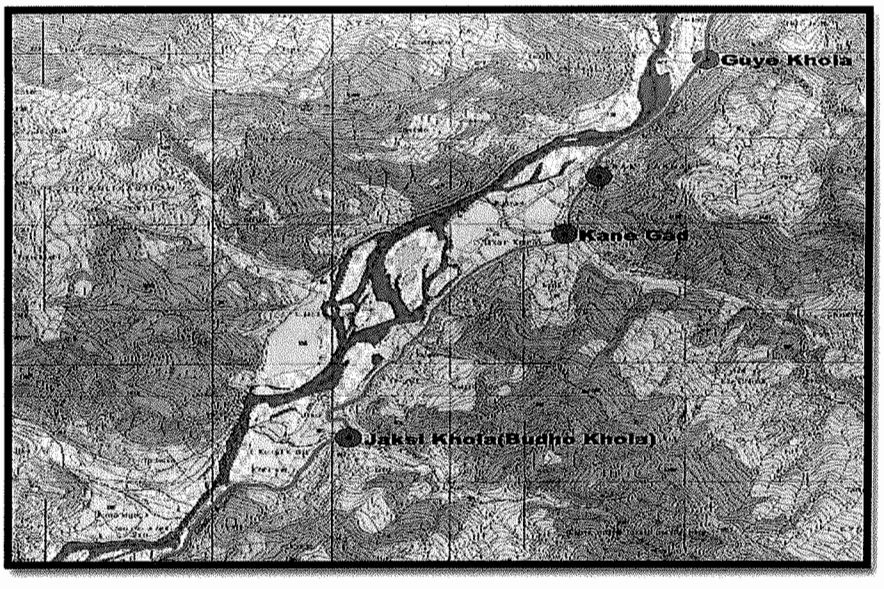

Figure 3.3: Project Site in Topographical Map

(Source: - GIS 10.3 on the Topographical maps, Department of Survey)

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3.4 Impact Area Delineation

The project impact areas were identified during the preparation of ToR. Such areas were delineated based on the field conditions and nature of project development using the similar past experiences of the experts involved in the IEE process. Based on the environmental impacts of the project, the project-affected areas are classified as the following Table 3.2.

Table 3.2: Impact Area Delineation of the Project

Direct Impact Areas	Project implementation site, the adjacent land plots, built up structures, houses, Quarry Site, Stockpiling Site, Camp Site 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 i.e. **Aathabish Municipality, Dailekh District, Karnali Province**

3.5 Materials to be used

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

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

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

Table 3.3: Construction material to be used during the project

Construction Materials	Quantity	Unit
Steel Structure	-	-
Steel Bars (for deck slab, approach slab)	92.14	MT
Concrete	1214.33	M^3
Cement	464.41	MT
Sand	545.31	M^3
Aggregate	1073.07	M^3
Boulders/Stones	1310	M^3
Cable Wire	-	-
Gabion Boxes	1185.55	M^2
Binding Wire	1304.11	Kg

(Source: Design Report of Kane Gadh Bridge, 2076)

3.6 Human Resource Requirements

The construction of the proposed bridge requires an estimated 60 workers, among them 20 will be skilled and unskilled whereas 40 will be unskilled workforce. The project will prioritize the local people in proposed bridge construction works.

3.7 Resources required during implementation of the proposal

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

3.7.1 Total cost of the project including Environmental & Social Cost

Total cost of the project including Environmental & Social Cost for the implementation.

Table 3.4: Total cost of the project including Environmental & Social Cost

S.N.	Particulars			Cost (NRs.)
1	Total Cost of the Project			62,805,577.74
2	Environmental Cost (EMP Cost)	Mitigation measure under physical environment	18,95,362.4	28,75,362.40
		Environmental Monitoring	980,000.00	
3	Social Cost	Land, properties acquisition, resettlement and rehabilitation cost	1,21,76,400.00	12,626400.00
		Income Restoration and Skill Development Training for Affected HHs	450,000.00	

3.7.2 Land use (temporary and permanent)

The land use around the proposed bridge is dominated by settlement, grassland and cultivated land. Community Forest (Belaney Salkot CF) is located at about 500 m from the bridge location.

Table 3.5: Land use (temporary and permanent)

Land type	Temporary/ Permanent	Project Component				Total (ha)
		Approach Road and Bridge axis and river training	Construction Yard and Stockpiling Area	Construction Camp	Spoil Disposal	
Private	Temporary	0	0	0.08		0.08
	Permanent	0.154	0	0		0.154
Government	Temporary	0	0.04	0		0.04
	Permanent	0	0	0	0.05	0.05
Total (ha)		0.154	0.04	0.08	0.05	0.324

3.7.3 Construction technology (with used machinery and tools) and implementation mechanism

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

3.8 Methods adopted during study

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

3.8.1 Desk Study

3.8.1.1 Literature review, maps interpretation

Available useful data and information from various sources pertaining with the project's IEE study will be collected and reviewed. Such sources of information included existing laws, rules, guidelines and manuals, DPR, IEE reports of similar projects, Environment and Social Management framework published by DoR, GESU.

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

3.8.1.2 Checklist Format/Questionnaire preparation

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

3.8.1.3 Field Study

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

Detailed Engineering Survey and design of the Kane Gadh Bridge Project shall be reviewed to determine the nature and scope of activities of the project.

3.8.2.1 Survey

- **Survey DIZ and IIZ (all domains; physical,biological, Socio-economic and cultural environment)**

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

Table 3.6: Methods to collect the baseline data

Data Collected	Methods/ Tools
• ***Physical Environment***	
Physiography, Topography, Land use type and land use classification,	GIS 10.3 analysis on the topographical maps published from the Department of Survey, Google image.
Hydrology - drainage network and drainage density	GIS (QGIS Brighton 2.6.1) analysis on the topographical maps published from the Department of Survey, Google image.
Geology – rock types and rock classification, seismicity, stability	Field Investigation / Direct Observation, Analysis of geological map as published by Department of Mine and Geology.
Soil Type and soil condition	Field observation, soil analysis
Sound / Noise meter	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	Direct observations for observatory parameters and available secondary information
• ***Biological Environment***	
Vegetation analysis	Field enumeration / survey
Faunal Environment	Key Informant Interview (KII)
Aquatic Animals	Field Sampling of Macro-invertebrates/ Macrophytes, Visual Observation/ Key informant Survey, past literatures for Fishes
• ***Socio-economic and Cultural Environment***	
Demographic, Economic, and social services and facilities, Occupation and Education	Secondary Information from CBS, District Coordination Committee (DCC), 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, FGD

- **Household survey for impacted household**

Detailed household survey of HHs impacted has been done based on Checklist Format/Questionnaire prepared (Annex I).

3.8.2.2 Focus Group Discussion (FGD-in Right of Way-RoW and Settlement)

The local people in project area, concerned government organizations, local NGOs, CBOs, etc. were consulted during IEE study. In accordance with the Rule (7.1) of Environment Protection Rules, 1997, a 15-day public notice published in a national daily newspaper, Arthik Abhiyan on 4th May, 2017. Furthermore, the copies of public notice were pasted at public places of project area and their evidences (Muchulka) were collected.

Public Consultations: The IEE team carried out a consultation meeting on 2074-01-29 at Serabada of Rakam Karnali, Aathabish Municipality-4, Rakam Karnali of Dailekh District, Karnali Province. 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.

Issue and Suggestion of local people during Consultation:

- The project should be implemented as soon as possible.
- The project should provide the employment opportunities to the local people.
- The project should not affect the market located near the project location.

- The project should be implemented with minimal environmental impacts.
- The environmental impacts of the project should be mitigated with suitable mitigation measures.
- The construction of project should not impede the Highway.

Information Disclosure: Approved IEE reports will be sent to Rakam Karnali, Aathabish Municipality-4, Dailekh District, Karnali Province and Dailekh DCC 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

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

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

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

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

3.8.2.3 Walk through survey/measurement with GPS tracking

The construction site is surveyed by walking over. The biological environment information can be easily gathered by walk through survey in the construction site. With a GPS tracking device the chainage of the construction site, impacted site/households, forest areas and impacted public as well as private structures can be determined.

3.8.3 Impact Identification, Prediction and Evaluation

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

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

3.8.4 Data Analysis and Interpretation

Similarly, pertinent sources of secondary information shall be identified, collected and reviewed to build acquaintance with the environmental settings of the project area under physical, biological and socio-economic and cultural domains of the environment. These sources included publications of DCC Dailekh, CBS, NGOs, INGOs, CBOs and other governmental and non-governmental organizations and various research papers. Data on rainfall and other meteorological conditions shall also acquire from DHM.The experts of the relevant field analyzed the primary and secondary information qualitatively and quantitatively. Physical, chemical, biological, socio-economic, and cultural information were assembled and tabulated. The information were crosschecked and analyzed by the respective experts. The data were processed using computer-based spreadsheet (Excel) and SPSS and were presented in tabular and pictorial forms.

3.8.5 Report preparation and Report Presentation

After identifying, predicting and evaluating the impacts; the primary data collected from the field study (surveys and FGD) and the secondary data collected from different publications DCC Dailekh, CBS, NGOs, INGOs, CBOs and other governmental and NGOs and various research papers are analysed and then a report is prepared. The report prepared consists of all the description of the construction area, the expected beneficial as well as adverse impacts their mitigation measures and expected costs. The report further goes to the presentation process.

3.9 Detail particular of the area (Baseline information)

3.9.1 Socio-economic and Cultural Environment

3.9.1.1 Project Affected Ward of Municipality

The proposed Kane Gadh Bridge project lies in Rakam Karnali, Aathabish Municipality-4, Dailekh District; Karnali Province is the project affected ward of municipality of proposed Kane Gadh Bridge. The socio-economic information of the project affected ward of municipality is given below:

a. Demography

According to National Population Census of 2011, the total population of Rakam Karnali, Dailekh District is 2,814. The population of female in Rakam Karnali is slightly greater than male. The details of population distribution are presented in the following table:

Table 3.7: Demographic Characteristics of the Project affected ward of Municipality

District	Ward	Household	Population			Average household size	Sex Ratio
			Total	Male	Female		
Dailekh	Rakam Karnali , Aathabish Municipality-4	556	2,814	1,344	1,470	5.06	91.43

Source: CBS, 2011

b. Caste/Ethnicity Composition

According to the National Population Census of 2011, Chhetri is the dominant ethnic group in terms of population in the project affected ward no. 4 of Aathabish Municipality, Rakam Karnali. Kami is the second large ethnic groups found. Other ethnic groups within the project affected ward are Brahmin, Thakuri, Damai, Sarki, etc. The ethnic composition of the project affected ward of Aathabish Municipality, Rakam Karnali, is presented in the following table:

Table 3.8: Population distribution around project ward of Municipality according to Caste/Ethnicity Composition

Caste/Ethnicity	Total	Percentage (%)
Rakam Karnali , Aathabish Municipality-4		
Chhetri	1675	59.52
Brahman-Hill	61	2.16
Magar	20	0.71
Musalman	27	0.95
Kami	647	22.99
Damai/Dholi	64	2.27
Thakuri	247	8.77
Sarki	26	0.92
Sanyasi/Dashnami	26	0.92
Majhi	11	0.39
Others	10	0.35
All Castes	2814	100

Source: CBS, 2011

c. Sanitation and Drinking water facilities

According to the National Population Census of 2011, about 44% of the households in Project Municipality do not have toilet facility. The proportion of households with flush toilet is found to be much greater than the ordinary toilet in affected Municipality. The sanitary facility in Rakam Karnali is found to be not satisfactory. The table below shows the status of toilet facility in project affected ward of Municipality.

Table 3.9: Household proportion with and without toilet facility around project affected ward of Municipality

District	Ward	Total Households	Households without toilet facility	Household with facility of		Toilet facility not stated
				Flush Toilet	Ordinary Toilet	
Dailekh	Rakam Karnali, Aathabish Municipality-4	556	246	301	5	4

Source: CBS, 2011

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

Table 3.10: Drinking water facilities around the project affected ward of Municipality

District	Ward	Total Household	Main Source of Drinking Water				
			Tap/ piped water	Covered well/ kuwa	Uncovered well/ Kuwa	Spout water	River/ Stream
Dailekh	Rakam Karnali , Aathabish Municipality-4	556	256	0	41	126	130

Source: CBS, 2011

d. Energy usage

The project Municipality has majority of households that use firewood as the main source of fuel for cooking while other sources do not contribute to any. Only 12 of the households in project affected ward of Municipality is found using LPG as fuel for cooking purpose. The details of the source of fuel for cooking in project affected ward of Municipality are given in table below:

Table 3.11: Fuel used for cooking purpose in project affected ward of Municipality

District	Ward	Total Household	Fuel usually used for cooking					Not-stated
			Wood/ Firewood	Kerosene	LPG	Santhi/ Guitha (Cow dung)	Biogas	
Dailekh	Rakam Karnali , Aathabish	556	538	0	12	0	0	3

	Municipality-4							

Source: CBS, 2011

Electricity covers significantly larger proportion of energy source for lighting in affected ward of Municipality whereas 25% of the households use solar for lightingHowever, none of the households are found to be using Kerosene and biogas to light their houses. The details of the source of fuel for lighting in project affected Municipality are given in table below:

Table 3.12: Fuels used for lighting purpose around affected ward of Municipality

District	Ward	Total Household	Fuel usually used for lighting				Others
			Electricity	Kerosene	Biogas	Solar	
Dailekh	Rakam Karnali , Aathabish						
	Municipality-4	556	279	0	0	140	133

Source: CBS, 2011

e. Education and health facilities

As per the National Population Census of 2011, the literacy rate of Rakam Karnali is 62%. However, the male literacy rate (75.55%) is higher than that of the female literacy rate (51.43%). The details of the literacy status of the project affected ward of Municipality are given in the table below:

Table 3.13: Literacy Status of the Project affected ward of Municipality

District	Ward and sex	Population who			Literacy Rate (%)
		Can read & write	Can read only	Can't read & write	
Dailekh	Rakam Karnali , Aathabish Municipality-4				
	Both Sex	1,514	85	797	62.90
	Male	865	41	236	75.55
	Female	649	44	561	51.43

Source: CBS, 2011

f. Communication facilities

Radio and mobile phones are the major and most widespread communication facilities available within the project Municipality. Other sources of modern communication facilities like television, computer, and telephone are very less. However, none of the households are found to have cable television and internet facilities. The details of the available communication facilities in the project affected ward of Municipality are given in the table below:

Table 3.14: Communication facilities in project affected ward of Municipality

District	Ward	Total	Household having facilities of					
			Radio	TV	Cable TV	Computer	Telephone	Mobile Phone
Dailekh	Rakam Karnali , Aathabish Municipality-4	556	250	50	5	5	6	235

Source: CBS, 2011

3.9.1.2 Direct Impact Zone

a. Demographic Composition

There are 13 households located within the direct impact zone of the proposed sub-project. The total population of the direct impact zone is 72, with the population of male slightly greater than the population of female. Furthermore, the average household size is 5.54.

Table 3.15: Demographic characteristics of direct impact zone

Name of bridge	Affected HHs	Male	Female	Total	Family size
Kane Gadh Khola	13	42	30	72	5.54

(Source: RAP, 2015)

b. Caste/ Ethnicity Composition

The project construction site is located in Karnali Province of Nepal. 13 household will be affected by the construction of bridge. Among the affected households 5 HHs belonging Chhetri, 3 households Dalit, 3 are Janajati, and remaining two are Thakuri of the survey households. The table below shows the ethnic composition.

Table 3.16: Caste/Ethnicity Composition

S.N	Caste/Ethnicity	Households	Percentage
1	Chhetri	5	38.46
2	Dalit	3	23.08
3	Janjati	3	23.08
4	Thakuri	2	15.38
Total		13	100.00

(Source: RAP, 2015)

c. Age Distribution

Among the project affected population, majority (54%) populations are economically active and remaining 46% populations are between 0-15 years and above 60 years, which indicates that these age group populations are economically inactive and dependent for their livelihood. The table below shows the age distribution of the project affected households.

Table 3.17: Age Distribution of Direct Impact Zone

Age Distribution	Population	%
Below 5 Years	7	9.72
6-15	23	31.94
16-60	39	54.17
Above 60 Years	3	4.17
Total	**72**	**100.00**

(Source: RAP, 2015)

d. Education and Literacy Status

There is Secondary level school located near from the settlement and students have to travel about an hours for higher secondary level education. About 94% are literate and 6% are illiterate. The student's dropout rate seems increasing in higher education. About 14% populations have received informal education and can read and write only. Majority of the affected population, 35% are in primary level which decreased and about 7% are passed SLC and 3% have intermediate and remaining 2% have Bachelor above. None of them have Master's above. The table below shows the education level.

Table 3.18: Literacy Status

S.N	Education	No.	Percentage
1	Illiterate	4	6.15
2	Literate	9	13.85
3	Class 1-5	23	35.38
4	Class 6-10	21	32.31
5	SLC	4	6.15
6	Intermediate	2	3.08
7	Bachelor	1	1.53
8	Master's above	0	0.00
Total		65	100.00

(Source: RAP, 2015)

e. 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, 46 percent HHs have a source of income from business. Following table shows major sources of income of affected people.

Table 3.19: Major Sources of Income

S.N	Major source of Income	Households	Percentage
1	Wages (Local)	1	7.69
2	Wages (Out)	2	15.38
3	Sale of House and Livestock	1	7.69
4	Services	2	15.38
5	Business	6	46.15
6	Foreign Employment	1	7.69

7	Others	0	0.00
Total		**13**	**100.00**

(Source: RAP, 2015)

f. Food Sufficiency Level

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

Out of the total project affected households about 31% (4) have not a agricultural land so they have managed from their alternative income sources. About 38 percent of households have food sufficiency for 6-9 month. This is the clear reflection of the food security problem in these areas.

Table 3.20: Food Sufficiency from Own Agricultural Production

S.N.	Range of food sufficiency	Households	Percentage
1	No agriculture	4	30.77
2	<3 Months	0	0
3	3-6 Months	4	30.77
4	6-9 Months	5	38.46
5	9-12 Months	0	0
Total		13	100

(Source: RAP, 2015)

g. Measures to Meet Food Deficit

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

h. Level of Income

Local business is the major sources of income among the affected HH. The range of income shows that they have different range of income level. All of the affected households earn NRs 100,001 to 500,000 per year.

i. Level of Expenditure

There seems similarity between income and expenditure of the population of DIZ. Among the affected households, 46 percentage households are expenses above 100,000 per year and remaining 54 percent have below 100,000 expenditure per year.

j. Health and Sanitation

District hospital is located in district headquarters of Dailekh districts is center for treatment of affected people. Mostly people visit Birendranagar, Surkhet and Nepalgunj for better treatment but minor cases

are treated in village based service centers. Sub-health post is located in one-hour travel is the nearest health facility received by the affected households.

k. Source of Water

The water source is local springs. Among the total affected households' about 100 percent HHs have used a community tap managed by themselves. The water managed from source to their yard. Twenty four-hour water supply facility is available in the project area.

l. Toilet Facility and Defecation Practice

Open defecation practice is still prevailed in bridge construction site. Majority 69 percent of the affected households have a toilet facility. Remaining 31 percent (4) houses uses 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.

m. Gender Status

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 high 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 also.

3.10.2 Physical Environment

3.10.2.1 Physiography and Geomorphology

The proposed site for the construction of Kane Gadh Bridge is located at the boundary of two village of Dailekh district; Rakam and Serabada. The proposed bridge is located at the distance of 1km upstream of the Karnali-Kane Gadh confluence at the elevation of 703 amsl. The average gradient of 54.8% is observed along the course of Kane Gadh River at the bridge location. The steepness of the Kane Gadh River valley is more in the upstream region from the proposed construction site.

3.10.2.2 Geology and Soil

The bridge site is geologically located in the rocks of quartzite and phyllite of the Ranimatta Formation, Midland Group, Western Nepal Himalaya. On the left bank of the Kane Gadh Khola superficially comprises of thick alluvial deposits whereas on right bank is composed of superficially alluvial and colluvial deposits.

No any landslides and instabilities were observed around the proposed construction location. Major geological structures like faults and the thrust cannot find around the location of the bridge. The bearing of the proposed bridge axis is 000-180 degrees. The flowing direction of the Kane Gadh Khola around the proposed bridge site is 095-275 degrees.

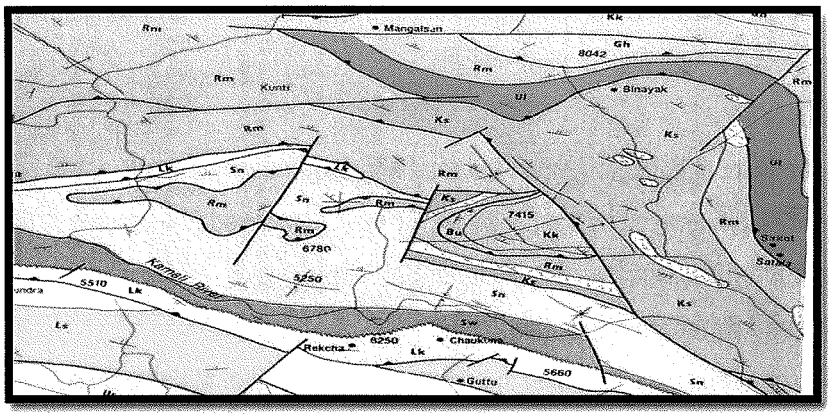


Figure 3.4: Geology around Kane Gadh Khola area

The surface soil of the bridge area consists of mainly alluvial soil deposits at riverbed. The alluvial deposits are mainly found in the riverbeds of the Sija Khola. The thicknesses of alluvial deposits are more than 3 m. The alluvial deposits are composed of boulders, cobbles, pebble and sands. Boulder, cobbles and pebbles are mainly granite, quartzite from the Lesser Himalaya (0.5 to 2 m in diameter). The nature of the surface soil is characterized by lack of calcareous cementing material so the surface soils are loose in nature.

3.9.2.3 Seismological Study

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

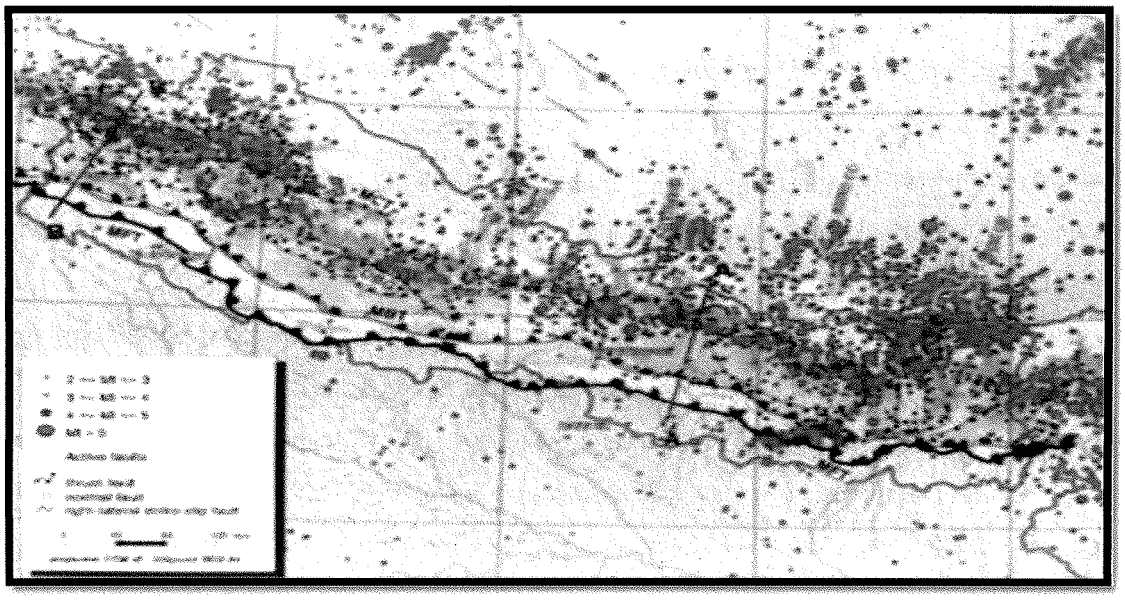


Figure 3.5: Epicenters of earthquakes in the Nepal Himalaya

Similarly, the seismic hazard of the Nepal Himalaya is presented in figure 3.7 below:

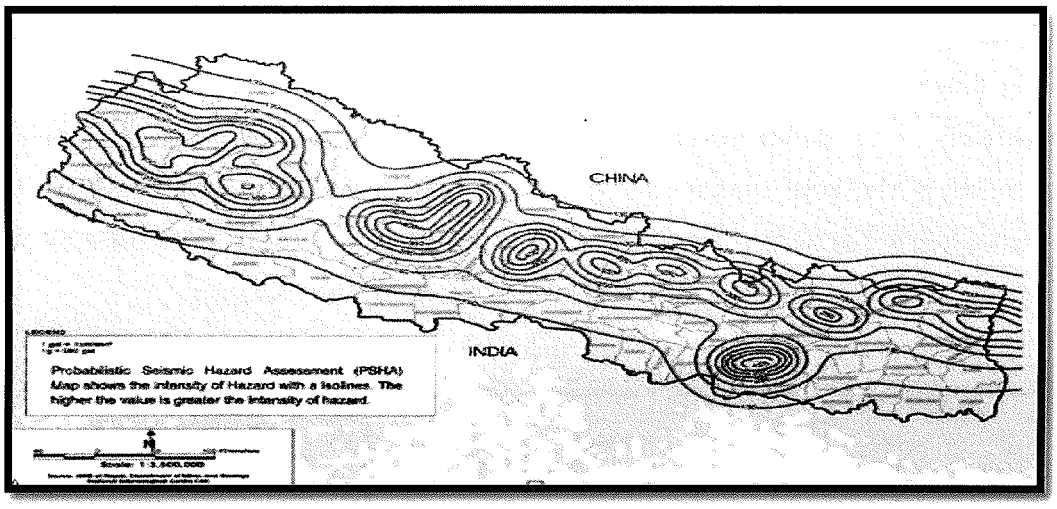


Figure 3.6: Seismic Hazard Map of Nepal

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).

3.9.2.4 Drainage and Hydrology

The proposed bridge has been proposed over the Kane Gadh Khola which is a small river (stream). The gradient of the river d/s of the bridge is found to be lower than its u/s. The river shows the complex dendritic pattern comprising of many rivers making the confluence with it. The

Kane Gadh River makes the confluence with the Karnali Khola at 1 km downstream from the proposed bridge location.

The lowest and highest elevations of the Kane Gadh Khola Catchment are 650m and 2,719m above mean sea level respectively. Furthermore, the total area of Kane Gadh Khola Catchment is 29.57Km^2 and the total channel length is 10.70 Km. Similarly, the recommended discharge for the Kane Gadh Khola at Khani bazzar (near the bridge construction location) is 282m^3/s. As identified from the observation of flood marks and the consultations with the local people the maximum depth of water during rainy season is 1.5m.

3.10.2.5 Climate

Tropical climate is found along proposed project site. The maximum temperature around the project area during summer season exceeds 34^{0}C, while the minimum temperature during winter season remains not less than 8^{0}C. The average annual precipitation around the project area recorded is about 1700 mm.

3.10.2.6 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 right bank whereas on the left *bank* there is less possibility of occurrence failure. The wedges formed by the intersection of the joints and foliation plane seem to be stable in left bank and right bank is very unstable so possibility to occur the failure.

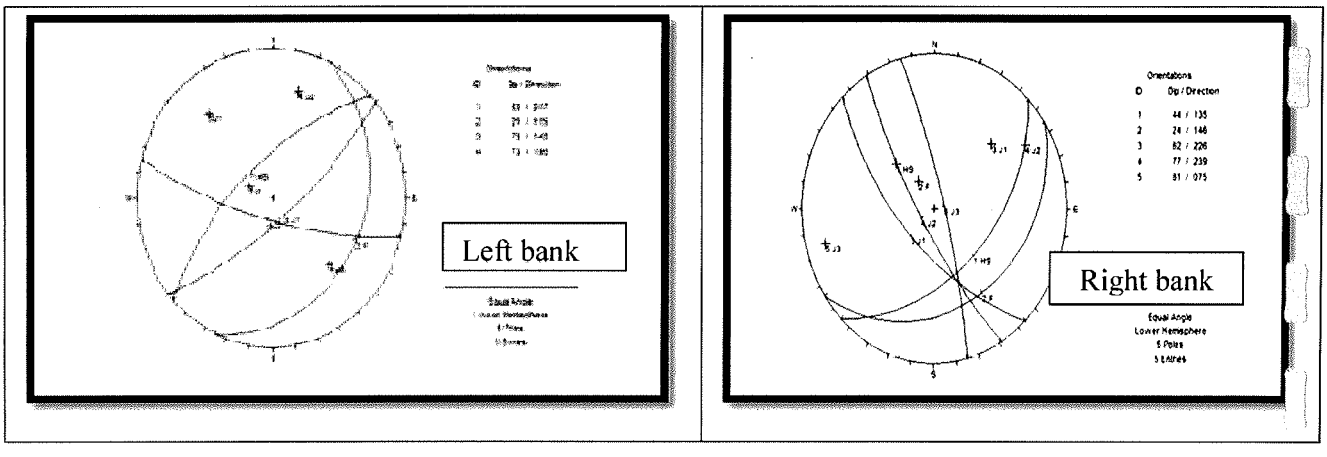


Figure 3.7: Stereographic projection of the proposed bridge site area

Table 3.21: Condition of the slope stability of the rock

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

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

3.10.2.7 Air Quality, Water Quality and Noise levels

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

3.10.2.8 Quarry and borrow pit location and available quantity

Table 3.22: Quarry site as proposed by the project geological team

Location	Distance	Slope stability	Source	Quantity m3	Materials
Karnali River	Within 5 km distance from confluence of Kane Gadh Khola and Karnali River 2 km black topped and 2 km earthen road	Stable after extraction of materials due to wide flood plain	Sand and gravel from riverbed Quartzite and gneiss 90%, schist 10%	2000x10x1	Quartzite, gneiss, granite 100% material can be extracted Noulder 40% cobble 40% and sands 20%
Kane Gadh Khola	Within 0.5 km upstream Riverbed road	Riverbed	Quartzite 100%	100x2x1	Boulder and cobble from riverbed
Quarry site	Within 5 km distance black topped road 5 km	Hill slope along the road alignment	Granite and gneiss and quartzite 100%	More than sufficient quantity available	Fresh rocks

(Source: Design Report of Kane Gadh Bridge, 2016)

3.10.2.9 Location of crusher plant, labor camp, stockpiling, spoil disposal site

The crushers will be placed around the quarry areas (table 3.22) for quarrying constructive material for quick and good work of bridge construction. Besides, the labor camp and the material stockpiling site will be located adjacent to each other. The grass land and agricultural land at the left side of the Surkhet-Jumla Road, about 200m from the proposed bridge at the Rakam has been proposed for labor camp and material stockpiling site. The proposed land is under the private ownership. Stockpiling on particular site will not affect the smooth movement of vehicles. The labor camp will be provided with separate drinking water facility, toilet facility, etc.

The excavation of soil from the foundation of the bridge and approach road will generate about 14156 m^3 of spoil. Out of total spoil generated, 780m^3 materials will be used for the construction of foundation and 6,000 m^3 will be used for backfilling. And some amount of excavated materials is used for river training works and remaining spoil will be disposed in two different sites that have been recommended. First one is 200 m u/s from the existing Bailey Bridge on the left bank of Kane Gadh Khola, while the second one is 1km d/s from the existing bridge on the right bank of Karnali River. Since, both the recommended sites for the disposal of spoil are located on the bank of river special attention has to be given while disposing the spoil here.

3.10.2.10 Structure (Private ard Public) and public utilities

There are 6 structures owned by 2 house owners at Ch.119+140 on Rakamkarnali, Aathabish Municipality-4, Dailekh District, Karnali Province of Surkhet to Jumla road Section. And three public structures (1 Public Tap and Two Irrigation Canal) that are directly affected by the project. However, no religious and cultural areas are sited within the influence area of the project. The public structures will be rehabilitate and relocate nearby during the construction are as follows:

Table 3.23: Public structure affected by the project

Public structure	Distance from the project area(m)	Numbers of User's Households
1 Public tap	200	50-55
2 irrigation canal	200(around the bridge)	Above 300 ropani

3.9.3 Biological Environment

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

the bridge construction. The following headings deal with the biological environment found around the project area.

3.9.3.1 Floral Diversity

The project area being situated in the lower altitude, tropical forests can be found covering the long ridges of the area dominated by Sal (*Shorea robusta*) and Sisau (*Dalbergia sisso*). The other plant that can be found in the area are pine (*Pinus wallichinia*), Khair *(Acacia catechu)*.

3.9.3.2 Faunal Diversity

The temperate forest around the project area is the habitat for many wild animals and birds. Some of the commonly found wild animals around the project area are Jackal (*Canis aureus*), and Langur (*Colobinae ajax*). Likewise, the birds include Kalij (*Lophura leucomelanos*), Danphe (*Lophophorus impejanus*), and Chyakhura etc.

3.9.3.3 Fish Diversity/ Aquatic Condition

The Kane Gadh Khola serves a potential habitat for many aquatic lives. The major fish species found in the Kane Gadh khola are Bucche Asala (*Schizothoraix plagiostomus*), Chucche Asala (*Schizothoraichthys spp.*), Tite (*Psilorhynchus pseudecheneis*), and Thed.

3.9.3.4 Protected Species of Flora and Fauna

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

S.N	Local Name	Scientific Name	Categories		
			GoN	IUCN	CITES
Fauna					
1	Langur	*Semnopithecus ajax*		EN	I
2	Jackal	*Canis aureus*		LC	
Flora					
1	Sal	*Shorea robusta*		LC	
2	Sisau	*Dalbergia sisso*		LC	
Fauna					
1	Kalij	*Lophura leucomelanos*		LC	I

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

***GoN Categories**: P Protected by legislation*

CITES Categories: I -Appendix I (are species that are threatened with extinction and are or may be affected by trade), II - Appendix II (re species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild), and III - Appendix III (are species

that are listed after one member country has asked other CITES Parties for assistance in controlling trade in a species).

3.10 Review of Relevant Acts, Rules, Regulations and Guidelines

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

i) Constitution of Nepal

Article 30 of the Constitution of Nepal 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

ii) Policies and Plans

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

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 Terai. 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.

National Transport Policy 2058 BS (2001)

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.

Nepal Environmental Policy and Action Plan 2049 BS(1993)

Nepal Environmental Policy and Action Plan (NEPAP) have 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.

Three Years 14th Periodic Plan 2073/74-2075/76 BS

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 Maintenance and Construction of affected roads from earthquake, Enhance basic road networks, Develop the main highway of Nepal, Connecting roads between North-South Border Road as a trade road and Important link, Kathmandu Valley approach road, Construction of bridge and maintenance, Construction of Tunnel, Maintenance and Rehabilitation of road, Road safety and more.

Bridge Maintenance manuals, 2005

This document describes the inspection and maintenance requirements and sets out the way in which this work is implemented and recorded. Using the Manual as a guide, complete the Routine inspection report forms for each of the bridges in the Division. The condition, extent and urgency for the maintenance are noted, a report is prepared including prioritise work and cost are estimated using this manual.

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.

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

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

World Bank Policy on Environmental and Social Safeguard

The World Bank Operational Policy OP. 4.01: Environmental Assessment

World Bank requires environmental assessment (EA) of projects that are proposed financing from World Bank to help ensure that they are environmentally sound and sustainable, and thus to improve decision

making. EA evaluates a project's potential environmental risks and impacts in its area of influence, examines project alternatives; identifies ways of improving project selection, siting, planning, design, and implementation by preventing, minimizing, mitigating, or compensating for adverse environmental impacts and enhancing positive impacts; and includes the process of mitigating and managing adverse environmental impacts throughout project implementation. EA takes into account the natural environment (air, water, and land); human health and safety; social aspects (involuntary resettlement, indigenous peoples, and cultural property), and Trans boundary 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 Narugad Khola Bridge) falls within Category project. As per World Bank Operational Policies a proposed project is classified as Category B if its potential adverse environmental impacts on human populations or environmentally important areas—including wetlands, forests, grasslands, and other natural habitats—are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and in most cases mitigatory measures can be designed more readily than for Category A projects.

For sector investment loans (SILs), during the preparation of each proposed subproject, the project coordinating entity or implementing institution carries out appropriate EA according to country requirements and the requirements of this policy. The Bank appraises and, if necessary, includes in the SIL components to strengthen, the capabilities of the coordinating entity or the implementing institution to (a) screen subprojects, (b) obtain the necessary expertise to carry out EA, (c) review all findings and results of EA for individual subprojects, (d) ensure implementation of mitigation measures (including, where applicable, an EMP), and (e) monitor environmental conditions during project implementation. If the Bank is not satisfied that adequate capacity exists for carrying out EA, all Category A subprojects and, as appropriate, Category B subprojects—including any EA reports—are subject to prior review and approval by the Bank.

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

As per OP. 4.04, World Bank supports for the protection, maintenance, and rehabilitation of natural habitats and their functions in its economic and sector work, project financing, and policy dialogue. The Bank supports, and expects borrowers to apply, a precautionary approach to natural resource management to ensure opportunities for environmentally sustainable development. The Bank promotes

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

World Bank Operational Policy (OP 4.36): Forest

World Bank Operational Policy 4.36 aims to reduce deforestation, enhance the environmental contribution of forested areas, promote afforestation, reduce poverty, and encourage economic development. Combating deforestation and promoting sustainable forest conservation and management have been high on the international agenda for two decades. However, little has been achieved so far and the world's forests and forest dependent people continue to experience unacceptably high rates of forest loss and degradation. The Bank have proposed revised approach to forestry issues, in recognition of the fact that forests play an increasingly important role in poverty alleviation, economic development, and for providing local as well as global environmental services. Success in establishing sustainable forest conservation and management practices depends not only on changing the behavior of all critical stakeholders, but also on a wide range of partnerships to accomplish what no country, government agency, donor, or interest group can do alone. Where forest restoration and plantation development are necessary, the Bank assists borrowers with forest restoration activities that maintain or enhance biodiversity and ecosystem functionality. The Bank also assists borrowers with the establishment and sustainable management of environmentally appropriate, socially beneficial, and economically viable forest plantations to help meet growing demands for forest goods and services.

Involuntary Resettlement (OP 4.12)

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

- Involuntary resettlement should be avoided where feasible, or minimized, exploring all viable alternative project designs.

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

The policy covered the following impact;

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

(a) The involuntary taking of land resulting in

(i) Relocation or loss of shelter;

(ii) Loss of assets or access to assets; or

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

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

(i) informed about their options and rights pertaining to resettlement;

(ii) Consulted on, offered choices among, and provided with technically and economically feasible resettlement alternatives; and

(iii) Provided prompt and effective compensation at full replacement cost for losses of assets affected by the project

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

Physical Cultural Resources (OP 4.11)

The Bank seeks to assist countries to manage their physical

Cultural resources and to avoid or mitigate adverse impact of development projects on these resources. This policy is triggered for any project that requires an EA.

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.

iii) Acts/Rules

Environment Protection Act 2053 BS (1997)

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 Forests and Environment (MoFE).

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.

Solid Waste Management Act 2068 BS (2011)

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.

Public Road Act 2031 BS (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 Municipality 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.

Labor Act 2074 BS

The Labor Act, 2074 has received the assent of president and become effective from the date Bhadra 19, 2074. The Labor Act, 2074 has replaced the previous labor law completely i.e. Labor Act, 2048 has ceased to be in effect. The New Labor Act has been passed for provisions for the rights, interest, facilities and safety of workers and employees working in enterprises of various sectors.

Local Government Operation Act 2074 BS

The Act empowers the Local Government (Municipalities and Rural 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. Clause 3 of this act defines the roles, responsibilities and authorities of the local governments. Formulate policies and laws; mobilize security force and maintain public security; carry out local development activities; construct development infrastructures, preserve, language, art, culture and other heritage etc. are the responsibilities of the Local Government.

CITES Act 2073 BS

This act is based on Article-296 (1) of Constitution 2072 B.S. In pros, Nepal to Convention on International Trade in Endangered Species of Wild Fauna and Flora, 1973 move to implement the

conservation of Endangered Species of Wild Fauna and Flora and also it's international monitoring and supervision for their conservation and survival.

Aquatic Animal Protection Act 1961 (2018 BS) (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).

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.

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

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 DCC. 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.

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

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

Environment Protection Regulations 2054 BS (1997)

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 Municipality, DCC, 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 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.

Solid Waste Management Rules 2070 BS (2013)

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.

iv) Manuals / Guidelines/ Directives

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.

National Environmental Impact Assessment Guidelines 2050 BS (1993)

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.

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.

Reference manual for Environmental and Social aspect of integrated Road Development

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

Batawaran Nirdesika 2057 BS (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.

v) Environmental Standards

National Standard on Noise Level 2069 BS

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

Threshold limit of noise in different sectors

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

Maximum threshold limit of noise for several machineries

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

National Ambient Air Quality Standard 2012 AD

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

National ambient air quality standards for several pollutants

Parameters	Units	Averaging Time	Concentration in Ambient Air, maximum
TSP (Total Suspended Particulates)	µg/m³	Annual	-
		24-hours*	230
PM_{10}	µg/m³	Annual	-
		24-hours*	120
Sulphur Dioxide	µg/m³	Annual**	50
		24-hours*	70
Nitrogen Dioxide	µg/m³	Annual	40
		24-hours*	80
Carbon Monoxide	µg/m³	8 hours*	10,000
Lead	µg/m³	Annual**	0.5
Benzene	µg/m³	Annual**	5
PM2.5	µg/m³	8-hours*	40
Ozone	µg/m³	8-hours*	157

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.

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

National Diesel Generator Emission Standard, 2012

The Ministry of Forests and Environment (MoFE) 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.

Nepal Vehicle Mass Emission Standard 2069 BS (2012)

Para 62, Volume 29, Nepal Gazette, Part 5, 15th October, 2012 exercise the jurisdication veted by c. 15 of Environmental Protection Rules, 1997, the Government of Nepal haslaid down the following **Nepal Vehicle Mass Emission Standard 2012 (2069 BS)** applicable to the vehicles except for tractors, power tillers, dozers, cranes, rollers and exavators to be imported in Nepal. Nepal Vehicle Mass Emission Standard 2069 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, (ii) Smoke capacity test, (iii) Emission of crankcase gases, (iv) Determination of evaporative emission, and (v) Durability of pollution control devices.

vi) International Conventions and Treaties

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.

International Labour Organization (ILO) Convention

Nepal joined the ILO in 1966. In view of the increasing need for support in Nepal and scope for expansion of ILO programmes, the Office of the Senior ILO Adviser was established in January 1994 in Nepal. The Kathmandu Office transitioned to a full-fledged Country Office in 2000.

Nepal has ratified 11 ILO Conventions , including seven core Conventions. The Country Office in Kathmandu supports the constituents in their efforts to achieve decent work and social justice in Nepal. Present ILO Nepal technical cooperation programmes include promoting employment-centric inclusive growth, improving labour market governance and industrial relations, and promoting fundamental principles and rights at work. The ILO in Nepal has played an important role in developing a constructive and congenial social partnership between the Government, workers' and employers' organizations. Based on this partnership, the tripartite constituents have been able to unionize informal workers, implement a range of social protection measures, amend labour laws, establish a social dialogue mechanism, and ratify ILO Conventions.

The ILO Nepal is responsible for the coordination of the outcome two of the United Nations Development Assistance Framework (UNDAF) 2013-2017 , which aims to increase the country capacity to design, execute and manage economic development programmes, inclusive labour and economic policies, and social protection benefits to boost productive employment and income opportunities.

CHAPTER 4: SPECIFIC IMPACTS OF THE IMPLEMENTATION OF THE PROPOSAL ON THE ENVIRONMENT

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

4.1 Beneficial Impacts

Construction Stage

- **Employment Generation**

The construction of bridge over the Kane Gadh Khola requires a number of skilled, semi-skilled and unskilled manpower. The project shall generate the employment opportunity to 60 workers, among them 20 will be skilled and unskilled whereas 40 will be unskilled. This will create employment opportunities to the people of affected villages which will result in enhanced income generation. *This impact will be of high magnitude, local in scale and short term in duration.*

- **Enhancement of skills**

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

Operation Stage

- **Improved Mobility**

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

- **Saves Time**

Although the present number of vehicles running towards Kalikot is very low, the construction of road network towards the neighboring districts from Kalikot will obviously increase the number of vehicles,

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

- **Reduced Traffic Congestion**

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

4.2 Adverse Impacts

4.2.1 Construction Stage

Socio-economic Environment

- **Social Conflicts**

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

- **Obstruction to social services and facilities**

The social services and facilities like drinking water supply (i.e. One public tap and two irrigation canal to will be rehabilitate and relocate nearby for the bridge construction during construction period. Besides, the area around the proposed bridge possesses the adequate supply of drinking water. In addition of workforce would pose stress on available water resources like spring for drinking water. *This impact will be medium in magnitude, site-specific and medium term in duration.*

- **Accidental risks**

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

- **Land and property Acquisition**

The bridge construction work will affects 6 structures owned by 2 house owners and 4 land parcels owned by 4 house owners. The details of structure that are directly affected by the project are presented in table below:

Table 4.1: Detail of owners and type of structure affected by the project

Address	Name	Structures	Type	Roof
Aathbish municipality-4	Namsara Majhi	Living House/Toilet &bathroom/Septi tank/Back side staircase	Stone & Cement Plaster	Cemented Lanter
Aathbish municipality-4		Living House	Load bearing with RCC Slab	Cemented Lanter
Aathbish municipality-4	Mr. Lal Bahadur Shahi	Living House & Rent	Wood, Stone & Mud	Wooden & Zinc Sheet

(Source: Updated RAP, February, 2018)

Similarly, the details of land area affected by the project are presented in table 4.2.

Table 4.2: Details of land affected by the project

Address	Present Address	Name	Side L/R	Total Area of Affected Plot (m2)	Land to be Acquired (m2)	kitta no.
Rakam Karnali VDC-4	Aathbish municipality-4	Nanisara Majhi	l	2053 (0.2053ha)	286	336
Rakam Karnali VDC-6	Aathbish municipality-4	Ganga Majhi	Right of Strm	2340 (0.234 ha)	90	217
Rakam Karnali VDC-4	Aathbish municipality-4	Dil Majhi	Left of Strm	2125 (0.2125 ha)	40	21
Rakam Karnali VDC-4	Aathbish municipality-4	Lal Bahadur Shahis	Left of Strm	117 (0.0117ha)	55	335

(Source: Updated RAP, February, 2018)

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

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

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

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

There is no any impact on any cultural, religious and historical sites from the construction of the project area.

- **Impact on landscape aesthetics**

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

Physical Environment

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

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

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

The construction of the bridge does not need to acquire large area of the land permanently. About 0.204 ha of the land permanently is required for the construction of the bridge. Likewise, the construction camp and stockpiling of the construction materials need to acquire some private and public land temporarily. About 0.08 ha of the land is occupied by the construction camp and about 0.04 ha of the land is required for the stockpiling of the construction materials. *The impact due to change in land use is of low magnitude, site-specific and short term.*

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

The construction of foundation and approach road for the proposed Kane Gadh Bridge requires the excavation of about 0.154 ha of land (Table 2.1). The hill slope on the left bank of Kane Gadh khola (Serabada side) is very steep. Thus, use of heavy machineries like drillers, bull dozers, etc. could destabilize the slope triggering into landslides and soil erosion. *This impact is envisaged to be high significance, site specific and medium term in nature.*

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

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

During the construction phase of Kane Gadh Bridge, there would be abundant materials during the excavation of hill slope for the construction of the approach road that can be used as construction materials. This would ultimately reduce the possible stress on the proposed quarry site, leading towards the minimized exploitation. *This impact will be of medium magnitude, site-specific in nature and medium term in duration.*

- **Spoil and construction waste disposal**

The excavation of soil from the foundation of the bridge and approach road will generate about 14156 m^3 of spoil. Out of total spoil generated, 780m^3 materials will be used for the construction of foundation and 6,000 m^3 will be used for backfilling. And some amount of excavated materials is used for river training works and remaining spoil will be disposed. The random and improper disposal spoil can be very hazardous as the runoff during rainy season would wash the materials causing water pollution in the nearby water bodies and even resulting in several water borne diseases. *Hence, the impact will be medium, local and medium term in nature.*

- **Degradation of water quality**

The mishandling of chemicals and oils used in machineries if get contaminated with the river water, it could result the water pollution. Similarly, runoff during monsoon season would erode and transport the earthen materials from the fresh cut hill slopes for approach road and foundation pit to the river. This would increase the turbidity and contribute the water pollution. *This impact is envisaged to be medium in magnitude, local in extent and medium term in duration.*

- **Approach road and related issues**

The construction of the Kane Gadh Bridge requires the construction of approach road on either side of the bridge. Construction around the Serabada side is particularly vulnerable as a stable hills slope consisting of low to moderately weathered rocks has to be cut for the construction of 70 m approach road. Mechanical activities around such rocky terrain are highly likely to cause instabilities around those slopes. *This impact is envisaged to be highly significant, site-specific and short term in duration.*

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

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

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

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

- **Air and noise pollution**

The operation of machineries during the construction period for the excavation of river terraces in order to construct the foundation of the bridge will be the main source of air pollution, noise and vibration around the surrounding area. Similarly, the operation of crushers around the quarry areas also contribute to the problems associated with noise and vibration. Furthermore the project vehicles carrying construction materials will cause air, noise pollution. Generators are the only source of electricity around the project area and the operation of generators even contribute to the air and noise pollution. However, since the area is not over crowded and natural settings can easily disperse the air pollutants and absorb noise reducing the magnitude of their impact. *The impact is of low significance, site specific and short term in nature.*

- **Combustible and toxic material management**

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

- **Use of bitumen**

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

- **Environmental issues associated with work camp**

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

- **Occupational health and Safety**

During the construction stage, different heavy machines and equipment would be operated which can pose the threat to the safety of the workers. Likewise, excavation, slope cutting etc. can cause the physical injury to the workers. Similarly, smoke and dust emission, noise generated during the operation

of the machines and generators can also causes the occupational health impact to the workers. *The envisaged impact is moderate, site specific and medium in duration.*

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

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

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

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

Biological Environment

- **Clearing of forest, and habitat destruction and loss**

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

- **Impact on Aquatic Life /barriers to fish/aquatic movement**

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

- **Disturbance to wildlife and biodiversity**

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

4.2.3 Operation and Maintenance Stage

Socio-economic Environment

- **Traffic accidents**

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

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

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

Physical Environment

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

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

- **Air pollution**

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

- **Noise and Vibration**

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

- **Backwater Effect During Floods**

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

- **Embankment Erosion**

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

- **River Channel Shifting**

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

- **Stockpiling of materials during regular/periodic bridge maintenance**

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

- **Encroachment of DIZ area of bridge**

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

- **Scouring/ Congestion around the adjoining around of Bridge abutment**

Scour of stream bed occurs during the passage of flood discharge, when the velocity of the stream exceeds the limiting velocity that can be withstood by the particles of the bed materials. The scour is aggravated at the nose of the piers and at the bends. The maximum scour depth has to be determined to calculate the depth of the foundation of the bridge.

The scour depth for a particular design discharge depends on local geology and the opening of waterway and type of flow. According to sieve analysis the average size d_{50} = 15 mm is used for scour calculations.

Regime Formulation by Lacey 1930	
Design Discharge	282.00m³/s
Mean Scoured Depth	5.14m
Scour Below the Original bed level	1.86m
Regime Formulation by Blench	
Mean Scoured Depth	6.40m
Regime Formulation Component Velocity Approach	
Mean Scoured Depth	3.06m
Maximum Scoured Depth	4.67m
Scour Below the Original bed level	1.39m

(Source: Design Report of Kane Gadh Bridge, 2016)

Biological Environment

- **Barriers to fish/aquatic movement**

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

CHAPTER 5: ALTERNATIVE ANALYSIS

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

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

5.1 Location Alternatives

No alternatives locations were analyzed during the design period of the proposed bridge project.

5.2 Design and Construction Alternatives

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

5.3 Time Schedule Alternatives

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

5.4 Resource Alternatives

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

5.5 No Project Alternative

The existing Bailey bridge over the Kane Gadh khola has been under operation for about two years. The load bearing capacity of that bridge is not enough for the movement of heavy vehicles. Furthermore,

Bailey bridges are not the long term crossing solution and thus there is no alternative to the construction of concrete bridge over the Kane Gadh khola.

CHAPTER 6: MEASURES TO REDUCE OR CONTROL THE IMPACT OF THE IMPLEMENTATION OF THE PROPOSAL ON ENVIRONMENT

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 Kane Gadh Bridge are presented in table 6.1.

Table 6.1: Institutions and their role in EMP implementation

Institution	Roles	Responsibilities	Remarks
Ministry of Forests and Environment(MoFE)	Formulation and implementation of environmental plans, policies and programs at national level	✓ Providing technical and legal base for the formulation of environmental safeguard measures ✓ Providing guidance during evaluation and monitoring of environmental safeguard mechanism	
Ministry of Physical Infrastructure and Transport (MoPIT)	It is the concerned ministry and has the role of project execution	✓ Review and approval of Initial Environmental Examination (IEE) document ✓ Coordinate with project implementing bodies during the implementation of environmental safeguard mechanism and their monitoring	
Department of Road (DoR)	It is a department under MoPIT and has the role of project execution	✓ Responsibility for the implementation of the project alongside the environmental safeguard measures	
Road Sector Development Project (RSDP)	Foreign cooperation project under the DoR, which coordinates with donors to invest for the road projects in Nepal	✓ Coordination with the donor agencies to invest for the construction of the road ✓ Execution of the road projects	

Geo-Environment and Social Unit (GESU)	Unit under the DoR responsible for technical advice for IEE	✓ Review, comment, and forward ToR and IEE for the approval by the concerned ministry (MoPIT)	
World Bank	Role in decision making for the execution of the project	✓ Responsible for overseeing DoR's project design, implementation of mitigation measures in accordance with their grant/loan conditions including environmental and social safeguards	
Design Consultant	Project design, environmental assessment and social assessment	✓ Prepare a detail engineering design for the project ✓ Prepare IEE report and get approval from the concerned ministry ✓ Prepare resettlement plan for the affected households ✓ Prepare Environmental and Social Management Plan	
Supervision consultant	Role in monitoring the compliance of environmental mitigation measures during construction as guided by the EMP	✓ Oversee the overall implementation of the EMP, provide expertise knowledge, suggestions and recommendations when and where are necessary to minimize/avoid/prevent any adverse environmental damage	
Construction contractor	Role of complying environmental measures into the bridge construction work	✓ The contractor/s must implement all the mitigation measures described in EMP during construction period to mitigate all environmental impacts associated with the construction activities	

6.1 Environmental Management Plan

The complete sets of environmental enhancement and mitigation measures have been formulated for the sustainable implementation of Kane Gadh Bridge. The environmental management plan ensures the involvement of all the parties that are directly and indirectly associated with the construction of Kane Gadh Bridge. The framework for the environmental management plan for beneficial impacts and adverse impacts are presented respectively on table 6.2 and 6.3.

Table 6.2: Framework for benefit enhancement measures

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

Increase in Awareness	Project impact area	Sub-project will provide awareness trainings related to solid waste management, health and sanitation issue, and conservation of wildlife and biodiversity. For this a 3 day training program will be provided to the locals of the project impact area (both DA and IIA)	30,000 (@10, 000 per day)-included in BoQ	Project Implementation agency (RSDP)	Supervision consultant/DoR
Reduced Traffic accidents and congestion	Entire project area	Unnecessary stoppage of vehicles will be reduced by placing no parking zone around the bridge axis. Similarly, the wide bridge will even help to minimize the traffic accidents	No additional Cost	Contractor	Supervision consultant/DoR

Table 6.3: Framework for adverse impact mitigation measures

Activity/Issues	Adverse Environmental Impacts	Mitigation Measures	Affected Location	Timing of Action	Mitigation Cost	Institutional Responsibility	
						Implementing Agency	Supporting Agency/ Supervision
Physical Environment/Characteristics:							
Bridge Construction	Change in morphology, profile and water regime of river	• Project will not unnecessarily scour the river bed. • River diversion will be done whenever necessary. • Minimum disturbance will be done during the construction phase. • The spoils generated during the excavation will be disposed-off immediately.	Bridge construction area	During construction	No additional cost required	Contractor	Supervision consultant/DoR
Environmental issue related to Sand and gravel extraction	Over extraction of the construction materials could result in bank cutting, river bank erosion and even landslides	• Avoid over extraction of the construction materials near bridge foundation	Bridge Foundation area	During construction		Contractor/ project	Supervision consultant/DoR
Degradation of water quality	Mishandling of chemicals and oils used in machineries	• Avoiding of spoilage, Management of wastes as prescribed earlier; to control water	River side	During construction	NRs. 30,000 for solid waste	Contractor/ project	Supervision consultant/DoR

	get contaminated with water of river	pollution and water quality.			Management		
Bridge/Road Safety	The impact is felt critical at nearby school and bazaar areas.	• Mirror Convex glass, Traffic Signs should be installed	Bridge construction area	During construction	(Rs. 20,000 for convex mirrors included in Contract)	Contractor/ project	Supervision consultant/DoR
Bridge construction, camp site operation, spoil disposal and quarry site operation	Pollution of water resources	• Spoils generated during the excavation will be disposed-off safely in the designed spoil disposal site. • Oils and chemicals used in construction vehicles and machineries will be handled properly to avoid the contamination with the water bodies. • Separate toilet facilities will be provided to the construction crew with proper septic tank facility. • Liquid waste generated within the camp site will be disposed safely without	Bridge construction area, spoil disposa site and quarry site	During construction and quarrying	No additional cost required	Contractor	Supervision constultant/DoR

		releasing intc the water bodies. • Accidental spillage of the oil, grease and other chemicals substance will be captured immediately without allowing them to get contaminate the water bodies					
Approach road construction	Landslides, slope destabilization and soil erosion	• The retaining structures proposed in the DPR will be constructed. • Approach road will be supplemented with the construction of properly designed side drain. • Check dams and gabions structures will be constructed to check landslides and erosion	Around the approach road	During construction	Included in project detail design	Contractor	Supervising consultant/DoR
Camp site operation	Loss of productive land	• Camp site will be established on recommended barren land to avoid the loss the productive land	Around the camp site	During construction phase	7,34,000.00 for Camp site Contractor	Contractor	Supervising consultant/DoR

					Office/ Workshop [Labour Camp] (Cost included in BoQ)		
4 Operation of quarry site	Environmental and social damage associated with quarry site operation	• Authority from the local stakeholders and authority office will be taken prior to the opening of new quarry. • Unstable sites, erosion prone areas, dense forested areas, settlements, fertile farm land will be avoided for quarry operation • In case of river bank quarry, only the materials deposited during the previous year will be collected without disturbing the sedimentation cycle of the river. • In case of quarrying over the hill slope, the hill slope will be stabilized by constructing the slope	Around the quarry site	During quarrying	NRs. 30,000 for quarry site reclamation (Cost included in BoQ)	Contractor	Supervising consultant/DoR

		protection structures once the quarrying requirements are meet.					
Chemical handling	Environmental issues associated with the mishandling of chemical substances	• Proper safety measures will be adopted while handling the hazardous chemicals like oil, grease, etc. • Combustible chemicals like petrol, diesel, etc. will be stored separately in a safe container. • Project will have the provision of fire extinguisher throughout the construction period.	Around the construction site, and camp site	During construction period	NRs. 20,000 for fire extinguisher (five 4kg, cylinder, at the rate of 4000/cylinder)	Contractor/project	Supervision consultant/DoR
Construction materials stockpiling	Environmental issues associated with the material stockpiling	• The land allocated for the storing of construction materials will be far from agricultural land and water bodies. • The permission from the local stakeholders will be taken before commencing the stockpiling of the construction material.	Material stockpiling site	During construction period	NRs. 10,000 for fencing and covering materials (included in BoQ)	Contractor	Supervision consultant/DoR

		• Construction material should be covered with tarpaulin during stockpiling to prevent from rain water and dust emission generated from the stockpiling site. • Construction materials will be further encircled with side barriers and covered to avoid mix up with deleterious materials.					
Impact due to Spoil disposal	Environmental issues associated with spoil disposal	• Whenever possible, surplus spoil will be used to fill eroded gullies, quarries and borrow pits, depressed areas, etc. • Remaining spoil will be disposed in the recommended spoil disposal site **[First one is 200 m u/s from the existing Bailey Bridge on the left bank of Kane Gadh Khola, while the second one is 1km d/s from the existing bridge on the right**	Spoil disposal area	During construction period	Rs. 40,000 for gabion structure construction	Contractor/CBOs /Project	Supervision consultant/DoR

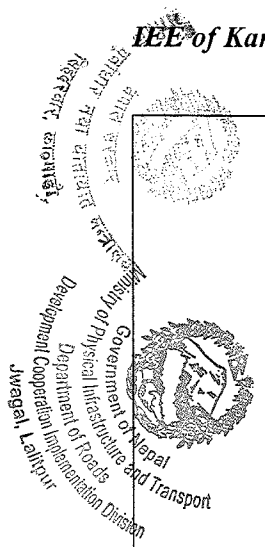
		bank of Karnali River] in a controlled manner. • Disposal of spoil on slopes, farmland, marshy land, forested areas, natural drainage path, canals and other infrastructures will be prohibited. • A disposal site will be provided with proper drainage, vegetation and adequate protection against erosion.					
Operation of project vehicles and machineries	Air and noise pollution	• Contractor will use the conditioned vehicles and machineries. • Alternative schedule will be adopted during the operation of the vehicles and machineries so that there will not be disturbance on the livelihood of the local people	Construction site and Around quarry site Where there will be operation of crusher	During construction period	No additional cost	Contractor	Supervision consultant/DoR
Bitumen handling and heating	Soil, water and air pollution	• Proper handling of bitumen to avoid soil and water contamination.	Approach road and bridge	During construction period	NRs. 20,000 for cleaning sites after	Contractor	Supervision consultant/DoR

		• Bitumen heating site will be at least 200m away from the settlement. • Unnecessary quantity of bitumen will not be heated. • Occupational health and safety measures will be adopted while heating the bitumen • If bitumen is spread over the land accidentally and in improper place then it will be cleared immediately. • Bitumen related work will not be carried out during rainy season. • Bitumen will not be used discharged into the drain structure while overlaying on the sub-base material.			bitumen heating		
Work camp operation	Environmental pollution due to the release of solid and liquid waste from the work camp	• Solid waste will be managed following 3 R principle. • Bio-degradable waste will be disposed in	Labour camp	During construction period	No additional cost	Contractor	Supervision consultant/DoR

		a separate pit away from the water bodies. • Liquid waste will be disposed in a separate ditch and disinfectant will be continuously spread to avoid contamination. • Separate sanitary toilet will be construction near the construction camp with the facility of septic tank. • Provision of clean dirking water will be made at the construction camp					
Vehicular movement	Air and noise pollution	• This is a residual impact and can't be avoided. Thus, mitigation measures are not proposed	Approach road and bridge	During operational period	No additional cost	-	-
Regular maintenance	Environmental issues due to stockpiling of construction materials during regular maintenance	• Selection of safe and appropriate site for material stockpiling	Bridge	During operation period	No additional cost	DoR	DoR
Bridge construction	Occupation health and safety of workers	• The workers will be provided with helmets, masks, muffles	Construction area	During Construction period	Included in project design	Contractor	Supervision consultant/DoR

		• Trading of animal skin, horns, bones, feathers, etc. will be fully controlled and supervised, and if anybody is found guilty, he/she will be informed to the authority. • Contractor will arrange/buy energy resource for bitumen heating from the authorized source					
Bridge construction	Impact on aquatic life	• Minimum possible disturbance on the river system will be done during the construction stage. • River flow will not be completely blocked during any time of construction. • Spillage of toxic and hazardous chemicals on water bodies will be avoided. • Disposal of solid and liquid waste on water bodies from the construction camp will be completely prohibited.	Around construction site	During construction period	No additional cost	Contractor	Supervision consultant/DoR

		• Critical habitat of fishes and other aquatic life will not be disturbed. • Construction workers will not be allowed to carry any kind of fishing related activities					
Socio-economic and Cultural Environment:							
Bridge construction	Social conflicts	• The labour should comply with the code of conduct set by the contractor		During construction period	Not applicable	Contractor	Supervision consultant/DoR
Bridge construction	Obstruction of social services and facilities	• Separate facilities of drinking water and other services will be made on camp site. • Construction schedule will be developed to facilitate the smooth movement of vehicles.	Around construction area	During construction period	No additional cost required	Contractor	Supervision consultant/DoR
Bridge construction	Land and property acquisition, compensation, resettlement and rehabilitation	• The project will have direct impact on the private and public structures; 6 structures owned by 2 house owners and 4 land parcels owned by 4 house owners will be	Around project area	During pre-construction stage	Included in resettlement cost and Compensate as per RAP. 2 irrigation canals and 1 tap will	Project	Project/local stakeholders/local government aurhority



		directly affected by the project (Table 4.1 and Table 4.2) • Project has prepared a separate resett ement plan which address the issues related to the land and property acquisition, compensation, resett ement and rehabilitation			rehabiliated and relocation nearby		
Operation Phase							
Encroachment area of Bridge	Obstruction in movement	• Awareness should be given to local	Within the bridge	During operation		Contractor/proje ct	Supervision consultant/DoR
Scouring/Congestion around the adjoining around of Bridge abutment	Scouring of river bed	• Over extraction and over depth extraction from single location or deposits will be strictly prohibited. • Prohibitation on the discharge of construction spoils, or other camp wate of the water bodies. • Foundation of the bridge and collection of aggregate be done only in the cry season.			Included in project document	Contractor/proje ct	

6.2 Cost for Execution of EMP

6.2.1 Details of specific cost

a) Land, properties acquisition, resettlement and rehabilitation cost

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

Table 6.4: Cost associated with resettlement and rehabilitation

1. Direct Cost			
A. Compensation & Rehabilitation			
I. Estimated compensation for private structures (including 11 business houses, 4 toilets 2 under construction house/ Kitchen & two residential houses dismantling cost)	Number	19	95,00,000
II. House displacement allowance	Number	13	1,30,000
III. Transportation allowance	Number	13	1,30,000
IV. Business displacement	Number	11	1,10,000
V. Support Allowance	Number	12	1,20,000
VI. Compensation of Land	Sqm	3844	23,06,400
Sub Total of 1			**1,21,76,400**

(Source. RAP,2015)

b) Income Restoration and Skill Development Training for Affected HHs

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 Environment and Social Management Framework (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 up lift 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. ***This cost will not be included in this report.***

Table 6.5: Proposed training and cost estimate

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

(Source: RAP,2015)

c) **Cost for Physical Impact Mitigation**

The cost for the mitigation of physical impacts is presented in table 6.7 below. The cost include all the cost included in EMP matrix.

Table 6.7: Cost of physical impact mitigation

Environmental Issues	Unit	Rate (Rs)	Amount (Rs)	Remarks
Camp site • Contractor Office/ Workshop • Labor camp		7,34,000.00	7,34,000.00	Contractor will bear the cost of labor force site including land/house hire, fuel, drinking water supply, electricity etc.
Capacity Building • Pre-construction orientation to the senior level bridge engineer and mid-level bridge engineer • Training (work force)	• Lump sum • Lump Sum	30,000 20,000	30,000 20,000	Contractor will conduct all necessary trainings related to bridge construction
Safety gadget	18 months	5000	90,000	Project is planned to be completed in 24 months however, working period

				will be 18 months avoiding 3 monsoon months. Safety gadget will be provided to work force, visitors, supervision consultant.
Awareness Raising Program to the local (Training related to river safety like awareness regarding wastes not to be disposed in river banks, river bed extraction within 500 m u/s and d/s from the bridge location, health and sanitation, biodiversity conservation	3 day	10,000	30,000	
Quarry, Rock break, river bed extraction site rehabilitation	PS	30,000	30,000	Reinstatement of quarry and river bed extraction site
Safe disposal of spoil including transportation and rehabilitation of site	PS		40,000	The cost includes transportation of spoil to the designated site, and rehabilitation of the site
Public structure(public tap, irrigation canal)	PS	40,000	1,20,000	Public structures needs to be relocated by the project
Traffic Sign Post	PS	1500*3+500	5,000	NRs. 1500 per post and 500 installation charge
Bitumen Heating (Safe storage, heating and handling and closure)	PS	20,000	20,000	

Construction of Berms and fencing of stockpiling materials	Lump Sum	10,000	Contractor will bear the cost for protecting the stockpiling materials	
Fire Safety Gadget	5	4,000	20,000	
River training	3 day	10,000	30,000	Contractor will conduct all necessary trainings related to bridge construction
Protection of embankment (bioengineering)			666,362.40	Contractor will bear the cost and conduct the bio-engineering measures
Solid waste management			30,000	Contractor will bear the cost
convex mirrors			20,000	Contractor will bear the cost
Sub-Total			***18,95,362.4***	

6.2.2 Total Cost for EMP Implementation

The breakdown of cost for the implementation of Environmental Management Plant is presented in table 6.8.

Table 6.8: Total cost of implementation of EMP

S.N.	Activities	Cost	Remarks
1	Mitigation measure under physical environment	18,95,362.4	
3	Environmental Monitoring/ Social Monitoring	9,80,000.00	
Total Cost of EMP implementation		28,75,362.40	

CHAPTER 7: MATTERS TO BE MONITORED WHILE IMPLEMENTING OF THE PROPOSAL

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

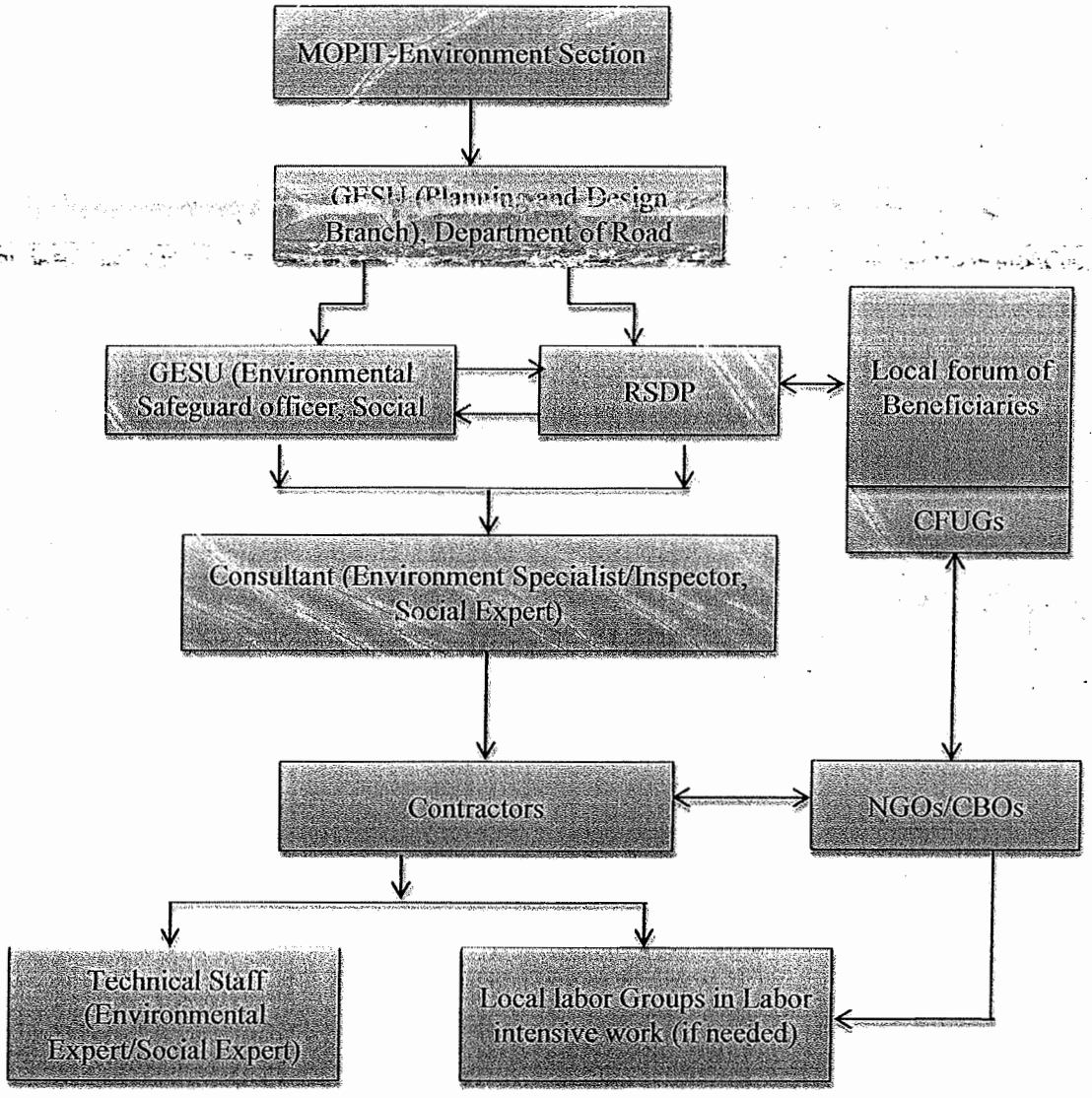


Figure 7.1: Agencies responsible for the implementation of EMP

7.1 Environmental Monitoring and Reporting

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

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

Impact monitoring is in general carried out during the project construction and post construction phases. This type of monitoring mainly focuses on the environmental impacts due to the construction of the project and their mitigation 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 7.1.

Table 7.1: Specific monitoring indicators selected for the IEE document

Monitoring Field	Parameters Selected for the Monitoring
Land use, erosion, landslides and waste management	▪ Area (ha) of land, forested and properties deformed (changed) ▪ Number, location and extent of slope failures ▪ Cause analysis for slope failure (natural or man-made) ▪ Nos and extent of gully erosions and pavement failures ▪ Nos of days and nature of traffic delays due to slides ▪ General condition of waste management site ▪ Drainage and erosion condition of the waste management site
Seismicity	▪ Nos and magnitude of local seismic activities and respective damage to structures
Water use and pollution status for both surface and sub-surface flows	▪ Nos and extent of water logging around the construction sites ▪ Nos of irrigation canals, drinking water taps, etc. that lie within the project construction site ▪ Incidents and trends of waterborne diseases ▪ Blockage of waterways – extent and secondary impacts ▪ Water pollution incidents due to unsafe disposal of spoil

	▪ Trend analysis for local fisheries ▪ Records of seasonal groundwater fluctuations ▪ Laboratory tests for river water quality
Air, noise and vibration in relation to traffic volume	▪ Point measurement of noise near the construction site ▪ Qualitative analysis of wind borne dust particles during the construction stage of the project ▪ Qualitative assessment of vibrations sensed around the nearby households of the project construction site
Bridge/Road safety	▪ Speed measurement at both sides of the bridge ▪ Nos and type of accidents recorded by the Traffic Police Office and local health service centres that occurred around the bridge ▪ Effectiveness of safety signs
Wildlife habitat disturbance and impacts on forest resources and its mitigation	▪ Nos and extent of accidents inflicting wildlife ▪ DFO records on illegal medicinal plant, wildlife exploitation and trade ▪ Nos, extents and causes of forest fires ▪ Observations and handling of invasive species ▪ Success/failure/effectiveness of roadside plantation
Socio-economic development around bridge location	▪ Demographic, economic and educational status ▪ Nos of HHs and extent of market expansion around the bridge, land and structure ▪ Nos and extent of new business ▪ Nos and extent of new services and utilities

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

7.1.1 Pre-construction Phase Monitoring

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

7.1.2 Construction Phase Monitoring

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

a. Daily Supervision

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

b. Weekly Supervision

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

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

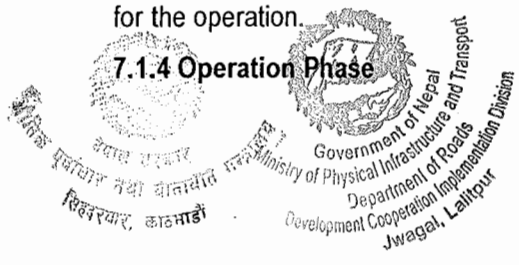
c. Monthly Supervision

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

7.1.3 Post-Construction Phase

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

7.1.4 Operation Phase



Environmental monitoring of the bridge during the operation phase shall focus on the key environmental issues identified during project design including river channel, condition of approach road, drainage, etc. DoR's GESU shall also undertake at most two inspections in a year. These inspections will include a visual assessment of:

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

The details of guideline for compliance and impact monitoring are presented in table 7.2 and 7.3.

Table 7.2: Compliance monitoring parameters with respective indicators

Parameters	Verifiable Indicators	Verification Methods	Schedule	Responsible Implementing Agency	Responsible Monitoring Agency
Final location and design as per IEE/EMP recommendation	Incorporation of IEE/EMP recommendations into location and design selection and finalization	Site observation and verification	Preconstruction phase	Consultant	Proponent/RSDP, DoR
Site selection and preparation of construction logistics	Project's arrangement of material storage, and construction activities (e.g.: campsite, material stockpiling site, etc.)	Site inspection, general sketch and photographs	Beginning of construction phase	Technical consultant, contractor	Proponent (RSDP, DoR)
Use of local labour, particularly vulnerable groups and women	Number of local labours employed in project	Records of the local recruitment bodies who facilitate and coordinate the process for local people's employment, interview	Once a month for the entire construction period where labour work is contracted	Contractor	Proponent (RSDP, DoR)
Occupational Health and Safety Issues	Health and safety regulation, first aid and medical arrangements, provision of safety equipment and measures, sanitation of labour	Spot checks at camps and work sites, photos, accident records, causes	Once a month throughout the construction phase	Contractor	Proponent (RSDP, DoR)
Environmental protection measures, including pollution prevention, water and soil management, slope stabilization, cut and fill, spoil and waste management, environmental and socially	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	Site inspection, discussion with project management, consultants, and local people. Quantifying site-specific impacts, photos, laboratory tests where required.	Before and during construction period	Consultant (for baseline survey); Contractor	Proponent, (RSDP, DoR)

critical sites, protection of fauna and flora	sensitive habitats, forests and fuel wood use.	Existing patrol, control and enforcement mechanisms, enforcement records.			
Pressure on forest and wildlife	Use of firewood or fossil fuel by construction crew, events of hunting and poaching of wildlife	Inspection and interview	Regular by contractor, once a month by consultant	Contractor	Proponent, (RSDP, DoR)
Air and noise pollution	Visual inspection and frequency of air borne respiratory infection with the consultation with local people Noise level measured around the construction area	Interview data, photographs, noise level meter record	Regular by contractor, once a month during construction by consultant	Contractor	Proponent, (RSDP, DoR)
Water pollution	Visual inspection, open defecation and waste disposal around water sources near construction sites and labour camp	Site inspection, interview	Regular by the contractor, once a month by the supervision consultant	Contractor	Proponent, (RSDP, DoR)
Public health and accident risk	Health and safety regulations, first aid and medical arrangements, contingency plan, safety awareness programme. Provision of toilet and waste management facility to the construction crew	Spot checks at camps and work sites, photos, accident records from Traffic Police, Training records and materials, road signs	Once in two months by consultants	Contractor	Proponent, (RSDP, DoR)
Adequate technical and environmental supervision	Adequate number of technicians mobilized regularly at site. Ability to implement labour 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, (RSDP, DoR)

Clean up and reinstatement of the construction site, camps, quarries and burrow pits	Decommissioned sites should not indicate any adverse and residual environmental impacts, and should be rehabilitated to the satisfaction of supervision consultant and land owners	Site observation, comparative photos, consultation with land owners	At the end of construction period	Contractor	Proponent, (RSDP, DoR)

The parameters selected for the impact monitoring are as follows

Table 7.3: Parameters selected for the impact monitoring

Parameter	Verifiable Indicators	Verification Methods	Location	Schedule	Responsible Implementing Agency	Responsible Monitoring Agency
Slope Stability Erosion	Inclination, Slope failures, causes; Drainage facilities such as catch drain, side drains and functionality of DC structures; Fresh gullies and erosion Success/failure of bio-engineering solutions	Site observation, photos Discussion with people and technicians	Near steep slopes and at slide areas and sites where bio-engineering failed	Continuously during construction and operation	Technical consultant Maintenance Division DoR	Proponent, (RSDP, DoR)
Bio-engineering of Disturbed Slopes	Re- vegetation through bio-engineering application on disturbed slope Establishment of nursery	Site observation Inspection of nursery and its production rate; photos, measurement	Cut slop area, where vegetation is cleared; Nursery	During and at end of project construction	Contractor	Proponent, (RSDP, DoR)

Disposal of Spoils and Conservation wastes	Initiated erosion, affected aesthetic value, affected forest and agriculture, initiated land erosion by local blocked drainage, hazard to downhill slope residents and agricultural lands	Site observation and interviews, photos, geo- referencing sites	At specific locations where such sites occur	During construction	Contractor	Proponent, (RSDP, DoR)
Quarrying of Conservation Materials	Initiated erosion, change in river regime, erosion by river systems, landslide due to quarrying, degradation of vegetation, water logging, waterborne diseases	Site observation, photos Records from local health centers	Quarry site areas	During construction	Contractor	Proponent, (RSDP, DoR)
Disruption of Drainage System	Status of rehabilitation Service status of irrigation and water supply system, Operation and maintenance requirement	Observation and interviews, photos, fisheries data, wildlife records	Disrupted aquatic system, irrigation schemes	During construction	Contractor	Proponent, (RSDP, DoR)
Water Quality	Turbidity and general status of nearby water bodies Some physio-chemical properties like pH, DO, conductivity, other chemical parameters	Visual inspection, sampling and laboratory analysis of water quality parameter	Nearby water bodies	During Construction and operation	Contractor	Proponent, (RSDP, DoR)

Air Quality	Atmospheric dust	Visual inspection	At construction sites and at sensitive spots (Schools, hospitals)	During construction and operation	Contractor	Proponent, (RSDP, DoR)
Forest and vegetation	Numbers of trees, presence of group vegetation, signs of illicit logging and extraction of NTFPs	Observation, DFO record, photos, stake-holder interviews	In and around the construction sites, markets	During construction and operation	Contractor	Proponent, (RSDP, DoR)
Harvest/ trade of Medicinal herbs	Sales of medicinal herbs increased	Observation, interview, photos	Project Areas and markets	During operation	Local stakeholders	Proponent, (RSDP, DoR)
Wildlife	Wilclife hunting trapping and poaching by work force, Trade of Wildlife, Biological survey on selected biota	Interview with local people/DFO, Photos Observations	Forest areas at roadside	Throughout project	Contractor, LCF, DFO	Proponent, (RSDP, DoR)
Change in Economy	Numbers of people employed by the project during construction Numbers of women in work forces Changes in land use pattern	Records kept by the project management, discussion with people	Project Area	Twice a year during construction and operation	Contractor, Consultant,	Proponent, (RSDP, DoR)
Trade and Commerce	Number of shops increased or decreased, rental of houses and land spaces	Records, interview, observations, photos	Project Area	Throughout project	Consultant	Proponent, (RSDP, DoR)

Industries	Establishment of industries in the vicinity of Project Area	Records and interview, photos	Project Areas/Zone of influence	Throughout project	Consultant	Proponent, (RSDP, DoR)
Occupational Safety and Hazard	Type of number of accident occurred during construction, Adequacy of occupational safety measured provided Compensation provided in case of fatal accidents or invalidity	Observation, photos, spot checks, Contractors and health centre records interview with laboures	Project Area	During construction	Contractor	Proponent, (RSDP, DoR)

7.2 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 7.4: 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

7.3 Grievance Redress Mechanism

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

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

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

Grievance recording register will be maintained at PIC office. Project affected people as well as local people can lodge their complaints at these offices related to assets acquisition and construction related activities. Special project grievance mechanisms such as on site provision of complain hearings allows project affected persons to get fair treatment on time. In this sub project one LCF will be formed in bridge location site to handle initial grievances of the project-affected people. The PAPs will have unhindered access to the grievance redress office to forward and file them complains without being intimidated or being deterred by

excessive bureaucratic hurdles. The provision of Local Community Liaison Assistant (LCLA) in the project implementation is good practices in this regard. LCLA can be mobilized in order to help PAPs to file the complaints to the concerned agency. APs will be exempted from all administrative fees incurred, pursuant to the grievance redressed procedures except for cases filed in court Proposed mechanism for grievance resolution is given below:

Box: 1 Stage of Grievance Mechanism

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

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

Stage3: *If the PAP is not satisfied with the decision of CDC or in absence of any response of its representatives, within 35days of the complaint, the PAP, in his/her last resort, may submit its case to the court.*

CHAPTER 8: CONCLUSION

The construction of Kane Gadh Bridge results in a substantial beneficial impacts. Lacking of permanent concrete bridge has caused several problems in the smooth operation of vehicles. In case of Kane Gadh Bridge the environmental impact of bridge construction is very low and can be easily mitigated through the mitigation measures proposed in chapter 6. Removal of trees is not required during the construction of the proposed bridge. One of the significant environmental issues during the construction of the approach road is the excavation of hill slope on the Serabada side which would require mitigation measures to prevent from the future risk associated with the excavation.

As a part of social impact, 6 structures owned by 2 house owners and 4 land parcels owned by 4 house owners including one public tap and two irrigation canal belonging to private owner have to be acquired during the construction of the proposed bridge. The project affected household, private land and structures will be compensated as per prepared RAP. The temporary land for stockpiling and labor camp will be acquired in lease agreement and reinstatement by Contractor and 1 public tap and two irrigation canal will be rehabilitated and relocate nearby.

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

ANNEXES

Annex A: Approved Terms of Reference (ToR)

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

URL : www.moppw
email : info@moppw
४२११
फोन नं. ४२११
४२११
फ्याक्स नं. ४२११
सिंहदरबार, काठमा
नेपाला

पत्र संख्या : ०७३।०७४।२.३
चलानी नं. : ४३९२

मिति : २०७३/१२/२८

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

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

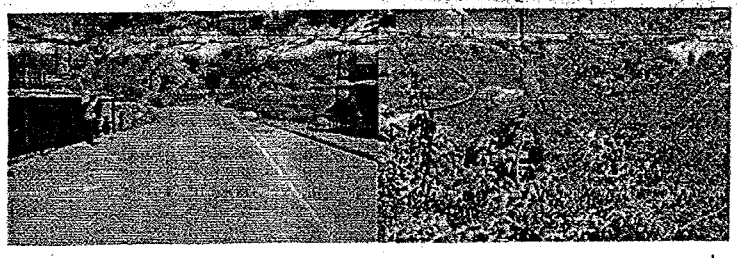
भुक्तानी दिइ
दस्तुर रु. ५००
मिति ०७३/१२/२९

उपरोक्त सम्बन्धमा भू-वातावरण तथा सामाजिक शाखा, सडक बिभाग प्रस्तावक रहेको **Kane Gad Bridge(Surkhet-Jumla Road), Dailekh** को प्रारम्भिक वातावरणीय परीक्षण(IEE) को कार्यसूची नेपाल सरकार (सचिवस्तर) को मिति २०७३/१२/२१ 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 ।

२।७।७३
१२।२८
(शोभा भण्डारी)
समाजशास्त्री

Terms of Reference
For the
Initial Environmental Examination (IEE)
Of
Kane Gad Bridge (Surkhet-Jumla Road)

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



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

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

Prepared By:

April, 2017

M/s Kunhwa Engineering & Consulting Co. Ltd., Korea
in associationin the form of sub consultancy with
ERMC (P) Ltd., Nepal
(Environment & Resource Management Consultant)

Office Address:
126/23, Puja PratisthanMarg
Mid- Baneshwor, Kathmandu
Tel.:977-1-447-1884
P.O. Box: 12419, Kathmandu
Fax: 977-1-4479361

Acronyms and Abbreviations

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

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CHAPTER-1: NAME AND ADDRESS OF THE PROPONENT

1.1 Name and Address of Institution Preparing the Report

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

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

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

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

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

Kunhwa Engineering and Consultancy Co., Ltd., Korea
in association with
Environment & Resource Management Consultant (ERMC) Pvt. Ltd.
Mid-Baneshwor, Kathmandu, Nepal
P. O. Box: 12419, Kathmandu
Tel.: 977-01-4483064, 4465863; **Fax:** 977-01-4479361
Email: **safe@ermc.wlink.com.np**, Web: **www.ermcnepal.com**

CHAPTER-2: GENERAL INTRODUCTION OF THE PROPOSAL

2.1 Background

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

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

In this regard, construction of Kane Gad Bridge was proposed along the chainage of 119+140 along Surkhet-Jumla Road. The proposed bridge has total length of 21.2 m with a single span. This Terms of Reference for Initial Environment Examination (IEE) has been prepared so as to incorporate environment and social safeguard measures in the design for new construction of Kane Gad Bridge.

2.2 Objectives of Terms of Reference (ToR)

The general objectives of the ToR are as follows;

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

2.3 Objectives of IEE

The objectives of IEE are as follows:

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

2.4 Rationality of IEE

As per Environment Protection Rules (EPR) 1997, construction of a major bridge requires an IEE and its subsequent approval from its concerned ministry (वातावरण संरक्षण नियमावलीको अनसूची-१ (नियम ३ संग सम्बन्धित) को "ई" सडक क्षेत्रको ४ नं. प्रावधान, Schedule-1 (pertaining to rule 3) "D" Road Sector, Clause-4 of EPR). National Bridge Standard 2010 classifies a bridge as a major bridge when its span is more than 25 m long or the total length of the bridge is more than 50 m. Although the length of bridge and/or span of Kane Gad is less than what Bridge Standard has stated the total project construction cost exceeds NRs. 50,000,000. EPR 1997 further demands the Initial Environmental Examination for the project whose project cost exceeds NRs. 50,000,000. Therefore, this ToR is prepared in accordance with the Rule-5 and Schedule-3 of EPR 1997.

2.5 Relevancy of the Proposal

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

2.6 Description of the Proposal

2.6.1 Project Area

The proposed sub-project i.e., Kane Gad Bridge lies along the Surkhet-Jumla road at chainage 119+140. Kane Gad Bridge has been proposed at Rakam Karnali VDC ward number 4, Kholi Bazar in Dailekh district, Bheri Zone, Mid-Western Development Region. The geographic location of the proposed bridge is 29°03'18.968" N and 81°27'34.525" E and the elevation is 702.54 m above mean sea level.

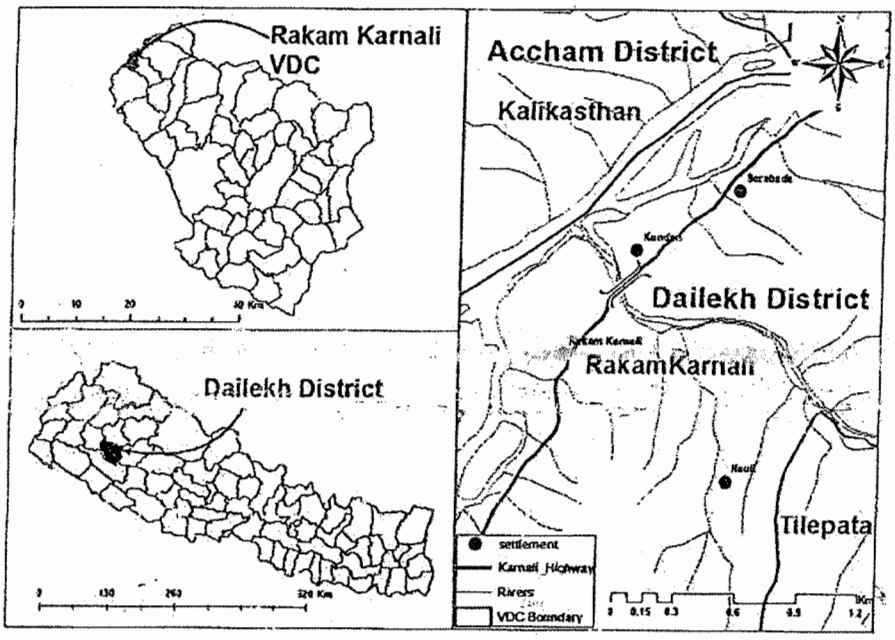


Figure 2-1: Location Map of the Proposed Project

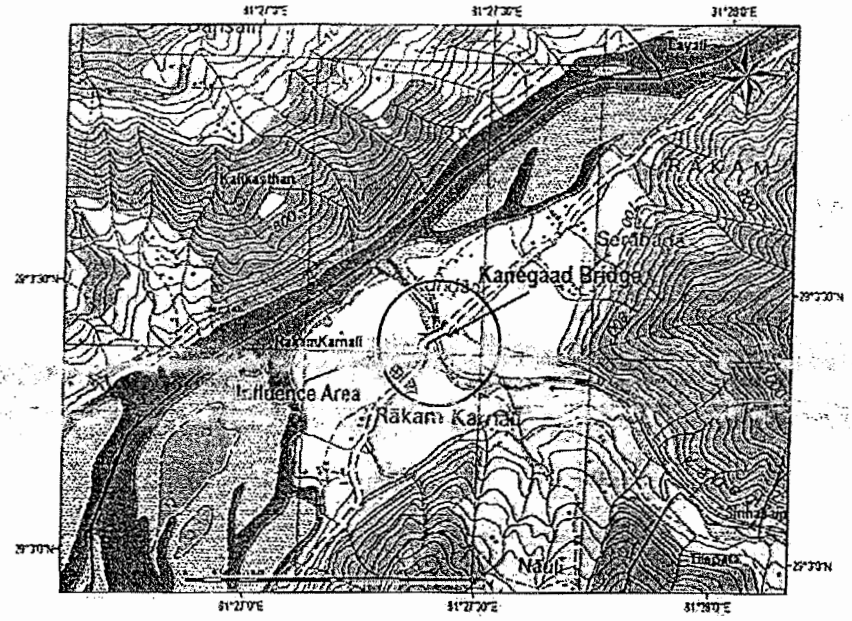


Figure 2-2: Topographical Map Showing Location of the proposed bridge

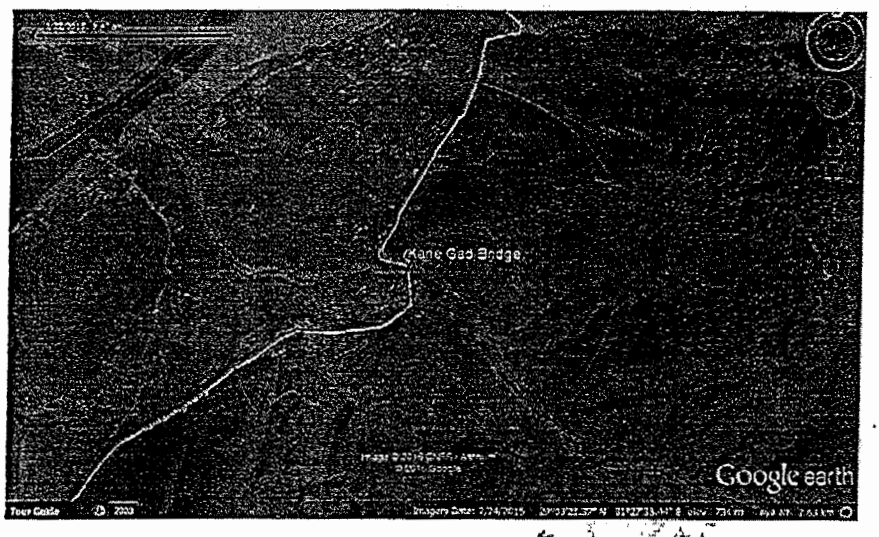


Figure 2-3: Google location of the project area (Red circle indicated DIZ)

2.6.2 Salient Features

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

Table 2-1: Salient Features of the Project

1. Name of the Project	:	Construction of Kane Gad Bridge
2. Bridge Name	:	Kane Gad Bridge
3. Location		
3.1. Development Region	:	Mid-Western Development Region
3.2 Zone	:	Bheri
3.3 District	:	Dailekh
3.4 Village / Town	:	Rakam Karnali VDC, Ward Number 4
3.5 Name of the Road	:	Surkhet Jumla Road
3.6 Chainage of the Bridge site:		119+140
3.7. Geographical Location	:	Lat: 29°03'18.968"N Long: 81°27'34.525"E
3.8 Classification of Road	:	Highway
3.9 Type of Road Surface	:	Bituminous
3.10 Terrain / Geology	:	Hilly
4. Structure		
4.1 Total length of the Bridge:		21.2 m
4.2 Span Arrangement	:	1x 20 m
4.3 Total width of the bridge	:	11.0 m
4.4 Width of Carriage way	:	7.50 m
4.5 Width of Footpath	:	1.5 m
4.6 Kerbs	:	0.35 m
4.7 Type of Structure	:	Simply Supported
4.8 Type of Superstructure	:	RCC T Beam Bridge
4.9 Type of Abutment	:	RCC (Cantilever)
4.10Type 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/m2
5.3 Design Discharge	:	282 m3/s
5.5 Highest Flood Level	:	689.370 m
5.6 Lowest Bed Level	:	695.04 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)
6. Summary of Cost (NRs)		
6.1 Total Cost of the Bridge	:	NRs. 36,646,541.87
6.2 Cost per running meter	:	NRs. 1,726,610.47

Source: Draft Design Report of Kane Gad Bridge, 2015

2.6.3 Impact Area Delineation

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

Table 2-2: Project Impact Area Delineation

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

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

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

3.1 Desk Study and Literature Review

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

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

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

3.2 Field Study

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

3.3 Collection of Environmental Baseline Data/Information

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

Table 3-1: Baseline Data Collection Methodology

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

3.4 Data Analysis

The experts of the relevant field will analyze primary and secondary information qualitatively and quantitatively. Physical, chemical, biological, socio-economic, and cultural information will be

assembled and tabulated. The information will be crosschecked and analyzed by the respective experts. The data will be processed using computer-based spreadsheets (Excel) and SPSS and will be presented in tabular and pictorial forms.

3.5 Impact Identification/ Prediction and Evaluation

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

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

3.6 Public Involvement

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

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

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

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

Recommendation Letters: The recommendation letters from project affected VDC (Rakam Karnali VDC) of Dailekh district will be collected for the environmental clearance and implementation of the project.

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

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

4.1 Constitution

- Constitution of Nepal

4.2 Acts and Regulations

- Environment Protection Act, 2053 BS (1997 AD)
- Environment Protection Rules, 2054 BS (1997 AD)
- Solid Waste Management Act, 2068 BS (2011 AD)
- Solid Waste Management Regulation 2070 (2013 AD)
- Labor Act 2048 BS (1992 AD)
- Local Self-Governance Act 2055 BS (1998 AD)
- Public Road Act, 2031 (1974)
- Forest Act, 2049 (1993)
- Forest Rules 2051 (1995)
- Aquatic Animal Protection Act 2017 (1961)
- National Foundation for the Development of Indigenous Nationalities Act, 2002
- Land Acquisition Act 2034 (1977)
- Child Labor Act 2056 BS (2001 AD)
- Ancient Monument Preservation Act 2013 BS (1953 AD)

4.3 Policies and Plans

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

4.4 Manuals/Guidelines/ Directives

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

4.5 Standards

- National Standard about Noise Level 2069 BS
- National Ambient Air Quality Standard 2012 AD
- Nepal Road Standard 2070 BS
- Nepal Bridge Standard 2067 BS

4.6 International Conventions and Treaties

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

CHAPTER-5: RESOURCE REQUIREMENT FOR THE STUDY

5.1 Time Requirement

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

Table 5-1: Estimated Time Required for IEE Study

S.N.	Activities	April 2017	May 2017					June 2017	
		Weeks							
		5	1	2	3	4	5	1	2
1	Desk Study and Literature Review								
2	Public notice publication								
3	Field study and Consultation/Interaction with community								
4	Data Analysis and interpretation								
5	Draft report preparation								
6	Comments on draft report								
7	Final Report preparation and Submission								

5.2 Human Resource Requirement

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

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

CHAPTER-6: DELETED

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

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

7.1 Project Activities

7.1.1 Pre-construction Phase

- Regulatory Permissions (including those related to labour)
- Plant sites-location layout and facilities
- Land and/or Property acquisition
- Preparation of Environmental Management Plan including;

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

7.1.2 Construction Phase

- Site clearance, including demolishing of public and private structures, vegetation removal
- Transportation of Construction Materials
- Operation of Construction Machines / Equipment's (Operation of rolling machine, asphalt/concrete Plant, Hot mix Plant etc.)

- Land Clearance and Land Preparation
- Excavation, Fresh Cut, Dredging and Drilling
- Quarry site construction and operation
- Blasting, Work on Quarry rock break up
- River Diversion / River training
- Material Stockpiling
- Operation of Power Generators
- Camp (labors and Contractor) site operation
- Spoil Disposal
- Waste Generation and Disposal
- Concrete Mixing
- Erection of Piers and Abutments
- Handling of petroleum and acid
- Vehicular Operation during bridge construction
- Use of fuels (fossil/biomass) for construction activities
- Use of Fuels for camp operation

7.1.3 Operation Phase

- Regular/Periodic maintenance of the project (Bridge)

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

7.2 Beneficial Impacts/Issues

7.2.1 Construction Stage

- Employment Generation
- Enhancement of technical skills
- Public awareness

7.2.2 Operation Stage

- Improved Mobility
- Reduce cost

7.3 Adverse Impacts/Issues

7.3.1 Pre-Construction Phase

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

7.3.2 Construction Stage

7.3.2.1 *Physical Environment*

- Change in morphology, longitudinal profile/river bed and hydrological character of regime of river and inundation in the upstream section
- Change in land use and loss of productive soil
- Landslides, slope destabilization and soil erosion
- Management and operation of quarries and borrow pits
- Spoil and construction waste disposal
- Water flow diversion

- Pollution of water resources
- Change in river regime
- Approach road and related issues
- Road diversion and related issue
- Contamination of soil
- Stockpiling of materials/issues related to stockpiling yard
- Air and noise pollution
- Combustible and toxic material management.
- Use of bitumen
- Work Camp location and management
- Occupational health and Safety of workers
- Accidental risks
- Impact on landscape aesthetics

7.3.2.2 Biological Environment

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

7.3.2.3 Socio-economic and Cultural Environment

- Influx of workforce (Construction Crews) into the project areas.
- Social Conflicts
- Obstruction to social services and facilities
- Impact on private and public properties
- Public grievance related to project construction
- Disruption of community structure and livelihood
- Conflict in or with nearby host communities
- Damage of community infrastructures
- Impact on vulnerable indigenous people and Dalits
- Impact on religious, cultural and historical assets

7.3.3 Operation & Maintenance Stage

7.3.3.1 Physical Environment

- Reinstatement of quarry, camps (labour and contractor's), crusher plant, stockpiling site, etc.
- Air pollution
- Noise and Vibration
- Backwater Effect During Floods
- Riverbank Erosion
- Water pollution due to washing of vehicles nearby the river
- River Channel Shifting
- Stockpiling of materials during bridge maintenance

7.3.3.2 Biological Environment

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

7.3.3.3 Socio-economic and Cultural Environment

- Congestion around the adjoining areas of Bridge Abutment

CHAPTER-8: ALTERNATIVES FOR IMPLEMENTATION OF THE PROPOSAL

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

8.1 No Project Alternative

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

8.2 Alternative Design

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

8.3 Alternative Sites

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

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

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

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

8.5 Other Matters

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

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

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

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

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

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

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

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

The monitoring plan will include the following aspects;

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

CHAPTER-11: OTHER NECESSARY MATTERS

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

Annexes

Annex A: Checklists for Environmental Baseline

Annex A1. Checklist for Physical and Chemical Environment

A. Topography/Physiography

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

B. Climate and Hydro-Meteorology

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

C. Air Quality

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

D. Erosion and land Stability

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

E. Land Use

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

Annex A2-BE: Check List for Biological Environment

A. Vegetation Analysis

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

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

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

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

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

Bridge Name:
Bridge Location:

1. Camp Site:

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

2. Material Stockpiling Areas

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

3. Quarry Site

- Location from the Bridge axis:
- Distance.....
- GPS location.....
- Type and Volume of available quarry materials.....
- Surrounding Environmental Features (Water Bodies, forest, Nearby settlements etc.).....
- Potential Unstable areas around quarry sites.....

- Foundation Excavation Site Conditions:
- Bed Rock (.....), Soil/Rock Mix (.....), others (Specify)(.....)
- Foundation Excavation Need: Trees Removal (Yes/No)
- Quantity of foundation excavation works (m^3):.....
- Quantity of Materials to be disposed (m^3): .....
- Site of Surplus materials safe Disposal:.....

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

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

5. Hazardous Material Yard

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

6. Methods of Disposal to be practiced:

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

7. Availability of Public utilities in project impact areas

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

8. Relocation Common Property Resources (CPR)
   - Electricity Poles.....
   - Water supply system.....
   - Irrigation pipe.....
   - Chautari.....
   - Others Specify.....

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

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

11. Nearby Natural Hazards
- Type .....
- Nature.....
- Dimension.....

12. Other Environmental Issues Associated With River Banks

Annex A3: Questionnaire for Household Survey

Annex A3: Questionnaire for Household Survey

घरधूरी सर्वेक्षण प्रश्नावली

१. आधारभुत विवरण:

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

२. घरधूरी विवरण

२१ पारिवारिक विवरण

क.सं.	घरपरिवारका सदस्यहरुको घरमुलीसंगको नाता	लिङ्ग		उमेर (पूरा भएकोमा उमेर)	शिक्षा (५वर्ष माथि)	पेशा (१४ वर्ष भन्दा माथि)	हाल घरमा भएको /नभएको	
		पु.	म.				भएको	नभएको
१.		१	२				१	२
२.		१	२				१	२
३.		१	२				१	२

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

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

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

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

३ . <u>बसाई सराई</u>

क.सं	प्रश्न	उत्तर
३.१	तपाईका परिवार (पूर्खा) कहिले देखि यस ठाउँमा बस्दै आउनुभएको हो ?	दूई पूस्ता भन्दा अधिवाट (५० वर्ष । ..... एक पुस्ता भन्दा अधिवाट(२५वर्ष) ..... हालसालै (१० वर्ष भन्दा कम) .....
३.२	यदि तपाई बसाई सरेर आउनुभएको हो भने कृपयातपाईको पूर्खाको ठाउँ तोक्नुहोस् ?	जिल्लाको अर्का गा.वि.सहरु ..... छिमेकी जिल्ला ..... अन्य जिल्ला .....
३.३	के तपाईको परिवारका कुनै सदस्य कामको सिलसिलामा बसाई सर्नु भएको छ?	छ ..... छैन

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

४. परिवारमा विरामी

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

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

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.	झ्याँरिया					
४.	झाडापखला					
५.	जन्डीस					
६.	टाइफाईड					
७.	निमोनिया					
८.	मुटु सम्बन्धि					
९.	अन्य(खुलाउनुहोस्)					
१०.	अन्य(खुलाउनुहोस्)					
११.	अन्य(खुलाउनुहोस्)					
१२	अन्य(खुलाउनुहोस्)					

४. शौचालय सुविधा

क.सं	प्रश्न	उत्तर
१.	के 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

नेपाल सरकार
भौतिक पूर्वाधार तथा यातायात मन्त्रालय
सडक विभाग
भू-वातावरण तथा सामाजिक इकाई
कानेगँडखोला पुलको

प्रारम्भिक वातावरणीय परिक्षण (IEE) गर्नेबारे सार्वजनिक सूचना

प्रथम पटक प्रकाशित मिति : २०७४/०१/२१

ल सरकार, सडक विभाग, सडक क्षेत्र विकास आयोजनाले सुर्खेत-जुम्ला सडकमा पर्ने कानेगँडखोला माथि निर्मा प्रस्ताव गरेको २१.२ मि.लम्बाई (१×२० मि. स्पान) तथा ११ मि. चैडाई भएको पक्कीपुलको प्रारम्भिक वातावरणी क्षण गर्ने सिलसिलामा वातावरण संरक्षण नियमावली २०५४ (पहिलो संशोधन, २०५५) को नियम ७(२) अनुसार र जनिक सूचना प्रकाशित गरिएको छ ।

ावनाको नाम र ठेगाना : भू-वातावरण तथा सामाजिक इकाई, सडक विभाग, चाकुपाट, ललितपुर, नेपाल

प्रस्तावको विवरण:

सं.	पुलको नाम	पहुच सडक	गा. वि. स.	प्रस्तावको विवरण
१	कानेगँडखोलापुल	सुर्खेत-जुम्लासडक	राकम कर्णाली गा. वि. स., दैलेख जिल्ला	RCC T Beam Bridge प्रकारको २१.२ मि. लम्बाई (१×२० मी. स्पान) तथा ११ मि. चौडाई भएको

थ उल्लेखित पुलको प्रारम्भिक वातावरणीय परिक्षण प्रतिवेदन तयार गर्ने क्रममा सो पुलनिर्माण हुने क्षेत्रको भौतिव क, सामाजिक-आर्थिक तथा सास्कृतिक प्रणालीहरु र यिनका अवयवहरु (Components) तथा यि अवयवहरु विचव तरक्रिया र अन्तरसम्बन्धमा पर्न सक्ने असरहरु र सो असरहरु न्यूनिकरण गर्नका लागि अपनाउन सकिने उपायह ावेश गरी आफ्नो राय सुझाव तल उल्लेख गरिएको ठेगानामा यस सूचना प्रकाशित भएको मितिले १५ दिनभि उनुहुन सम्बन्धित क्षेत्रका गा. वि. स. को कार्यालयहरु, विद्यालय, स्थानिय सरकारी, गैह्र सरकारी संघ संस्थाह ा सम्पूर्ण सरोकारवालाहरुमा हार्दिक अनुरोध गरिन्छ ।

राय सुझावको लागि पत्राचार गर्ने ठेगानाहरु:

प्रस्तावक	सम्बन्धित मन्त्रालय/विभाग
भू-वातावरण तथा सामाजिक इकाई सडक विभाग चाकुपाट, ललितपुर, नेपाल न नं. : ०१-५२६०६९६, फ्याक्स नं. : ०१-५५२९१०६ इमेल : gesunit@dor.gov.np	भौतिक पूर्वाधार तथा यातायात मन्त्रालय, सिंहदरबार तथा सडक विभाग सडक क्षेत्र सुधार आयोजना सानो गौचरन, काठमाण्डौं नेपाल

Annex D: Deeds of Inquiry (Muchulka)

क.सं	श्रोतहरु	प्रयोग गरेका मूख्य तिनवटा श्रोतहरु		प्रयोगका आधारमा प्राथमिकिकरण गर्नु होस्
		छ	छैन	
१.	धारा (निजी धारा)	१	२	
२.	धारा (सामूहिक)	१	२	
३.	कुवा /मूल /ढुङ्गेधारा	१	२	
४.	अन्य (खुलाउनुहोस्).....।			

६. आयोजना सम्बन्धि

६.१ तपाईलाई यस आयोजना बारे जानकारी छ ?

☐ ☐

६.२ यदि छ भने कुन माध्यममबाट थाहा पाउनु भयो ?

६.३ यस आयोजना बनाउँदा तपाईलाई कुन प्रकारको हानी नोक्सानी पुग्याउँछ ?

- जग्गाको क्षती
- भौतिक संरचनामा क्षती

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

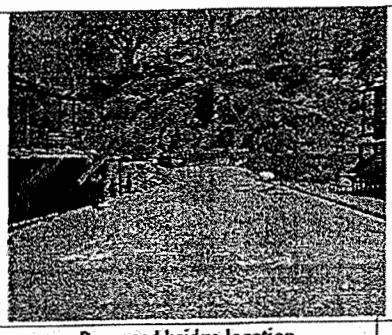
६.५ यस आयोजनाले यस क्षेत्रमा रहेको के कस्तो सार्वजनिक तथा भौतिक संरचनामा असर गर्छ ?

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

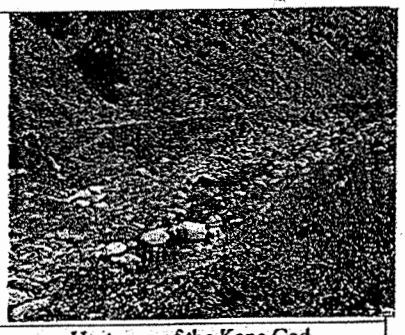
६.७ यो आयोजनाले के कस्तो फाईदा पुग्याउने देख्नु हुन्छ ?

६.१ आयोजना बारे तपाईको राय सुझावहरु के के छन् ?

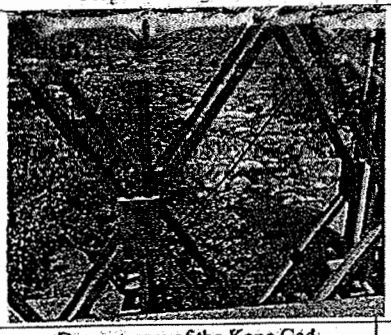
Annex B: Photographs



Proposed bridge location

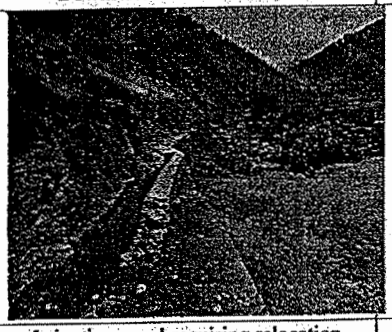


Upstream of the Kane Gad



Downstream of the Kane Gad

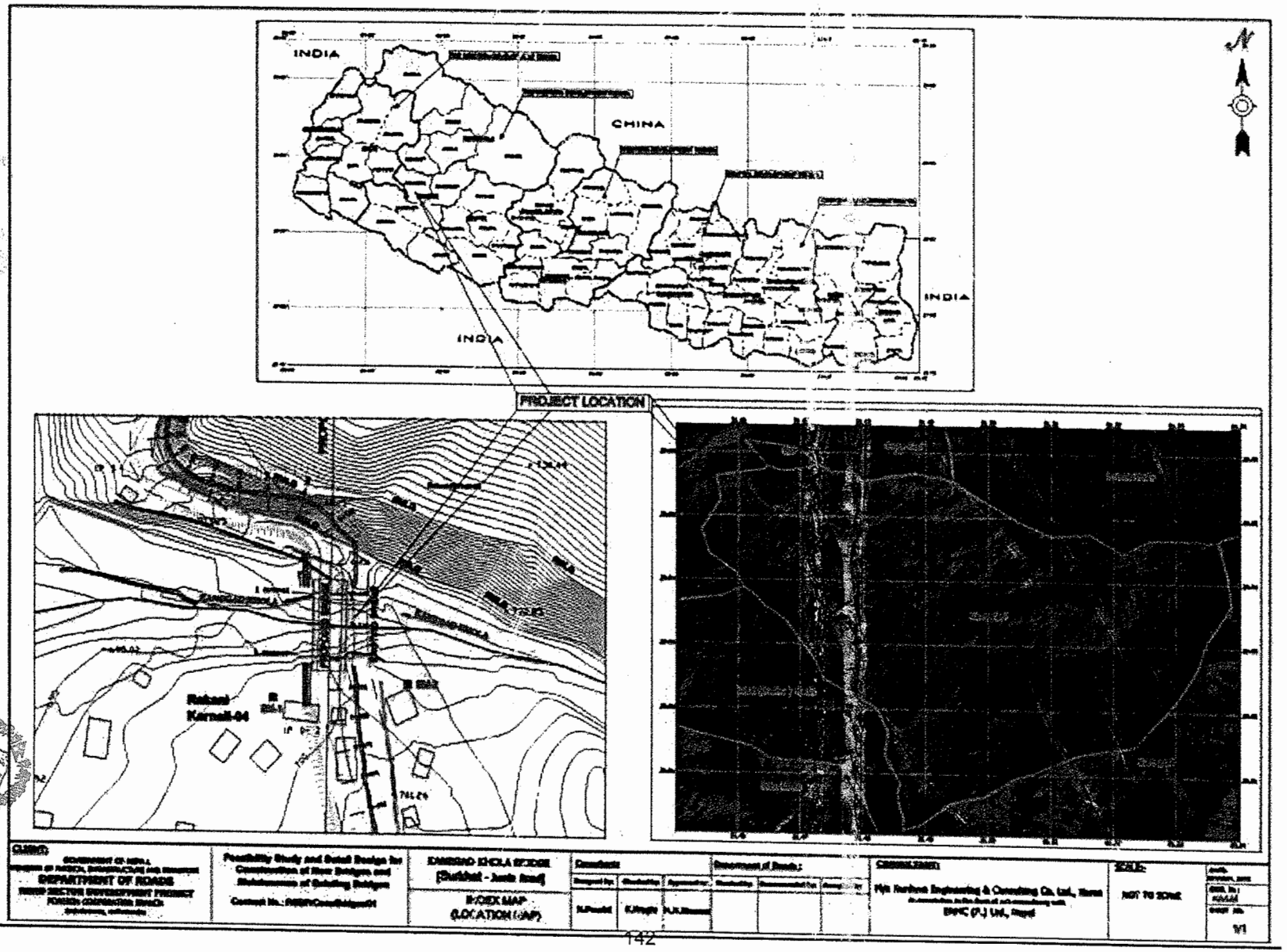
Interaction with the local people

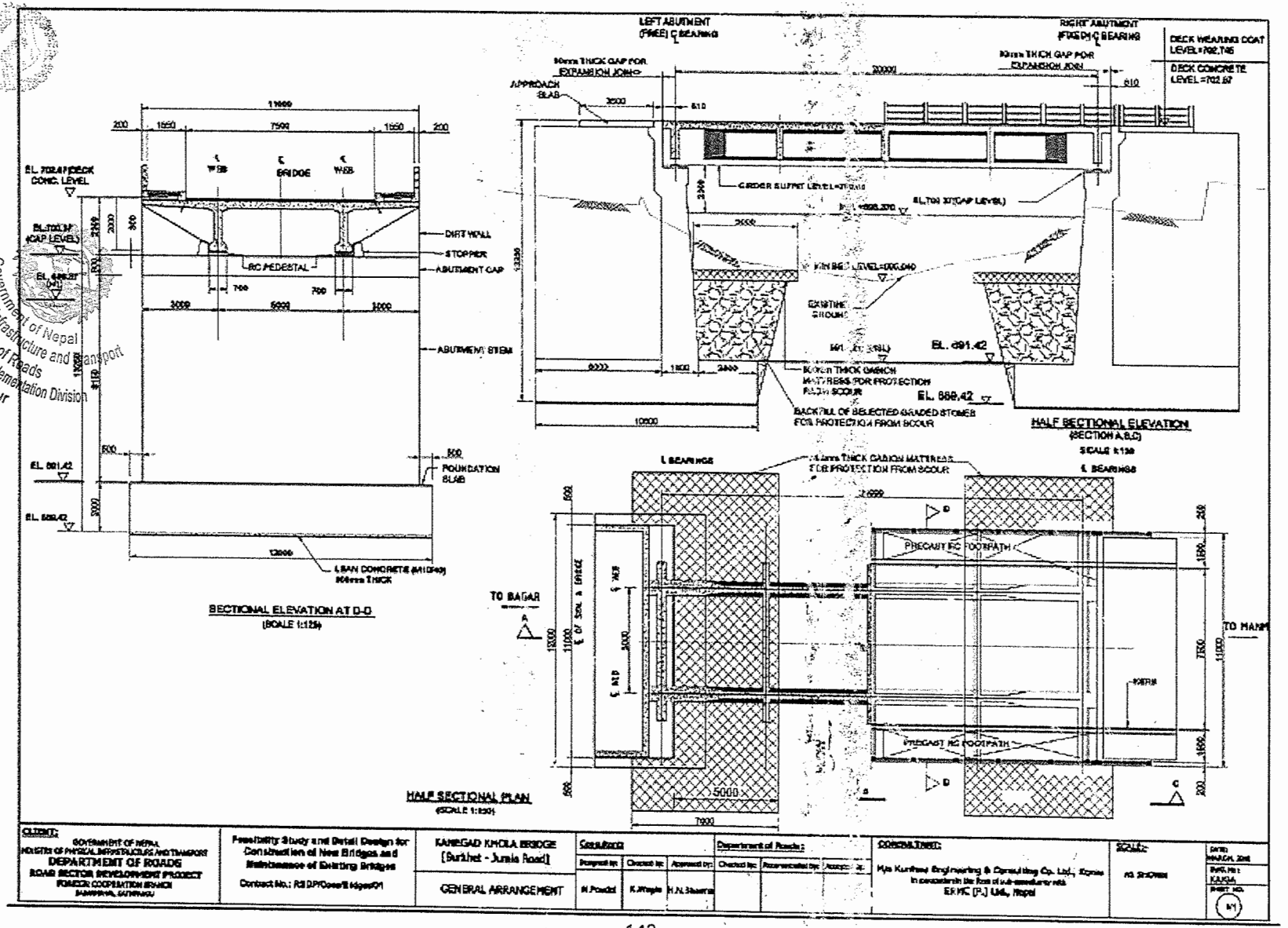


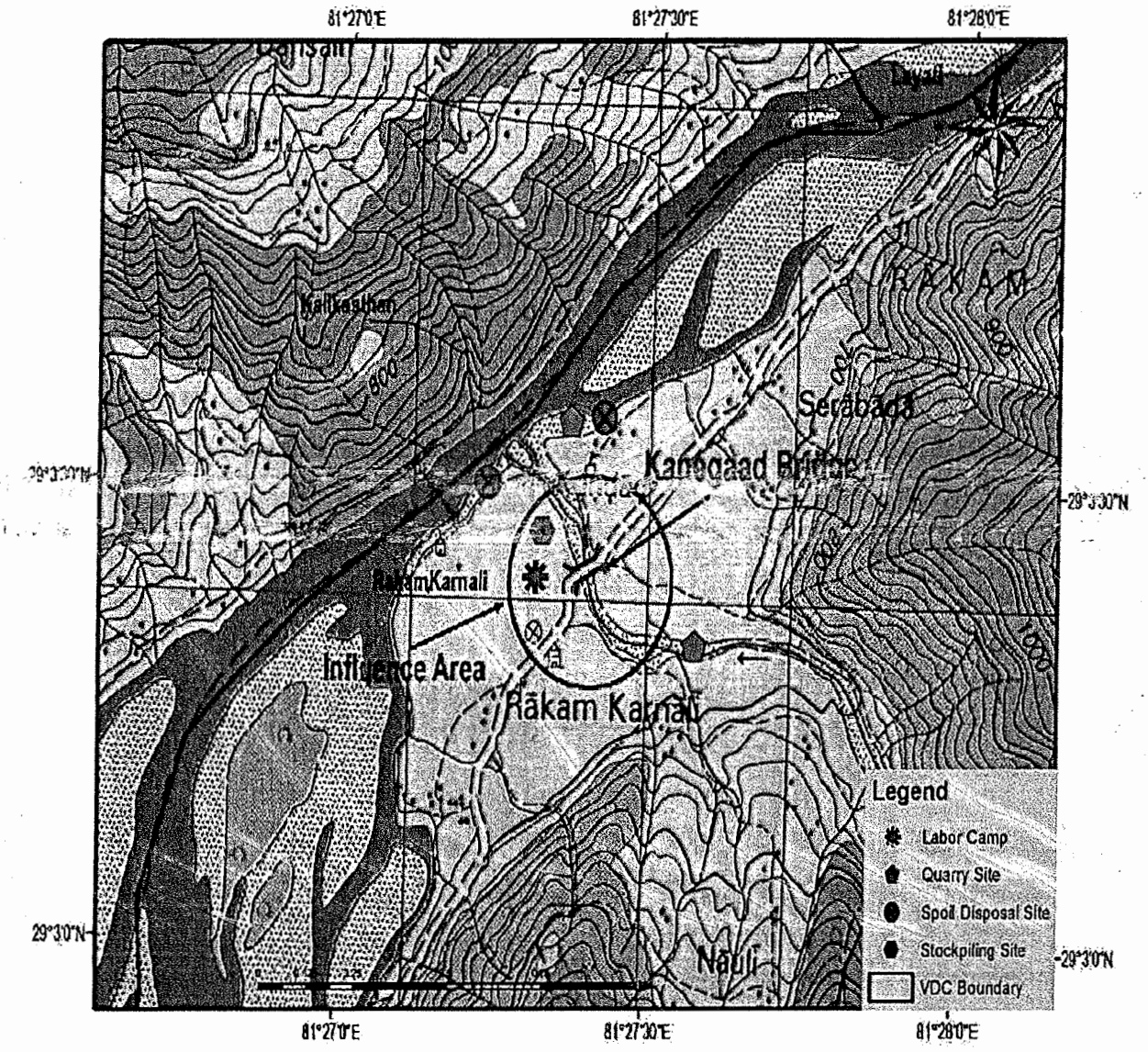
Irrigation canal requiring relocation

Water mill requiring relocation

Annex B: Map with Environmental Component







Annex C: Public Notice

आठबीस नगरपालिका
गाउँ कार्यपालिकाको कार्यालय
राकमकर्णाली, दैलेख
६ नं. प्रदेश, नेपाल

प.सं. :- २०७३/०७४
च.नं. :- ५४

मिति :- २०७४/१/२८

विषय :-सूचना टाँस गरीएको ।

श्री सडक सुधार विकास आयोजना,
प्रशासन महाशाखा,
सडक विभाग, काठमाडौं ।

प्रस्तुत सम्बन्धमासाविक राकमकर्णाली गा.वि.स. वडा नं. ४, हाल यस नगरपालिका अन्तर्गत वडा नं. ४ मा अवस्थित कानेगाड खोलामा निर्माण गर्न प्रस्ताव गरिएको 'कानेगाड खोला पुल'को प्रारम्भिक वातावरणीय परिक्षण गर्नेबारे राय सुझाव पेश गर्नको लागि आह्वान गरिएको आर्थिक अभियान राष्ट्रिय दैनिकमा मिति २०७४/१/२१ मा प्रकाशित सूचनाको छाँया प्रति यस कार्यालयको सूचना पाटीमा मिति २०७४/१/२८ मा टाँस गरिएको व्यहोरा जानकारीको लागि अनुरोध छ ।

(मातृका प्रसाद भट्टराई)
कार्यकारी अधिकृत

प्रारम्भिकवातावरणीय परिक्षण सम्वन्धि सूचना टाँसको मुचुल्का

आजमिति २०७४/०१/२१ गते [illegible] कादिन यस [illegible] साविकगाविस राकम कर्णाली भन्ने ठाउँमा कानेगँड झोलापुलको प्रारम्भिकवातावरणीय परिक्षण गर्ने क्रममा सम्पूर्ण सरोकारवालाहरुलाई प्रस्तावितपुलनिर्माण गर्दा त्यस क्षेत्रको भौतिक, जैविक, आर्थिक सामाजिकतथा सांस्कृतिकवातावरणमा पर्न सक्ने असर तथाति असरहरु न्यूनिकरण गर्नअवलम्बनगर्न सकिने सम्भावितउपायहरु वारे आफ्ना राय सुझावहरु पाउनआवहानगर्दै मितिर०७४/०१/२१ को आर्थिक अभियान राष्ट्रिय दैनिकमाप्रकाशित १५ दिने सार्वजनिक सूचनाहरुको छाँया प्रतिहरुमीनिम्न सरोकारवालाहरुको उपस्थितीमा टाँस गरिएको व्यहोरात्र सहीहो भनि यो मुचुल्कामा हस्ताक्षण गर्दछौं ।

[illegible]	[illegible]	[illegible]	पेशा	[illegible]
१.	[illegible]	राकम-४, [illegible]	[illegible]	[illegible]
२.	[illegible]	"	[illegible]	[illegible]
३.	जानकी [illegible]	"	विद्यार्थी	Janaki
४.				
५.	[illegible]	"	विद्यार्थी	[illegible]
६.	[illegible]		[illegible]	[illegible]
८.				
९.				
१०.				
११.				
१२.				
१३.				
१४.				
१५.				

नेपाल सरकार
[illegible]
[illegible], काठमाडौं

Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads
Development Cooperation Implementation Division
Jwagal, Lalitpur

प्रारम्भिकवातावरणीय परिक्षण सम्बन्धि सूचना टाँसको मुचुल्का

आजमिति २०७८/०१/२९ गते २५ गते ..... कादिन यस साविकगाविस राकम कर्णाली-४ भन्ने ठाउँमा कानेगँड खोलापुलकोपुलको प्रारम्भिकवातावरणीय परिक्षण गर्ने क्रममा सम्पूर्ण सरोकारवालाहरुलाई प्रस्तावितपुलनिर्माण गर्दा त्यस क्षेत्रको भौतिक, जैविक, आर्थिक सामाजिकतथा सांस्कृतिकवातावरणमा पर्न सक्ने असर तथाति असरहरु न्यूनिकरण गर्नअवलम्बनगर्न सकिने सम्भावितउपायहरु बारे आफ्ना राय सुझावहरु पाउनआवहानगर्दै मिति २०७४/०१/२१को आर्थिक अभियानराष्ट्रिय दैनिकमाप्रकाशित १५ दिने सार्वजनिक सूचनाहरुको छाँया प्रतिहाभीनिम्न सरोकारवालाहरुको उपस्थितीमा टाँस गरिएकोव्यहोरा सहीहो भनि यो मुचुल्कामा हस्ताक्षण गर्दछौं ।

सि नं	नाम, थर	ठेगाना	पेशा	हस्ताधर
१.	[illegible]	[illegible]	[illegible]	[illegible]
२.	[illegible]	[illegible]	व्यापारी / hotel.	[illegible]
३.	[illegible]	"	Student	[illegible]
४.	[illegible]	"	Student	[illegible]
५.	[illegible]	"	कृषि	[illegible]
६.				
८.				
९.				
१०.				
११.				
१२.				
१३.				
१४.				
१५.				

Annex E: Recommendation Letter

आठबीस नगरपालिका
नगर कार्यपालिकाको कार्यालय
राकमकर्णाली, दैलेख
६ नं. प्रदेश, नेपाल

आठविस नगरपालिका नगर कार्यपालिकाको राकमकर्णाली, दैलेख ६ नं. प्रदेश, नेपाल

पत्र सं. :- २०७३/०७४
च.नं. :- ५५

मिति २०७४/१/२८

विषय :-सिफारिस ।

श्री सडक सुधार विकास आयोजना,
वैदेशिक महाशाखा,
सडक विभाग, काठमाडौं ।

प्रस्तुत सम्बन्धमा साविक राकमकर्णाली गा.वि.स. वडा नं. ४, हाल यस नगरपालिका अन्तर्गत वडा नं. ४ मा अवस्थित कानेगाड खोलामा निर्माण गर्न प्रस्ताव गरिएको 'कानेगाड खोला पुल' निर्माणबाट आवतजावतमा सहज हुने र वातावरणीय प्रभावका बारेमा IEE को प्रतिवेदन बमोजिम हुन उपयुक्त भएको व्यहोरा सिफारिस साथ अनुरोध छ ।

(मातृका प्रसाद भट्टराई)
कार्यकारी अधिकृत

Government of Nepal
Ministry of Physical Inirastructure and Transport
Department of Roads
Development Cooperation Implementation Division
Jwagal, Lalitpur

Annex F: Minutes of Public Consultation

प्रारम्भिक वातावरणीय परिक्षणको लागी लक्षित सामुहिक सल्लाह FGD

आठबिस नगरपालिका

आज मिति २०७४/०१/१५ गते बुधबार कादिन यस [illegible] साविक गाविस राकम कर्णाली-४ भन्ने ठाउँमा कानेगँड खोला पुलको प्रारम्भिक वातावरणीय परिक्षण गर्न प्रस्तावित पुल निर्माण गर्दा योजनाबाट प्रभावित व्यक्ति वा समुहलाई लक्षित गरी सामुहिक सल्लाह FGD भएको यसैं व्यहोराबाट जानकारी गराछौं।

सि.नं.	नाम, थर	ठेगाना	पेशा	हस्ताक्षर
१.	गणेश ब. माझी	राकम-४	कृषि	
२.	महेन्द्र ब. माझी	[illegible] राकम	कृषि	[illegible]
३.	पितम्बर [illegible]	राकम-४	"	[illegible]
४.	हस्त ब. माझी	"	विद्यार्थी	[illegible]
५.	मान ब. ~~माझी~~ [illegible]	"	कृषि	[illegible]
६.	~~[illegible]~~ कमल माझी	"	[illegible]	[illegible]
७.	मदन माझी	"	व्यापार	[illegible]
८.	अमित माझी	"	विद्यार्थी	[illegible]
१०.				
११.				
१२.				
१३.				
१४.				
१५.				

उपरोक्त सरोकारवालाहरु संगको छलफलबाट निम्न निर्णयहरु गरियो।

- आयोजना छिटो कार्यान्वयन हुनु पर्ने।
- स्थानिय बासिन्दालाई आयोजनामा रोजगारी प्रदान गर्नु पर्ने।
- आयोजना निर्माणक्रममा राजमार्ग अवरोध हुन नहुने।
- पुल निर्माण गर्दा स्थानिय वातावरणमा कुनै हानि नहुने उपयुक्त उपायहरु अवलम्बन गर्नु पर्ने।

Annex G: Supporting Document of Cost Estimation of Land and Structure

नेपाल सरकार
भूमिसुधार, तथा व्यवस्था मन्त्रालय
नापी विभाग
नापि कार्यालय, दैलेख

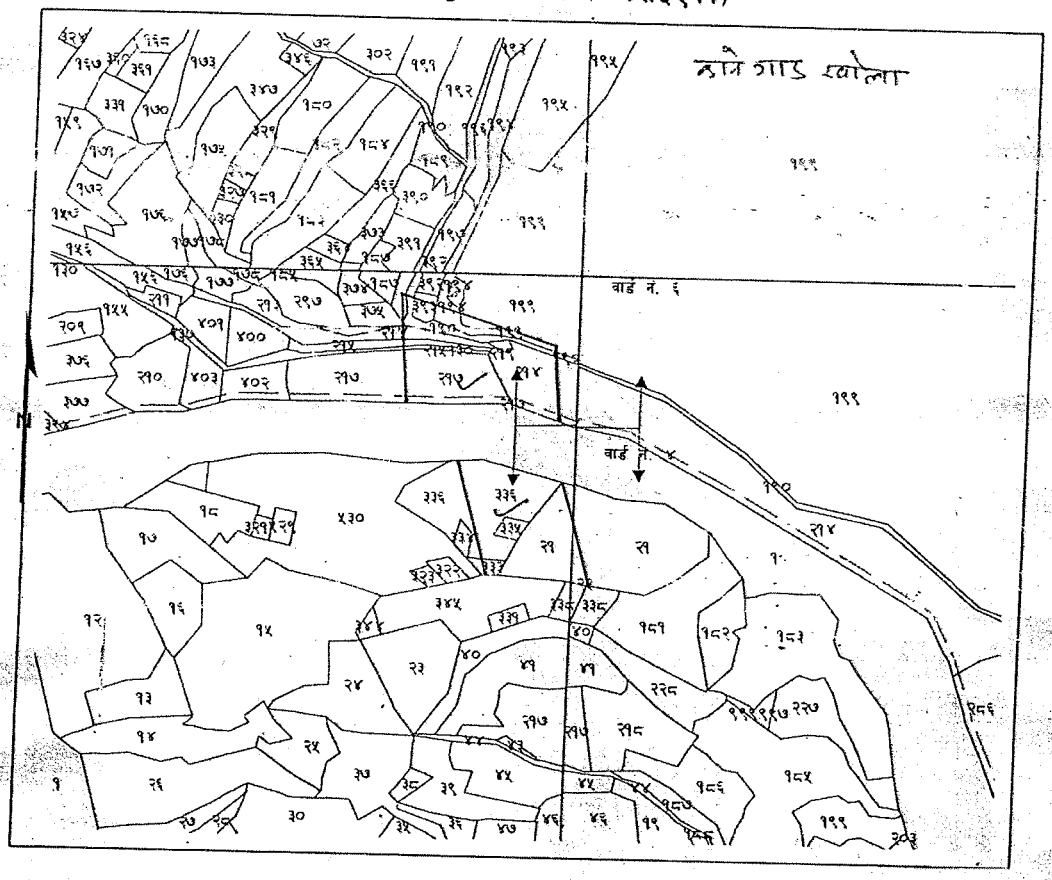
जिल्ला: दैलेख
सीट नं.०२२।११५६र
०२२।११५७

गा.वि.स.वा न.पा.: रोकमकर्णली

वडा नं: ४र६

स्केल १:२,५००

(प्रीन्टको सट्टामा उपलब्ध गराइएको)



नापि कार्यालय को च .न.७ मिति २०७२।०४।१३ को पत्रानुसार

तयार गर्ने

प्रमाणित गर्ने
नापी अधिकृत

जिल्ला......दैलेख...(कानेगढ खोला)........................., ... उपआयोजनाको लागि आवश्यक जग्गाको लगत फाराम

क्र.स.	चेनेज	जग्गाधनीको नाम	जग्गाधनीको बाबु'को नाम	गा.वि.स	वडा नं	नक्सा नं	कित्ता नं	प्रभावित कित्ताको जम्मा क्षेत्रफल	प्रभावित कित्ताको क्षेत्रफल	मोठ नं	तर्फ	कैफियत
१	११९+१४०	लाल वहादुर शाही	मान वहादुर शाही	राकमकर्णाली	४	०२२-११२६	३३५	०,०११७	०,०११७		पुरा	
२	"	मोतिराम माझी	पिरम वहादुर माझी	"	४	"	३३३	०,००९५	०,००६७		पुर्व तर्फ	
३	"	नमसरा माझी		"	४	"	३३६	०,२०१३	०,१२७१		पुर्व तर्फ	
४	"	दिल माझी	पौजे माझी	"	४	०११-११४६ ०११-११४८	२१	०,३१२५	०,१०५०		पश्चिम तर्फ	
५	"	गंगा माझी	वलिर सिंह	"	६	" ०११-११२८	२१७	०,२३४०	०,११००		पुर्व तर्फ	
६	"	कुलो	....	"	६	"	१३०	०,०८८०	०,००६७		पुर्व तर्फ	
७	"	गंगा माझी	वलिर सिंह	"	६	"	२१५	०,०२३५	०,००९१		पुर्व तर्फ	
८	"	भीर	....	"	६	"	२१४	०,६५६०	०,०९७३		पश्चिम तर्फ३९८व.मी. छोडी सो देखि पुर्व	
९	११९+१४०	कमल माझी		राकमकर्णाली	६	"	३९३	०,०१२८	०,००१२		दक्षिण तर्फ	
१०	"	वाटो	....	"	६	"	११४	०,१४६५	०,०१७५		दक्षिण तर्फ	

कार्यालय प्रमुख ... नापी अधिकृत

Annex H: Sample Questionnaire

घरधूरीसर्वेक्षण प्रश्नावली

१. आधारभुतविवरण:

क.सं.	प्रश्न	उत्तर
१.१	प्रश्नावली नं.	
१.२	अन्तरवार्ताको मिति	
१.३	जिल्ला	
१.४	गबिस	
१.५	वडा.नं.	
१.६	गाउँ वस्तीको नाम	
१.७	उत्तरदाताको नाम	
१.८	उत्तरदाताको लिङ्ग	पुरुष ..... महिला .....
१.९	घरमूलीको नाम	
१.१०	घरमूलीको लिङ्ग	पुरुष ..... महिला .....
१.११	जातर जाती: (उपयुक्त एक मात्रउत्तरमागोलो लगाउनुहोस्)	बाहुन ..... क्षेत्री ..... ठकुरी ..... जनजाती ..... दलित ..... अन्य-खुलाउनुहोस्). .....
१.१२	धर्म : (उपयुक्त एक मात्रउत्तरमागोलो लगाउनुहोस्)	हिन्दू ..... बौद्ध ..... मूस्लिम ..... क्रिश्चियन ..... अन्य-खुलाउनुहोस्) .....
१.१३	परिवारको प्रकार (उपयुक्त एक मात्रउत्तरमागोलो लगाउनुहोस्)	एकात्मक परिवार..... संयुक्त परिवार ..... विस्तारीत परिवार

२. घरधूरी विवरण

२.१ पारिवारिकविवरण

क.सं.	घरपरिवारका सदस्यहरुको घरमुलीसंगको नाता	लिङ्ग		उमेर (पूरा भएको उमेर)	शिक्षा (५वर्ष माथि)	पेशा (१४ वर्ष भन्दामाथि)	हाल घरमाभएको /नभएको	
		पु.	भ.				भएको	नभएको
१.		१	२				१	२
२.		१	२				१	२
३.		१	२				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 नातास् घरमूलि(१, श्रीमती(२, श्रीमान(३, छोरी(४ छोरा (५, बुहारी (६, बुबा(७, आमा(८, नाती(९, नातीनी(१०,बहिनी(११, दाई(१२, भाउजु (१३, भाई (१४, भाई बुहारी (१५, नातेदार (पूरुष)(१६, नातेदार (महिला)(१७, अन्य(१८

२. वैवाहिक अवस्था : अविवाहित(१, विवाहित(२, सम्बन्ध बिच्छेद/छुट्टै वसेको (३, विधवा/विदुर (४

३. शिक्षा : निरक्षर (१, साक्षर (२, प्राथमिक(३, निम्नमाध्यामिक(४, माध्यामिक(५, प्रवेशिकार उच्चमाध्यामिक(६, उच्चमाध्यामिकभन्दामाथि(७

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

३ . वसाई सराई

क.सं	प्रश्न	उत्तर
३.१	तपाईका परिवार (पूर्खा) कहिले देखि यस ठाउँमा वस्दै आउनुभएको हो ?	दूई पूस्ताभन्दा अघिवाट (५० वर्ष) ..... एक पूस्ताभन्दा अघिवाट(२५वर्ष) ..... हालसालै (१० वर्ष भन्दाकम) .....
३.२	यदितपाई बसाई सरेर आउनुभएको हो भने कृपयातपाईको पूर्खाको ठाउँ तोक्नुहोस् ?	जिल्लाको अर्कोगा.वि.सहरु ..... छिमेकीजिल्ला ..... अन्यजिल्ला .....
३.३	के तपाईको परिवारकाकुनै सदस्यकामको सिलसिलामाबसाई सर्नु भएको छ?	छ ..... छैन .....

३.४	यदि छ भने कामको लागि स्थानरुहरु								के बसाई सराई वार्षिक चलनहो?
	कम संख्या	जानेको संख्यालिङ्ग		जिल्लाभित्र	जोडिएको जिल्ला	अर्को जिल्ला	भारत	विदेश	हो	होईन
		पुरुष	महिला							

४. परिवारमाविरामी

क.सं	प्रश्न	उत्तर
३.७.१	गएका १२ महिनामातपाईको कुनै सदस्य बिरामीहुनु भएको थियो?	थियो .....१ थिएन् २

४.१ यदिथियो भने, परिवारका सदस्य कस्ता रोगवाट बिरामीभएकाथिए र कुन समयमा? कृपयाखुलाउनुहोस्।

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	पुरु सम्बन्धि					
९.	अन्य(खुलाउनुहोस्)					
१०.	अन्य(खुलाउनुहोस्)					
११.	अन्य(खुलाउनुहोस्)					
१२	अन्य(खुलाउनुहोस्)					

४.२ शौचालय सुविधा

क.सं	प्रश्न	उत्तर
१.	के तपाई बसी राखेको घरमाशौचालय सुविधा छ ?	छ ..... छैन.....
२.	यदि छ भने, तपाईको घरमा कस्तो प्रकारको शौचालय सुविधा छ ?	खाल्डे चपीरकच्चाचर्पी .....
		पक्काचर्पी .....

५. खानेपानीको सुविधा

क.सं	श्रोतहरु	प्रयोग गरेकामूख्य तिनवटा श्रोतहरु		प्रयोगकाआधारमाप्राथमिकिकरण गर्नु होस्
		छ	छैन	
१.	धारा (निजीधारा)	१	२	
२.	धारा (सामूहिक)	१	२	
३.	कुवा/मूल/ढुङ्गेधारा	१	२	
४.	अन्य (खुलाउनुहोस्).....			

६.आयोजना सम्बन्धि

६.१ तपाईलाई यस आयोजनावारे जानकारी छ ?

छ ☐ छैन ☐

६.२ यदि छ भने कुन माध्ययमबाट थाहापाउनु भयो ?

६.३ यस आयोजनाबनाउँदातपाईलाई कुनप्रकारको हानीनोक्सानी पुऱ्याउँछ ?
जग्गाको क्षती
भौतिक संरचनामाक्षती

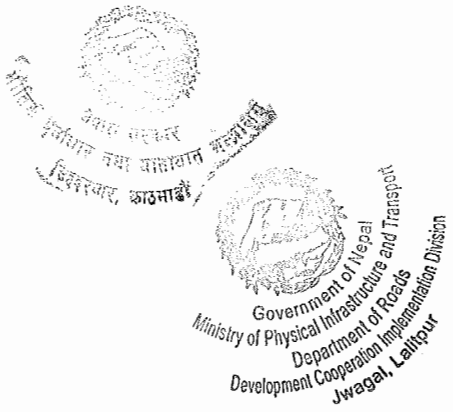
६.४ यस आयोजनाले यस क्षेत्रको भौतिक, जैविक, सामाजिक, आर्थिक तथा साँस्कृतिकवातावरणमा के कस्तो असर पर्ने देख्नुहुन्छ ?

६.५ यस आयोजनाले यस क्षेत्रमा रहेको के कस्तो सार्वजनिकतथाभौतिक संरचनामा असर गर्छ ?

६.६ यो आयोजनाले यस क्षेत्रमा रहेको मठ, मन्दिर, तथाअन्य साँस्कृतिक सम्पदाहरुमा असर पुऱ्याउने देख्नु हुन्छ ?

६.७ यो आयोजनाले के कस्तो फाईदा पुऱ्याउने देख्नु हुन्छ ?

६.१ आयोजनाबारे तपाईको राय सुझावहरु के के छन् ?



Annex J: Sample Filled Checklist

घरधूरी सर्वेक्षण प्रश्नावली

१. आधारभुतविवरण:

क.सं.	प्रश्न	उत्तर
१.१	प्रश्नावली ,नं.	
१.२	अन्तरवार्ताको मिति	२०७४/०१/३०
१.३	जिल्ला	
१.४	गाबिस	राकम कर्णाली
१.५	वडा.नं.	०४
१.६	गा.वि.स./ वस्तीको नाम	[illegible]
१.७	उत्तरदाता नाम	अविराम भाण्डी
१.८	उत्तरदाताको लिङ्ग	पुरुष ✓ महिला .....
१.९	घरमूलीको नाम	आफै
१.१०	घरमूलीको लिङ्ग	पुरुष ..... महिला .....
१.११	जात/ जाती: (उपयुक्त एक मात्रउत्तरमागोलो लगाउनुहोस्)	बाहुन ..... क्षेत्री ✓ ठकुरी ..... जनजाती ..... दलित ..... अन्य-खुलाउनुहोस्) .....
१.१२	धर्म : (उपयुक्त एक मात्रउत्तरमागोलो लगाउनुहोस्)	हिन्दू ✓ बौद्ध ..... मूस्लिम ..... क्रिश्चियन ..... अन्य-खुलाउनुहोस्) .....
१.१३	परिवारको प्रकार (उपयुक्त एक मात्रउत्तरमागोलो लगाउनुहोस्)	एकात्मक परिवार..... संयुक्त परिवार ✓ ..... विस्तारीत परिवार

२. घरधूरी विवरण

२.१पारिवारिकविवरण

क.सं.	घरपरिवारका सदस्यहरुको घरमुलीसंगको नाता	लिङ्ग		उमेर (पूरा भएको उमेर)	शिक्षा (५वर्ष माथि)	पेशा (१४ वर्ष भन्दामाथि)	हाल घरमाभएको /नभएको	
		पु.	म.				भएको	नभएको
१.	आफै	१	२	४७	८	४	१	२

२.	श्रीमती	१	२	५०	२	४	१	२
३.	छोरा	१	२	२७	५	३	१	२
४.	छोरा	१	२	२४	५	५	१	२
५.	छोरा	१	२	१९	६	६	१	२
६.	छोरी	१	२	२१	६	६	१	२
७.	बुहारी	१	२	२५	४	४	१	२
८.	नाती	१	२	४	-	-	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: घरमूलि-१, श्रीमती-२, श्रीमान- ३, छोरी- ४ छोरा -५, बुहारी -६, बुवा-७, आमा- ८, नाती- ९, नातीनी-१०,बहिनी- ११, दाई- १२, भाउजु -१३, भाई -१४, भाई बुहारी -१५, नातेदार (पूरुष)- १६, नातेदार (महिला)- १७, अन्य-१८

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

३. शिक्षा : निरक्षर -१, साक्षर - २, प्राथमिक-३, निम्नमाध्यामिक-४, माध्यामिक- ५, प्रवेशिका/ उच्चमाध्यामिक-६, उच्चमाध्यामिकभन्दामाथि-७

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

३ . <u>बसाई सराई</u>

क.सं	प्रश्न	उत्तर
३.१	तपाईका परिवार (पूर्खा) कहिले देखि यस ठाउँमा बस्दै आउनुभएको हो ?	दूई पूस्ताभन्दा अघिबाट (५० वर्ष । ..... एक पूस्ताभन्दा अघिबाट(२५वर्ष) ..... हालसालै (१० वर्ष भन्दाकम) .....
३.२	यदितपाई बसाई सरेर आउनुभएको हो भने कृपयातपाईको पूर्खाको ठाउँ तोक्नुहोस् ?	जिल्लाको अर्कोगा.वि.सहरु ..... छिमेकीजिल्ला

		..... अन्यजिल्ला .....
३.३	के तपाईको परिवारकाकुनै सदस्यकामको सिलसिलामावसाई सर्नु भएको छ?	छ ..... छैन ✓

३.४	यदि छ भने बताउनुहोस्।	काम को लागि स्थान/ठाउँ								के बसाई सराई वार्षिक चलनहो?
	क्रम संख्या	जानेको जिल्लाभित्र		जिल्लाभित्र	जोडिएको जिल्ला	अर्को जिल्ला	अन्य	विदेश	के	हो/होइन
		पुरुष	महिला							

४. परिवारमाविरामी

क.सं	प्रश्न	उत्तर
३.७.१	गएका १२ महिनामातपाईको कुनै सदस्य विरामीहुनु भएको थियो?	थियो ✓ .....१ थिएन् २

४.१यदिथियो भने, परिवारका सदस्य कस्ता रोगवाट विरामीभएकाथिए र कुन समयमा? कृपयाखुलाउनुहोस्।

क.सं	रोगको नाम	विरामी सदस्य संख्या		मौसम(कृपया टिक लगाउनुहोस्)		
		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 सम्वन्धि					
९.	अन्य(खुलाउनुहोस्)					
१०.	अन्य(खुलाउनुहोस्)					
११.	अन्य(खुलाउनुहोस्)					
१२	अन्य(खुलाउनुहोस्)					

४. शौचालय सुविधा

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

५. खानेपानीको सुविधा

क.सं	श्रोतहरु	प्रयोग गरेकामूख्य तिनवटा श्रोतहरु		प्रयोगकाआधारमाप्राथमिकिकरण गर्नु होस्
		छ	छैन	
१.	धारा (निजीधारा)	१	२	
२.	धारा (सामुहिक)	१	२	
३.	कुवा/मूल/ढुङ्गेधारा	१	२	
४.	अन्य (खुलाउनुहोस्).....			

६. आयोजना सम्बन्धि

६.१ तपाईलाई यस आयोजनाबारे जानकारी छ ?

[६] [ ]

६.२ यदि छ भने कुन माध्ययमबाट थाहापाउनु भयो ?
सबै पार्टि

६.३ यस आयोजनाबनाउँदातपाईलाई कुनप्रकारको हानीनोक्सानी पुग्याउँछ ? ऐन

- जग्गाको क्षती
- भौतिक संरचनामाक्षती

६.४ यस आयोजनाले यस क्षेत्रको भौतिक, जैविक, सामाजिक, आर्थिक तथा सांस्कृतिकवातावरणमा के कस्तो असर पर्ने देख्नुहुन्छ ?
- केही

६.५ यस आयोजनाले यस क्षेत्रमा रहेको के कस्तो सार्वजनिकतथाभौतिक संरचनामा असर गर्छ ?
- केही खुलो

६.६ यो आयोजनाले यस क्षेत्रमा रहेको मठ, मन्दिर, तथाअन्य सांस्कृतिक सम्पदाहरुमा असर पुग्याउने देख्नु हुन्छ ?
- केही

६.७ यो आयोजनाले के कस्तो फाईदा पुग्याउने देख्नु हुन्छ ?
- आउज जावतमा सजिलो / गाडीगुडागत सजिलो

६.१ आयोजनाबारे तपाईको राय सुझावहरु के के छन् ?
- पिचसालीन हुनु पर्यो /

Annex I: List of Flora and Fauna with Scientific Name

(ITALICS)

S.N	Local Name	Scientific Name	Categories		
			GoN	IUCN	CITES
Fauna					
1	Goral	*Naemorhedus goral*		NT	I
2	Langur	*Semnopithecus ajax*		EN	I
3	Jackal	*Canis aureus*		LC	
Flora					
1	Sal	Shorea robusta		LC	
2	Sisau	Dalbergia sisso		LC	
Fauna					
1	Danphe	*Lophophorus impejanus*	P	LC	I
2	Kalij	*Lophura leucomelanos*		LC	I

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

***GoN Categories**: P Protected by legislation*

CITES Categories: I -Appendix I (are species that are threatened with extinction and are or may be affected by trade), II - Appendix II (re species that are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation in order to avoid utilization incompatible with the survival of the species in the wild), and III - Appendix III (are species that are listed after one member country has asked other CITES Parties for assistance in controlling trade in a species).

Annex J: Photographs

Photo 1: Existing Bailey Bridge over Kane Gadh Khola

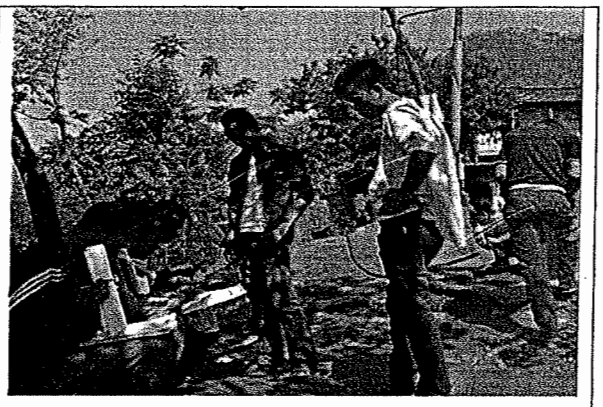


Photo 2: Interaction with the local people

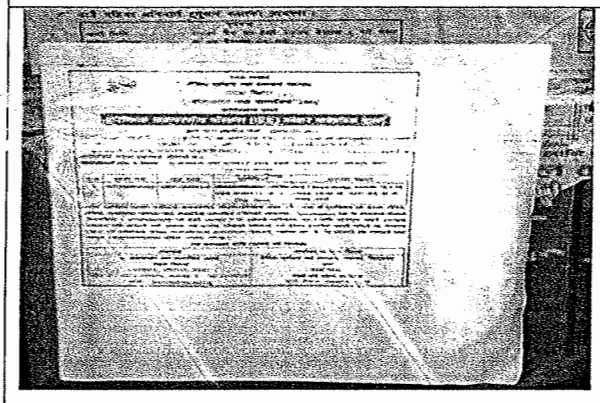


Photo 3: Public Notice

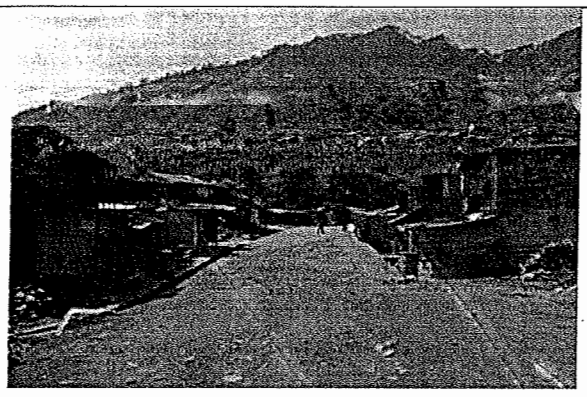


Photo 4: Settlement Area near Projected Bridge

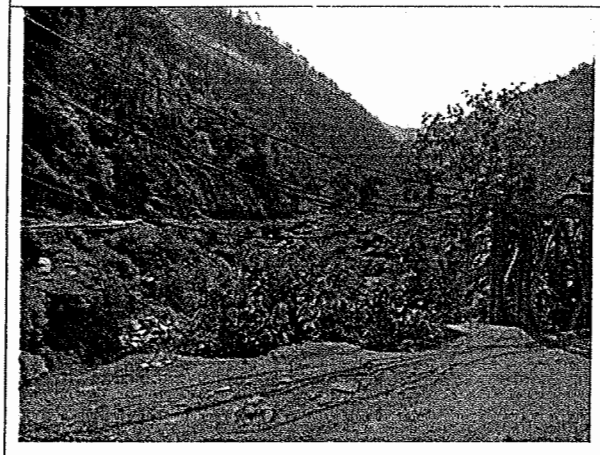


Photo 5: Upstream of the Projected Bridge

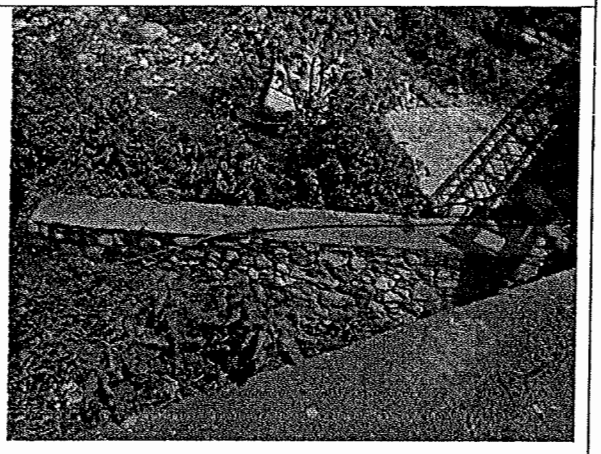


Photo 6: Downstream of the Projected Bridge

Annex K: Comments Incoorporated Matrix For Kane Gadh Bridge from GESU

S.N.	Comments	Page No.
Environmental aspects		
1	Executive summary of Nepali and English should be match of physical cultural and biological environment	i to viii
2	Clearly mention the baseline information of physical and biological environment	50-63
3	Baseline/impact/mitigation measures should be correlated Recheck relevancy of proposal	66-91, 2
4	Follow the Addendum ESMF, 2013	
5	Review the bridge related acts, rules, policies and manuals. Aquatic animal protection act, 1961 Bridge policy, 2005 Bridge maintenance manuals, 2005 Environmental assessment (EA) (OP4.01), cultural property (OPN:11.03) world bank and other related	32-47
6	Training awareness a. River training b. Protection of embankment (bioengineering) etc including cost	89
7.	Give baseline information of the mentioned table 10.2 parameters and include in EMP also. Rearrange the page	
8.	Include the all beneficial impact for all domain	
9.	Follow the ToR issue also	
10.	Add environmental inspector in Fig 0-1	92
11.	Mention the aquatic condition	31
12.	Add issues: adverse impact: Construction phase a. Sand and gravel extraction b. Degradation of water quality c. Bridge safety d. River flooding and bank erosion at both banks of river e. Environmental health and safety	51-63

	f. Bridge safety Operation phase a. Encroachment area of bridge b. Scouring /congestion around the adjoining around the bridge abutment c. Embankment erosion d. Reinstatement of environmental components e. Slope stabilization	
13.	Revise the IEE report	
Socio economic aspects		
1	Chapters and pages mismatch and incomplete table of content	
2	Arrange cover page according to GESU standard	
3	Baseline/impact/mitigation measures should compatible and correlates with methodology and data collection along with checklists	67-84, 14
4	Give Executive summary both Nepali and English in this report	i to viii
5	Include rationality of IEE study and project relevancy both in executive summary and in report	v to vi
6	Include some more relevant acts/policies correct the English date of lane acquisition act and rearrange it	32-47
7	Correct the language of field survey under methodology chapter 4 page 11 and include other more important social features on data requirement column in table no 4.2 method to collect the baseline data	15-18, 50-63
8	All the issues/impacts under socio-economic environment is not consistent between paragraph and table nor with resettlement action plan though the source is given and need correlation in write up/ explanation of some related issues.	18-25
9.	Table no 7.1 and 7.2 ; details of affected land and structures clearly shows vulnerable /indigenous people even in baseline data (table 6.4) but there is mentioned of no association of project construction and vulnerable groups in page 48.	5, 6

10.	Total private land requirement is miss match in land requirement table 3.2 page 7 and page 44 last bullet	13, 45
11.	Rearrange table 10.4 and 6 and should be compatible with impacts /mitigation sections	
12.	Include resettlement cost in executive summary as well as environmental and social mitigation cost table	i-viii (Executive Summary) 13, 103
13.	Include issues raised by public/stakeholder sections and remove recommendation from chapter 11	16, 105

Annex N: Comments Incoorporated Matrix For Kane Gadh Bridge from Ministry

Government of Nepal
Ministry of Physical Infrastructure & Transport
Department of Roads
Road Sector Development Project

Tel : 977-015541686
977-015541687
Fax : 977-015542532
Email : dorfcb@dor.gov.np

Kupandol, Jwagal-10
Lalitpur, Nepal

Ref. No.
DC: 9/6/2075-76/434

Date: February 22, 2019

KUNHWA, Korea
in association in the form of sub consultancy with ERMC, Nepal

Reference: **Consultancy service for Feasibility Study and Detail Design for Construction of New Bridges and Maintenance of Existing Bridges**
Contract No: RSDP/Cons/Bridge/01

Subject: Comments on IEE Report of Kanegaad Bridge

Dear Sir,

With respect to above mentioned subject, please find attached here with the comments on IEE Report of Kanegaad Bridge (Surkhet-Jumla Road) made by Ministry of Physical Infrastructure and Transport (Environment and Social Branch). We request you to endorse those comments at the earliest possible date and submit the Revised IEE Report for the above mentioned bridge.

Looking forward to hearing from you soon,

Thanking you.
Sincerely yours,

(Keshab Kumar Sharma)
Deputy Director General

Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads
Development Cooperation Implementation Unit
Jwagal

URL : www.moppw.gov.np
email : info@moppw.gov.n
फोन नं. ४२११८८०
४२११९३१
४२११६५५
फ्याक्स नं. ४२११७२०
सिंहदरबार, काठमाडौं,
नेपाल

नेपाल सरकार

भौतिक पूर्वाधार तथा यातायात मन्त्रालय

(वातावरण तथा सामाजिक शाखा)

पत्र संख्या : ०७५।०७८२.३
चलानी नं. ६४५

मिति : २०७५/१०/२८

विषय: Comments बारे गरी पठाइदिने सम्बन्धमा ।

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

सडक विभाग
भू-वातावरण तथा सामाजिक शाखा
दर्ता नं. ...TUE.....
मिति : 075/10/25

६१५६ चलानी

प्रस्तुत विषयमा तहाबाट प्राप्त **Kanegaad Bridge (Surkhet-Jumla Road)**को प्रारम्भिक वातावरणीय [illegible] प्रतिवेदनमा छलफल तथा प्रतिक्रिया लिन श्री [illegible] मिति २०७५/१०/२३ गते बसेको बैठकले दिएका सुझावहरु समावेश गरी परीमार्जित प्रतिवेदन पठाइदिनु हुन निर्देशानुसार अनुरोध छ ।

1. The approved Terms of Reference should be compulsorily followed, which is lacking.
2. Avoid all the generic presentation in the report by providing with specific data and information focused mainly on the project features and its activities.
3. Care shall be given to avoid all the spelling errors, grammatical mistakes and problem of copying that exist in the report.
4. Recommendation letter shall be obtained fifteen days after the public notice is posted in project affected places.
5. There is no public deeds of inquiry (muchulka) made in the proper format and presented in the report.
6. Executive Summary (ES) shall be presented in such a way that it conveys the findings of the IEE Report and the content of the ES in both the Nepali and English shall be made the same.
7. It shall be confirmed whether quarry and crusher plant are in the scope of the IEE study or not, and if it is, the requirement of either IEE or EIA pertaining to Schedules-1 and 2 of EPR, 97 shall be well explained in the Rationality of IEE. Furthermore, the salient features of quarry and crusher plant shall be provided in the project description along with their description. Give their spatial location as well.
8. Similarly, impacts due to quarry sites and crusher plant and also land necessary shall be identified and presented in the impact chapter with proper mitigation proposed in the concerned chapter.
9. There is no title and table number for a table given in page 4. Ownership of the land use necessary for the proposed project mentioned there shall be provided as well. Also, it would be better to differentiate the area of two land use types required temporarily for the construction camp.
10. Subchapter 2.7: Land and property acquisition, compensation, resettlement and rehabilitation shall be elaborated more in detail.
11. Maps/figures presented in the report (for e.g. in chapter 3) shall be made bigger in size having legends given correctly, scale, source, and the north direction added, so that the readers understand quite easily what a figure is trying to convey. Texts shall well describe the maps presented.

भौतिक पूर्वाधार तथा यातायात मन्त्रालय
सिंहदरबार, काठमाडौं

Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads
Development Cooperation Implementation Division
Jwagal, Lalitpur

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

URL www.moppw.gov.n
email : info@moppw.gov.r
फोन नं. ४२११८८०
४२११९३१
४२११६५५
फ्याक्स नं. ४२११७२०
सिंहदरबार, काठमाडौं,
नेपाल

12. Project layout shall be presented in an original colored topographic map distinctly showing - road alignment, affected rural municipality/municipality and their boundaries, locations of camp sites, quarry site, disposal sites, batching/aggregate crushing and storage facilities. Also, provide proper legends in the map and also the figures must be clear enough to be read easily. Improvement of all the given figures is necessary.
13. Impact area delineation seems to be incorrect. How can the direct impact area be within 500 m, when in subchapter 3.5 it is written that construction materials are to be brought from the riverbed of Karnali River which is 5 km far from the project site? Revisit the section to rewrite the section that is more justified.
14. Necessity of camp sites, borrow pits, storage yards, disposal sites, parking spaces and other likely ancillary facilities necessary to the proposed project shall be well presented in a quantified manner in the project description chapter. Don't just leave it with general information, rather be more specific.
15. Is it necessary to mention the tests of aggregates and sand in subchapter 3.5? Try not to add unnecessary information only to increase the volume of the report.
16. Main responsible agency for the implementation of the EMP is DOR not the Ministry. Remove recommendation from the objectives and conclusion.
17. Provide the provision of the constitution. Rewrite the Acts date first in Nepali and then English. Provide the construction period of the bridge. Remove the sentence like construction of bridge increases the accident.
18. It should be 119+140m not the km. Provide the first hand data and no. of household survey done. In methodology chapter Review of literature should be first and then it should be coherent to each other.
19. From where the comments had been provided as it is not clear in the matrix? Correct the cover page address. It is Gender status not the Gender situation.
20. Rationality of the project should be revisited. It is not the up gradation of the road. Provide the exact temporary and permanent loss of the land.
21. Data that are said collected and the collection methodology must be in agreement with the information presented in the baseline information section and vice versa. Baseline information should not be generic.
22. Corrective measures of the slope stability problems described in subchapter 3.10.2.6 shall be explained appropriately.
23. It would be better not to describe the impacts in the baseline information section - for example in subchapter 3.10.2.10.
24. There are contents in baseline, impacts, mitigations and monitoring chapters which are too generic in nature completely lacking facts and figures. Revisit the whole report to improve the quality by providing specific information that comes with facts and figures.
25. Land and property acquisition explained in page 52 does not provide any confirmation of relocation. Furthermore, the numbers of house owners written in the text do not tally with the numbers given in Tables 4.1 and 4.2.

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

URL : www.mopw.gov
email : info@mopw.gov
फोन नं. ४२११८८
४२११९३१
४२११६५५
फ्याक्स नं. ४२११७२८
सिंहदरबार, काठमाडौं,
नेपाल।

26. Chapter 4 shall be revised by carrying out the following: Generic impacts shall be avoided. Impacts, in relation to project - components, facilities and activities, shall be discussed with quantified information of likely changes, alteration, and losses; and are further assessed based on characteristics of existing condition and sensitivity of environmental components: physical, chemical, biological, and socio-economic and cultural.
27. If the proposed mitigation measures are part of contractual obligation for project construction then it shall be clearly identified; Mechanisms of ensuring implementation of those mitigation measures as compliance of contractors shall be proposed.
28. Check that all the enhancement and mitigation measures proposed and presented are written in such a way that they are the responsibility of the proponent and none other. So, the language used should show the commitment that the enhancement and mitigation measures will be fulfilled by the proponent himself. This also applies in the chapter presenting monitoring plans. So, make necessary corrections.
29. Proposed mitigation measures are too generic and by no means do any justice, in terms of detailing, to the components/features of the proposed project. Most of the mitigation measures have no bearing on project specific impact and characteristics and sensitivity of existing environment. Simply just writing mitigation and compensation will be carried out is not enough and acceptable. Mitigation/compensation measures shall be properly proposed being specific for all the identified impacts. For example: any property or community infrastructure identified as to be relocated or just impacted shall be proposed with elaboration in detail how such impacts will be mitigated/compensated. Just writing that they will be mitigated/compensated providing with lump sum amount of money is not sufficient and cannot be accepted.
30. Furthermore, cost of all the enhancement and mitigation measures proposed in the report shall be allocated.
31. Alternative analysis on the location of the proposed project shall be carried out to avoid property being affected, which the report speaks of the impact on 19 private properties.
32. Stakeholders' concerns and how they are addressed in the report shall be explained.
33. All the sections and subsections in a chapter shall be properly numbered, which at present is not done so.
34. Please review and check the approved TOR.

९०।२८

(शोभा भण्डारी)
समाजशास्त्री

S.N.	Comments	Page No.
1.	The approved Terms of Reference should be compulsorily followed, which is lacking	followed
2.	Avoid all the generic presentation in the report by providing with specific data and information focused mainly on the project features and its activities.	√
3.	Care shall be given to avoid all the spelling errors, grammatical mistakes and problem of copying that exist in the report.	√
4.	Recommendation letter shall be obtained fifteen days after the public notice is posted in project affected places.	153 (√)
5.	There is no public deeds of inquiry (muchulka) made in the proper format and presented in the report.	148-151
6.	Executive Summary (ES) shall be presented in such a way that it conveys the findings of the IEE Report and the content of the ES in both the Nepali and English shall be made the same.	i-ix
7.	It shall be confirmed whether quarry and crusher plant are in the scope of the IEE study or not, and if it is, the requirement of either IEE or EIA pertaining to Schedules-1 and 2 of EPR, 97 shall be well explained in the Rationality of IEE. Furthermore, the salient features of quarry and crusher plant shall be provided in the project description along with their description. Give their spatial location as well.	No scope
8.	Similarly, impacts due to quarry sites and crusher plant and also land necessary shall be identified and presented in the impact chapter with proper mitigation proposed in the concerned chapter.	66-68,71, 28, 29
9.	There is no title and table number for a table given in page 4. Ownership of the land use necessary for the proposed project mentioned there shall be provided as well. Also, it would be better to differentiate the area of two land use types required temporarily for the construction camp.	4, 12
10.	Subchapter 2.7: Land and property acquisition, compensation, resettlement and rehabilitation shall be elaborated more in detail.	50, 51

11.	Maps/figures presented in the report (for e.g. in chapter 3) shall be made bigger in size having legends given correctly, scale, source, and the north direction added, so that the readers understand quite easily what a figure is trying to convey. Texts shall well describe the maps presented.	√
12.	Project layout shall be presented in an original colored topographic map distinctly showing - road alignment, affected rural municipality/municipality and their boundaries, locations of camp sites, quarry site, disposal sites, batching/aggregate crushing and storage facilities. Also, provide proper legends in the map and also the figures must be clear enough to be read easily. Improvement of all the given figures is necessary.	√
13.	Impact area delineation seems to be incorrect. How can the direct impact area be within 500 m, when in subchapter 3.5 it is written that construction materials are to be brought from the riverbed of Karnali River which is 5 km far from the project site? Revisit the section to rewrite the section that is more justified.	10, 28,29
14.	Necessity of camp sites, borrow pits, storage yards, disposal sites, parking spaces and other likely ancillary facilities necessary to the proposed project shall be well presented in a quantified manner in the project description chapter. Don't just leave it with general information, rather be more specific.	10, 44, 70, 86, 40, 54, 56, 70, 71, 53,, 66, 29, 4
15.	Is it necessary to mention the tests of aggregates and sand in subchapter 3.5? Try not to add unnecessary information only to increase the volume of the report.	Not Necessary
16.	Main responsible agency for the implementation of the EMP is DOR not the Ministry. Remove recommendation from the objectives and conclusion.	63-78 (table 6.2 and 6.3)
17.	Provide the provision of the constitution. Rewrite the Acts date first in Nepali and then English. Provide the construction period of the bridge. Remove the sentence like construction of bridge increases the accident.	31-47, Removed
18.	It should be 119+140m not the km. Provide the first hand data and no. of household survey done. In methodology chapter Review of literature should be first and then it should be coherent to each other.	12

19.	Correct the cover page address. It is Gender status not the Gender situation.	√, 24
20.	Rationality of the project should be revisited. It is not the up gradation of the road. Provide the exact temporary and permanent loss of the land.	3, 4, 12, 50, 51
21.	Data that are said collected and the collection methodology must be in agreement with the information presented in the baseline information section and vice versa. Baseline information should not be generic.	√
22.	Corrective measures of the slope stability problems described in subchapter 3.10.2.6 shall be explained appropriately.	27
23.	It would be better not to describe the impacts in the baseline information section - for example in subchapter 3.10.2.10.	29
24.	There are contents in baseline, impacts, mitigations and monitoring chapters which are too generic in nature completely lacking facts and figures. Revisit the whole report to improve the quality by providing specific information that comes with facts and figures.	√
25.	Land and property acquisition explained in page 52 does not provide any confirmation of relocation. Furthermore, the numbers of house owners written in the text do not tally with the numbers given in Tables 4.1 and 4.2.	50, 51
26.	Chapter 4 shall be revised by carrying out the following: Generic impacts shall be avoided. Impacts, in relation to project - components, facilities and activities, shall be discussed with quantified information of likely changes, alteration, and losses; and are further assessed based on characteristics of existing condition and sensitivity of environmental components: physical, chemical, biological, and socio-economic and cultural.	√
27.	If the proposed mitigation measures are part of contractual obligation for project construction then it shall be clearly identified; Mechanisms of ensuring implementation of those mitigation measures as compliance of contractors shall be proposed.	63-78
28.	Check that all the enhancement and mitigation measures proposed and presented are written in such a way that they are the responsibility of the proponent and none other. So,	63-78

	the language used should show the commitment that the enhancement and mitigation measures will be fulfilled by the proponent himself. This also applies in the chapter presenting monitoring plans. So, make necessary corrections.	
29.	Proposed mitigation measures are too generic and by no means do any justice, in terms of detailing, to the components/features of the proposed project. Most of the mitigation measures have no bearing on project specific impact and characteristics and sensitivity of existing environment. Simply just writing mitigation and compensation will be carried out is not enough and acceptable. Mitigation/compensation measures shall be properly proposed being specific for all the identified impacts. For example: any property or community infrastructure identified as to be relocated or just impacted shall be proposed with elaboration in detail how such impacts will be mitigated/compensated. Just writing that they will be mitigated/compensated providing with lump sum amount of money is not sufficient and cannot be accepted.	63-78, 99
30.	Furthermore, cost of all the enhancement and mitigation measures proposed in the report shall be allocated.	63-78
31.	Alternative analysis on the location of the proposed project shall be carried out to avoid property being affected, which the report speaks of the impact on 19 private properties.	
32.	Stakeholders' concerns and how they are addressed in the report shall be explained.	14, 15, 36, 61,62
33.	All the sections and subsections in a chapter shall be properly numbered, which at present is not done so.	√
34.	All the sections and subsections in a chapter shall be properly numbered, which at present is not done so.	√
35.	Please review and check the approved TOR.	√

CVs and Declaration from Experts


Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads
Development Cooperation Implementation Division
Jwagal, Lalitpur
नेपाल सरकार
भौतिक पूर्वाधार तथा यातायात मन्त्रालय
सिंहदरबार, काठमाडौं

Declaration from Experts

KUNHWA, Korea in association in the form of Sub Consultancy with **Environment & Resource Management Consultant (ERMC) Pvt. Ltd., Mid-Baneshwor, Kathmandu** has submitted Final IEE study report of Kane Gadh Bridge, Rakam Karnali, Aathabish Municipality- 4, Dailekh, Province No. 6, Nepal as per EPR 2054 in Ministry Of Physical Infrastructure & Transport, Singhadurbar, Kathmandu.

We, herewith, declare that we have been involved in studying and writing of this Initial Environmental Examination (IEE) Report and ready to serve the company for preparing IEE Report of Kane Gadh Bridge till the approval from concern ministry i.e. Ministry Of Physical Infrastructure & Transport, Singhadurbar, Kathmandu.

S.N.	Name	Position	Signature
I.	Ashok K.C.	Team Leader(IEE)/ Environment Expert	
II.	Chintamani Sharma	Sociologist	
III.	Manish Pratap Singh	Civil Engineer	
IV.	Dr. Prakash Das Ulak	Engineering Geologist (National)	

Government of Nepal
Ministry of Physical Infrastructure and Transport
Department
Development Cooperation

Curriculum Vitae (CV)

1. **Name:** **Ashok K.C.**
2. **Cell No:** 9847540415
   Email: kcashok64@gmail.com
3. **Profession:** **Environment Expert**
4. **Date of birth:** 7th Jestha, 2045 B.S. (20th May, 1988)
5. **Nationality:** Nepali

6. **Key Qualification** :

Mr. K.C. is a Master's in Environmental Science from College of Applied Science-Nepal in the year 2017 AD. He got his graduation from Patan Multiple Campus, of TU in the year 2009 AD. He had several years of working experience in the field of Environmental Safeguard Sector. He had carried out EIA and IEE study of several bridges, roads, etc. He had started carrier professionally from November 2013 in Environment and Resource Management Consultant, (P). Ltd as Environment Expert. He had worked with different organisation like Nepal Environment and Scientific Services (NESS), Thapathali; Environmental Service Nepal, Thapathali; Explorer Geophysical Consultants Pvt. Ltd, Banasthali,etc.

7. **Education :**

- M. Sc. (Environmental Science), College of Applied Science-Nepal/ T. U., 2017 **(Disscrtation: Impact of Climate Change on Agricultural Production and Adaptation Measures Taken by People of Padsari VDC, Rupandehi, Nepal)**
- B.Sc. (Environmental Science), Patan Multiple Campus/Tribhuwan University Nepal, 2009
- Intermediate in Science with major in Biology from Glorious Higher Sec. School, Butwal- Rupandehi 2006
- Montessori Memorial English Boarding High School, Siddarthanagar-7-Rupandehi, Batch of 2004

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Development Cooperation Implementation Division
Jwagal, Lalitpur

8. **Training and Participation:**

Date	Events
5-7 December, 2013	**Participation in "Project Proposal Writing"** training, Rotary Bhawan, Thapathali
1-7 August, 2013	**"Chemical Management" Training,** College of Applied Science-Nepal (CAS), T.U.
14-31 July, 2013	**"Geographic Information System (GIS)" Training** using Arc View 9.3, College of Applied Science- Nepal (CAS), T.U.
April 28-June 24, 2013	**" Environmental Impact Assessment (EIA)" Training,** College of Applied Science- Nepal (CAS), T.U.
3-5 June, 2012	**Participation in "3rd Nepalese Youth Climate Summit 2012" organized by** Nepalese Youth for Climate Action and Clean Energy Nepal from in Pokhara, Kaski.
16-19 April, 2010	**"Training of Trainers for raising awareness on Climate Change" conducted by** NYCA, CEN and Livelihoods and Forestry Programme in Bhairahawa, Rupandehi.

9. **Countries of Work Experience: Nepal**

10. **Languages.**

Languages	Speaking	Reading	Writing
Nepali	Excellent	Excellent	Excellent
English	Excellent	Excellent	Excellent

Government of Nepal
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Development Cooperation Implementation Division
Jwagal, Lalitpur

11. **Employment Record:**

From April 14, 2010	:	To August 15, 2011
Employer	:	Loyalty Academy, Mandikatar, Ektabasti, Kathmandu
Position	:	Health and Environment Teacher of Lower Secondary Level

12. **Working Experiences:**

(September 2018 to January 2019)	Preparation of IEE Report of Kailash Cold Storage and Agro Pvt. Ltd., Baijanath-7, Pedari, Banke, Nepal from **Eco-Vision Service**, Tokha-07, Kathmandu, Nepal
(June to August 2018)	Preparation of IEE Report of Chere-Rodtali-Khali Road(9.27 km) from Chere to Khali of Chandannath Municipality-03,Jumla District, Nepal from **K.N.K. Engineering Consultancy Pvt. Ltd.**, Minbhawan, Kathmandu-31, Nepal
(May to July 2018)	Preparation of IEE Report of Extraction and Collction of Riverbed Materials from Simle Khola, Marin Khola, Thado Khola, Rampur Khola,, Rancha Khola and Taamjhor Khola of **Ghyanglekh Rural Municipality** of Sindhuli District, Nepal
(April to June 2018)	Preparation of IEE Report of Quality Hatchery and Agriculture Pvt. Ltd., Joshipur RM-04, Kailali from **Scientific Research Service**, Kritipur-09, Kathmandu, Nepal
(January 2017 to till the date)	Preparation of IEE report of 9 bridges and Environmental Screening and Site-Specific Environmental Management Plan of 55 bridges of 8 districts Headquarters namely: Darchula, Baitadi, Dailekh, Kalikot, Bajhang, Jumla, Musikot, and Jajarkot, including improvement of existing intermediate lane to double lane carriageway to Narayanghat- Mugling Road of **Road Sector Development Project (RSDP),** implement by Department of Roads (DoR) under the Ministry of Physical Infrastructure and Transport (MoPIT) with the grant assistance from the World Bank from **Environment & Resource Management Consultant (ERMC), New Baneshwor, Kathmandu**
(16 Sept to 15 October 2016)	Geo-Environmental Survey of Boje Khola Limestone Mine at Khotang from **Explorer Geophysical Consultants Pvt. Ltd., Kathmandu**

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Development Cooperation Implementation Division
Jwagal, Lalitpur

(May 2015 to October 2015)	Preparation of Scoping and ToR of EIA of Kasuwa Hydropower, 45 MW of Sankhuwasabha District from **Environmental Services Nepal, Thapathali, Kathmandu**
(20th March to 29th March 2015)	10 days of Environmental Baseline Survey of Upper Trishuli 'A' of 253 MW of Rasuwa from **Nepal Environmental and Scientific Services, Thapathali, Kathmandu**
(December 2014 to February 2015)	Work as Environment Safeguard Officer (**A RRRSDP-2 project of IEE of Upgrading Roads** of different districts under MoFALD) in **Environment & Resource Management Consultant (ERMC), New Baneshwor, Kathmandu** • Bansbari-Bageswori Purano Health-Post Way to VDC Building Road(upgrading), Bhaktapur • Pakhribas-Muga-Ghodetar Road(upgrading), Dhankuta district • Telkot-Bhattedanda-Katike Bhanjyang Road(upgrading), Bhaktapur • Sankhu-Paluwari-Nagarkot Road (upgrading), Kathmandu district • Gospul-Bidulphat-Sudal-Kalamasi Nagarkot Joining Road(upgrading), Bhaktapur district
(November 2013 to October 2014)	Work as Environment Safeguard Officer (**A RRRSDP-2 project of IEE of Upgrading Roads** of different districts under MoFALD) in **Environment & Resource Management Consultant (ERMC), New Baneshwor, Kathmandu** • Badbhanjhyang- Sano Masino-Thulo Masino-Satghumti Road(upgrading), Kathmandu district • Khorsane-karabari-Singhadevi Road Sub Project(upgrading), Morang district, and • Amaldagi-Samayagad-Basbari-Solmari Road Sub Project (upgradng), Jhapa district.
(June to August 2012)	Research Assistant (A project of Rural Water

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	Supply and Sanitation Fund Development Board, RWSSFDB) **Nepal Environmental and Scientific Services, Thapathali, Kathmandu** Drinking water sources of various VDCs of Kapilvastu. (June to August 2012) 1. Inspection of sanitary condition and Environmental Assessment of the water sources provided in the schemes. 2. Sampling of water from STW source using standard sampling procedures.
(September to November 2012)	Research Assistant (A project of **Rural Water Supply and Sanitation Fund Development Board, RWSSFDB**) Nepal Environmental and Scientific Services, Thapathali, Kathmandu Drinking water sources of various VDCs of Kapilvastu. (September to November 2012) 1. Inspection of sanitary condition and Environmental Assessment of the water sources provided in the schemes. 2. Sampling of water from Spring/Stream source using standard sampling procedures.

Certification:
I certify that, to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experiences. I understand that any willful misstatement described herein may lead to my disqualification or dismissal, if engaged.

Ashok K.C.
1 May, 2019
Email: kcashok64@gmail.com
Contact: 9847540415

Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads
Development Cooperation Implementation Division
Jwagal, Lalitpur

POSITION TITLE AND NO.	Sociologist
NAME OF EXPERT	**Chintamani Sharma**
DATE OF BIRTH	**19/02/1975**
CITIZENSHIP	Nepalese

Education:

- **M. A. (Rural Development) - 2003,** Tribhuwan University, Nepal
- **Bachelor in Arts - 2000,** Tribhuvan University / Patan Multiple Campus, Maj Eco.+ GeogPatanDhoka, Lalitpur
- I.A in Arts, 1994, TU.

Other Trainings:

- Training on PRA/ Problem Identification for implementation of the program at any areas from 2014 jointly organized at UNDP/GEF/SGP/ IRDC Kathmandu. (One Week)
- **Training on Environmental and social safeguard for Social Development Consultant (SDC) from March to April, 2011 jointly organized by Institute of Engineering Continuing Education Division T.U. DoLIDER, and RAIDP project Coordination Unit government of Nepal.** (35 Days)
- Social Science Research Methodology from December 11-22, 2006, Council for Social Development Lodhi Estate, New Delhi, India.
- Training on Human Rights, Humanistic Law and Peace Building from June 26-28, 2005, Organized by PragatisilSamajSewaSangh, Sindhupalchowk.
- Training of Trainers (ToT) Course from August 1 - 5, 2005, Institute of Cultural Affairs, Kathmandu.
- Participatory Rural Appraisal (PRA) from July, 2003, Integrated Bio-Scientific Research Group. Kathmandu. (4 Weeks)
- Health Research Methodology from July 21-25, 2003, Nepal Health Research Council (NHRC), Kathmandu.

Conducted EIA/Resettlement and land pooling conscious activities

- Martadi to Kolti Safe Manglesen **Outer Ring road 72 Km** and different parts of the country
- Chobar- Satgangl and ThaliDanchhi, selected part of Outer Ring Road and other places of Nepal

Presentation:

- Paper Presenter of blacksmiths project in learning and review workshop jointly organized by Pargati Nepal/IRDC and GEF/SGP/UNDP.
- Paper Presenter International Conference on Renewable Energy Technology for Sustainable Development 12 14 Nov 09 Jointly organized by NSES, Ecosian Korea/CES

Employment Record Relevant to the Assignments:

Period	Employing organization and your title / position. Contact information for references:	Country	Summary of activities Performed Relevant to the Assignment:
January 2017 to April 2019	**Employer:** ERMC – SILT-Full Bright JV (P) Ltd., Out Ring Road **Position Held: Senior Social Development and Monitoring and Evaluation (M&E) Specialist / Social Development and Resettlement Specialist (SD&RS) Social Coordinator,** **FOR REFERENCE:** **Tel:** 977-1- 4483064; **Mail:**safe@ermc.wlink.com.np **Name and title held:** U. R. Chaulagain - MD	Nepal	• Building Climate Resilience of Watersheds in Mountain Eco Regions Project financed by ADB • Feasibility Study and Detailed Design for Construction of New Bridges and Maintenance of Existing Bridges financed by World Bank
October 2015 to December 2017	**Employer:** MMM Canada in association with ITECO Nepal, TMS and Material Test JV **Position:Social Development Specialist** **FOR REFERENCES:** **Tel:** 46 21 764; **Fax:** +977-1- 46 22 298 **Mail:**iteco@mos.com.np (Office) **Name & title held:** Lalit Kumar Sharma, Team Leader, **Email:**lksharma88@yahoo.com	Nepal	Detail Design of 405 KM Hill Roads, tender document and preparation of Social and poverty assessment and RAP in Transport Project Preparatory Facility–Project Preparatory Consultant (PPC-2 Road) ADB Grant 0227-NEP: in Nepal - Ensure the social and poverty assessment of project beneficiaries - Explore potential social risk and propose mitigation measures
July 2014 to till date	**Employer:** MMM Group Ltd in JV with SAI India Limited (Int'l Consultant), ITECO Nepal and TMS Consultant JV. **Position Held: Social Development Specialist** **FOR REFERENCE:** Tel:+977-1- 46 21 764; **Fax:** 46 22 298 **Mail:**iteco@mos.com.np	**Nepal**	Road Sector Development Project -II (RSDP-AF) Survey, Design and Construction supervision of **444km of hill roads;** 30 ICB Contract, Conduct monitoring social development and assist DoR in resettlement activities and preparing progress report, monthly monitoring report on progress of RAP and provide adequate support and information to external monitoring and Feasibility, Detail Design, IEE study, social study, construction supervisionand quality control works Asian

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Department of Roads
Development Cooperation Implementation Unit
Jwagal, Lalitpur

	Name and title held: Tuk Lal Adhikari – MD:		Standard of Narayanghat - Mugling Highway upgrading (33.3KM Hill Road) and Resettlement Action Plan (RAP) under **Nepal-India Regional Trade and Transport Project.**
May 2011 - January 2014	**Employer:** DoLIDAR/RAIDP/Govt. Position Held:**Social Development Consultant/Social Coordinator** **FOR REFERENCE:** Tel:+977-1- 55 46 268; **Fax:** 55 46 524 **Mail:**raidpcu@dolidar.gov.np **Name and title held:** Shanker Pandit – Project **Coordinator**, DoLIDAR	**Nepal**	Rural Access Improvement and Decentralization Project (RAIDP)–Sarlahi District supported by World Bank Implementation and Supervision Social Safeguard instruction as per ESMF with help of Central Project Units, **Karmaiya – Hatowan Road (54KM), Kodena – Janakinagar Road (21.5KM),**ICB Contact
January, 2010 to April 2011	**Employer:** UNDP/GEF/SGP, CDECF Support Office Sindhupalchok **Position Held:Team Leader** **FOR REFERENCE:** **Tel:** 977-11-620371 **Mail:**info@cdecf.org.np **Name and title held:** Sarada Prasad Sapkota, Chairperson	**Nepal**	Responsible for Conduct training in joint venture with communities and Cottage and Small Industrial Development Council Sindhupalchwock on Improving charcoal production and biomass briquette, Aware about welfare and equity basis plan for indigenous and back warded blacksmiths, Coordinate and conduct various types of entrepreneurs development through Coordinate and conduct DDC, GTZ, UNDP etc. Client Reference: GopalSherchan, Program Coordinator, (Small Grant) UNDP, Roads are Namely: Bhotsipha – JandiKhaola – Chautara Rural Road **(18KM Hill Road)** andSipaghat - SipaPokhare – Jamire Mane – Jhandi – Chautara VDCs **Roads (23KM)** under DDC Finance by RCIW/GTZ,
January, 2009 to December 2009, (intermitte nt input);	**Employer:** SKAT-ERMC-MULTI-JV Consultant (Rural Reconstruction and Rehabilitation Sector Development Programme funded by ADB, SDC, DFID and OFID) **Position Held:Resettlement Officer** **FOR REFERENCE:** **Tel:** 977-1- 4483064 **Mail:**safe@ermc.wlink.com.np **Name and title held:** U. R. Chaulagain - MD	**Nepal**	Rural, Reconstruction and Rehabilitation Sector Development Program (RRRSDP) in Approx. **total 70 km rural gravel road length),** funded by the ADB, DFID, SDC, and OFID; Resettlement Plan Implementation Verification and report preparation, Prepare and organize land acquisition and compensation rights awareness-raising and training activities, particularly for stakeholders in the districts, and Liaising with other programs and agencies to explore the potential for collaboration in strengthening the land acquisition and compensation capacities of the DDCs, and DoLIDAR, The above activities were conducted on design and implementation of followings roads: Sildhunga -Tekanpur road, Sindhupalchok district, **23.94 km,**Chautara – Naubise –Melamchi Road **(43KM)** in Sindhupalchowk.
June 2006 - December 2008 (Intermitte nt)	**Employer:**ERMC – SILT-Full Bright JV (P) Ltd., Out Ring Road **Position Held: Resettlement Assistant / Social Coordinator,** **FOR REFERENCE:** **Tel:** 977-1- 4483064; **Mail:**safe@ermc.wlink.com.np **Name and title held:** U. R. Chaulagain - MD	**Nepal**	Implementation and Supervision Work for Land Pooling / Resettlement Action plan and Service Track in Chovar - Satungal Sector of Outer Ring Road, DoUDBC, Outer Ring Road Development Project; EIA & Preparation of Resettlement Plan of Otter Ring Roads **(72KM EIA Study) Chovar – Satungal Road (12KM), Thali – Danchhi Road (7KM),**
January 2007 to June 2008	**Employer:** ERMC – SILT-Full Bright JV (P) Ltd., Out Ring Road **Position Held:Team Leader (External Consultant)** **FOR REFERENCE:** **Tel:** 977-1- 4483064 **Mail:** safe@ermc.wlink.com.np **Name and title held:** U. R. Chaulagain - MD	**Nepal**	Preparation of EIA of Outer Ring Road Development Project (72 km), DUDBC; ICB Contact; Responsible for Manage, mobilize and monitor to field assistants, Discussion with DoR, CDO, DFO, DDCs' officials, related district level I/NGOs, VDC representatives and local key informants and identify major issuers related with road services, Social survey for resettlement survey, Walkthrough observation and assess physical condition, transportation facilities and other accessibility on road section, Apply PRA and RRA tools (FGD, Mobility Map, Resource Map, Social map etc) and prepare brief profile of affected VDCs, Identify problems and issues related to environment, women, disadvantage groups and potentiality of road accessibility, Preparation of **resettlement plan & it's implementation in plan** and Report Preparation and Submission.
December 2005 to December 2006	**Employer:** DHV Consultants **Position Held:Resettlement /Social Mobilization Supervisor** **FOR REFERENCE:** **Tel:** 977-1- 6631077, Fax: 977-1- 6630378 **Mail:**subedi@wlink.com.np	**Nepal**	Road Maintenance and Development Project (RMDP)/ Study for Sector Wide Road Program and Priority Investment Plan (SWRP & PIP) and Resettlement action plan (Baseline survey of **Sanfe - Mangalsen (15KM Hill Road), Sanfe - Martadi (42KM Hill Road) and Martadi - Kolti Road section (43KM Hill Road),** Achham and Bajura districts,ICB Contacts,

	Name and title held: Hari Ram Subedi – Authorize Country Representative		
March 2003 to April 2005	**Employer:** ERMC (P) Ltd., RAP Dailekh **Position Held:Social Mobilisation Supervisor,** RAP Dailekh **Consultant)** **FOR REFERENCE:** **Tel:** 977-1- 4483064 **Mail:**safe@ermc.wlink.com.np **Name and title held:** U. R. Chaulagain - MD	**Nepal**	Rural Access Program (RAP): **Survey, Design and Construction Supervision of Ramghat – Thatikhand - Singasain Rural Road (40 Km Hill Road),** Dailekh District, The Project Funded by DFID, UK; Conduct Mass Meetings to Motivate Beneficiaries in the Maint. of Built Infrastructures, Assist the Building Groups to Become as Cooperatives or CBO, Support Newly Formed Cooperatives/CBOs in Developing their Capacity, Prepare Household List of Beneficiaries, Base Line Survey and Beneficiary Awareness Campaigns to Prepare Labourers List, Conduct Awareness Raising Programs for Labourers at Construction Sites, Ensure and Facilitating to Labourers on Insurance Facilities, Facilitating to Use of Labour Cards, Develop and Implement Mechanism for Health Facilities, Disseminate Information Regarding Occupational Safety and Health, Prepare Posters and Pamphlets for Dissemination of Relevant Information, Develop and Implement Mechanisms for Fair and Timely Distribution of Wages, Through Group Motivators Witness the Distribution of Payments, Form and Mobilized Saving and Credit Group, Plan and Implement Training Program for Saving and Credit Activities, Identify Income Generation Areas, Conduct Regularly Community Review Meetings, Public Hearings and Public Audit, Develop Mechanisms and Implement to Maintain Transparency and Accountability, Plan and Implement Awareness Raising Programs to the Road Side Neighbors, Undertake District Community and Ward Level **Social and Resettlement Surveys,** Organize and Conduct Orientation Training, Maintain Constant Liaison with Key Stakeholders, CISC, PCU and National NGO.

Membership of Professional Association:

- General Member, Dynamic Society Nepal A Professional Organization Ktm, Since 2007
- General Member, Community Forestry Supported Network Ktm Since 2006
- General Member, Council for Social Development, New Delhi, India, Since 2006.
- General Member, Nepal Geographical Society, Kathmandu, since August 2001.
- General Member Integrated Bioscientific Research Group (BIOINT), since July 2003.
- Generalmember, Mountain Forum, Asia Pacific Region; Asia Pacific Mountain Network, ICIMOD, since July 2003.

Language skills (indicate only languages in which you can work): English: Excellent**& Nepali:** Excellent

Adequacy for the Assignment:

Reference to Prior work/ Assignment that Best Illustrates Capability to Handle the Assigned Task:

Name of Assignment or Project: Building Climate Resilience of Watersheds in Mountain Eco Regions Project financed by ADB; **Year:** January 2018 to April 2019; **Location:** Far western Region consisting of Dadeldhura, Bajhang, Baitadi, Doti, Achham and Bajura districts; **Client:** ADB / Ministry of Forest and Soil Conservation. Government of Nepal; **Main Project Features:** Develop a strategy that includes structures and mechanisms for participation of women, socially excluded and other key stakeholders in public project information dissemination meetings, scheme planning and preparation consultation meetings, and focus group discussions for scheme verification at the VDC level and carried out all other necessary activities; **Position Held:** Senior Social Development and Monitoring and Evaluation (M&E) Specialist; **Activities Performed:** Responsible for carrying out the following tasks: i) Develop a strategy that includes structures and mechanisms for participation of women, socially excluded and other key stakeholders in public project information dissemination meetings, scheme planning and preparation consultation meetings, and focus group discussions for scheme verification at the VDC level; (ii) Provide support, guidance for selection, orientation and specific training of the subproject COs. Prepare a simple task description for these COs, monitor their activities and make the necessary adjustments in their TOR including required follow up orientation and training; (iii) Provide overall guidance and templates/detailed procedures and regular technical support to the social development specialists in the field and FTTs in organizing meetings / consultations and in the implementation of the strategy while a) disseminating information on the project and the scheme selection criteria; b) inviting ward citizen groups to propose schemes related to water source protection and storage development for drinking water, irrigation and livestock use at the VDC-level that meets the needs and priorities of women, dalits and other socially excluded groups; and c) conducting focus group discussions at community level for scheme verification and preparation giving due attention to all the issues that may arise (water rights, gender equality, caste discrimination, inclusion of disadvantaged groups, inclusion of negatively affected non- beneficiary households, land acquisitions); (iv) Prepare protocols for social safeguard monitoring; (v) In close collaboration with the GIS/MIS specialist develop an appropriate M&E strategy and plan including the flow of information, structure of data to be collected, impact indicators disaggregated by sex and ethnic/cast groups and guide the development of a computerized, internet based, MIS/M&E system; (vi) Facilitate the flow of information in to the MIS including training of the responsible government and TA staff for data entry in to the MIS and data retrieval from the MIS;

(vii) Assist in the review of proposals from communities for source protection and storage development and the preparation of a short list for scheme verification; (viii) Assist with the review of the scheme verification data and the selection of schemes for further study and preparation. Ensure the selection criteria related to required collective community actions, which incorporate GESI, are adhered to; (ix) Assist with the preparation of lessons learned and the modification of procedures and used in the scheme selection, verification and preparation. Recommend on modifications in the scheme selection criteria. Work with the knowledge management team to produce relevant knowledge products; (x) Assist ADB staff and consultants to update project appraisal documentation in participation, communications, involuntary resettlement / land acquisition, gender, and indigenous peoples; (xi) Other tasks as directed by the Team Leader.

Name of Assignment or Project: Feasibility Study and Detailed Design for Construction of New Bridges and Maintenance of Existing Bridges financed by World Bank. **Year:** January 2017 to December 2017; **Location:** Various Places in Nepal; **Client:** World Bank, DoR; **Project Cost (Approx):** US$ 90 million; **Main Project Features: Detail Design of Bridges in Chinchu Jajarot Road** (Goche Khola Bridge 48m.); **Kalangaagad-Chainpur Road (1 No.); Satbaanjh Gokuleshwor Road (1 No.); Shitalpati Musikot Road** (Salabang Bridge (35m)); **Surkhet Jumla Road** (Sija Khola Bridge (40m); Tila Khola Bridge (48.7m)) **and Narayanghat – Mungling Highway** (Jugedi Bridge (50m); Khahare Bridge (36.50m); Khor Bridge (38.50m); Lamobaluwa Bridge (28.43m); Khani Khola Bridge (28m) Bhorle Bridge (57m); Mauri Bridge (26.30m); Dumre Bridge (32.40m); Simaltar Bridge (38m); Rigid Bridge (50m); Jalbire Bridge (25.66m); Namsi Bridge (31m); Kali Bridge (60m); Twin Khola Bridge (59.91m); Chinsenji Bridge (43m); Khahare Bridge (66m) Trishuli Bridge and Mungling (165m); Marsyangdi Bridge at Abu Khaireni 150m)). **Maintenance of Bridges in Rapti Highway** (Tui Khola Bridge (32.40m); Babai River (147m); Gauti Khola Bridge (28.25m), Sharada Khola Bridge (81.25)); **Khodpe – Chainpur Road, Bajhang** (Kalanga Gad Bridge (76.20m); Juli Gad Bridge (25.80m); Taru Gad Bridge (75.60m); Bhahuli Gad Bridge (75m); **Chhinchu – Jajarkot Road** (Goji Bridge 120 m); **Mahakali Highway** (Dhik Gad Bridge (25.25m); Thali Gad Bridge (25.50m)); **Karnali Highway** (Girighat Bridge (40.25m); Sot Khola Bridge (58.82m); Lohare Khola Bridge (117.9m).; **Position Held:** Social Development and Resettlement Specialist (SD&RS); **Activities Performed:** SO will perform his duties under the guidance of Team Leader and Deputy Team Leader. SO will assist and support the Construction Supervision team and project staff in implementing the requirements of ESMF, SAP and RAP. SO shall also conduct necessary training / orientation to the supervision team members, contractor's personnel, related project staff and social mobilizers for implementation of SAP and RAP in accordance with provision of ESMF. SO will also be responsible to monitor such works and preparing regular reports for all the social related activities.

Name of Assignment or Project: Transport Project Preparatory Facility – Project Preparatory Consultant (PPC-2 Road) ADB Grant 0227-NEP: in Nepal; **Year:** October 2015 to December 2016; **Location:** Kathmandu; **Client:** Department of Roads, ADB Project Directorate; **Total Project Cost:US$ 500 Million; Main Project Features: Feasibility Study of 405 km – DBST Road and Detailed Engineering Designof 403 km – DBST Road Position** Feasibility Study and detailed engineering design of **450 km – DBST road (Bhairahawa-Lumbini 4-laning, Lumbini-Taulihawa 2 lane)** including Kothy and SisiyaKhola Bridges will be designed as part of the **57 bridges**. Feasibility Study–115 km (4-laning) – DBST Road and Detail Engineering design of 93 km – DBST road under the East-West Highway (Narayanghat-Butwal section) including 22km Daunne Hill Section.
Feasibility Study and Detail Engineering Design of 90 km (4-laning) – DBST – Hill Road under the Prithvi Highway (Mugling-Pokhara) **Position Held: Social Development Specialist;Activities Performed:** i) Design methodologies for carrying out social and poverty survey 900 km i.e., census survey, socio- economic baseline survey, focused group discussion and public consultation, assessment of project affected areas explore potential income generation activities. (ii) Responsible for preparing the reports of social and poverty status, and availing the safeguards clearances from concerned bodies along with development of Institutional mechanism for social and livelihood program implementation (iii) Existing gender analysis, and develop plan to reduce gender imbalance. (iv) Preparation HIV / AIDS programme, preparation and implementation of Resettlement Plan, Gender Action Plan and Social Action Plan. (v) Ensure the safeguard compliance of ADB to EA Preparation of GESI Plan, Social Action Plan and Resettlement Action Plan

Name of Assignment or Project: Road Sector Development Project-II (RSDP-AF) Design and Construction supervision of 444 km of hill roads; **Year:** July 2014 to September 2015, **Location:** Mid-western and far western region of Nepal, **Client:** Department of Roads, **Main Project Features:** Land acquisition and compensation with resettlement activities, social mobilization, livelihood improvement and construction supervision of roads,**Position Held: Social Development Specialist / Resettlement Expert, Activities Performed:**Conduct monitoring social development and assist DoR in resettlement activities and preparing progress report, monthly monitoring report on progress of RAP and provide adequate support and information to external monitoring, Develop research tools for Socio-economic Baseline Study and Resettlement Action Plan Study, Provide research training to the local field staff, Monitor and supervise local field team, Public consultation for need identification, Prepare Resettlement Action Plan (acquisition compensation resettlement plan for road projects based on affected people/families), Preparation and implementation of Resettlement Action Plan report and Support Prepare Socio-Economic Baseline Study report, preparation and implementation HIV/AIDS and human trafficking, Provide information to all relevant social matters related to the project as per WB guidelines of following roads Backed up with environmental component for **Feasibility Study, Detail Design as well as Reviewed and Updated Existing Feasibility Study Report** with regard to environmental perspective of screened roads under RSDP for World Bank' additional funding under RSDP; Major Project are as follows:

- Environmental Assessment of some 444 km of hill roads, Ottaseal selected under RSDP for six (6) roads leading to: Review and update of Existing IEEs – prepared under PIP and RSDP I:
- i) Feasibility, Detail Design, cost estimate, rate analysis, preparation of bid document, IEE study, social study, construction supervision and quality control work, Narayanghat - Mugling Highway upgrading (33.3 KM Hill Road) and Resettlement Action Plan (RAP) under Nepal - India Regional Trade and Transport,
- ii) Gokuleswore - Thakthali Road (38.4 km), ii) Khidkijeula - Manma Road (27.3 km), and iii) Kalangagad Bridge – Chainpur Road (50 km)
- Study and preparation of Site-specific Environmental Management Action Plans (SS – EMAP) for: iii) Gokuleswore - Darchula Road (73 km), iv) Khidkijeula - Manma Road (27.3 km), v) Kalangagad Bridge – Chainpur Road (50 km), vi) Manma – Jumla Road (84.6 km)
- Study and preparation of fresh Initial Environmental Examination (IEE) reports (inclusive of SS – EMAP) for: i) Manma – Jumla Road

(84.6 km), vii) Thakthali – Darchula Road (32.4 km)
- Ensure EMAP safeguard cost included as BoQ in Bid Documents

Review and ensure EMAP related clauses adequately addressed in contract documents; ***Client Reference:*** *Sanjay Kumar Shreath, Ajaya Muland Rupak Kumar Shrestha, DoR, Program Coordinator*

Name of Assignment or Project: Community Development and Environment Conversation Forum (CDECF) Supported Project by Global Environmental Facility (GEF)/Small Grant Project (SGP)/ UNDP for Blacksmiths Up-liftmentProgramme in Sindhupalchwok districts, **Year:** February 2014 to June 2014, **Location:** Sindhupalchwok districts, **Client:** UNDP, **Main Project Feature:** Blacksmiths Upliftment VDC Namely: Bhotsipha VDC, Kunchow, SipaPokhare, Badegaoun and Shikharpur VDCs, **Position Held: Team Leader, Activities Performed:** Responsible for Conduct training in joint venture with communities and Cottage and Small Industrial Development Council Sindhupalchwock on Improving charcoal production and biomass briquette, Aware about welfare and equity basis plan for indigenous and back warded blacksmiths, Prepare information material on charcoal/ biomass briquette and training report, Coordinate and conduct various types of entrepreneurs development through agro biomass, Coordinate and conduct DDC, DFO, DADO, REDP, DLGSP & ADB etc. ***Client Reference:*** *Gopal Sherchan, Program Coordinator, (Small Grant) UNDP,*

Name of Assignment or Project: Rural Access Improvement and Decentralization Project (RAIDP)–Sarlahi District supported by World Bank Implementation and Supervision Social Safeguard instruction as per ESMF with help of Central Project Units, **Karmaiya – Hatowan Road (54KM), Kodena – Janakinagar Road (21.5KM),** ICB Contact,**Year:** May 2011 to January 2014, **Location:** Sarlahi District, **Client:** GoN/ DoLIDAR/RAIDP/ World Bank, **Main Project Feature:** Feasibility study, detailed engineering design, cost estimate, rate analysis, preparation of bid document, bid evaluation, IEE study, Social Screening/EIA/VDIMP & Preparation of Resettlement Plan of Road of the two road section and construction supervision and quality control works, **Position Held: Social Development Specialist /Social Coordinator, Activities Performed:** Responsible for social aspects of new sub-project appraisal such as Social Screening, Assessment and socio–economic Base line study, Compliance and assurance of social safeguards as required by the GoN and World Bank policy provisions according to ESMF, Formation of different level of Road users groups such as Formation of DRCC,VRCC,LRUC and DMC As per the ESMF, and other guidelines of DoLIDAR, Maintenance of records of affected families, vulnerable people and other socio-economic baseline data, of the selected sub project, Assist the DDC /DTO for organizing Cadastral survey of the purposed sub project, Prepare land acquisition/voluntary donation acceptance plan and preparation of voluntary Donation Impact Mitigation plan (VDIMP), Preparation and implementation of resettlement plan. Disclosure of the list of affected people in the public places and implements the plans as the per the principal and procedures describe in the ESMF, Records the vulnerable people households of the zero zone of influence of the project and prepare Vulnerable Community Development Plan (VCDP)to enhance their livelihood, Social mobilization, monitoring and evaluation of the subproject during project implementation, Organize Community Base Performance Monitoring (CBPM), preparation and implementation of HIV/AIDS programmes, Support and assistant to the Social Development Expert (SDE) of the project gathering necessary information as required, Assist the DDC\DTO, planning, Design and Engineering (PDE) and local institutions, NGOs, CBOs related to road in mitigating all types of negative social impacts arising from road construction upgrading. ***Client Reference:*** *Ashok Kumar Jha, Program Coordinator, RAIDP/DoLIDAR.*

Name of Assignment or Project: Community Development and Environment Conversation Forum (CDECF) Supported Project by Global Environmental Facility (GEF)/Small Grant Project (SGP)/UNDP for Blacksmiths Up-liftment Programme in Sindhupalchwok districts, **Year:** January, 2010 to April 2011, **Location:**Sindhupalchwok districts, **Client:** UNDP, **Main Project Feature:** Blacksmiths Upliftment VDC Namely: Bhotsipha – JandiKhaola – Chautara Rural Road **(18KM Hill Road)** andSipaghat – Sipa Pokhare – Jamire Mane – Jhandi – Chautara VDCs **Roads (23KM)** under DDC Finance by RCIW/GTZ, **Position Held: Team Leader / Social Expert, Activities Performed:** Responsible for Conduct training in joint venture with communities and Cottage and Small Industrial Development Council Sindhupalchwock on Improving charcoal production and biomass briquette, preparation and implementation of HIV/AIDS and human trafficking programmes. Aware about welfare and equity basis plan for indigenous and back warded blacksmiths, Coordinate and conduct various types of entrepreneurs development through Coordinate and conduct DDC, GTZ, UNDP etc. **Client Reference:** Gopal Sherchan, Program Coordinator, (Small Grant) UNDP,

Name of Assignment or Project: Rural, Reconstruction and Rehabilitation Sector Development Program (RRRSDP) in Approx. **total 70 km rural gravel road length),** funded by the ADB, DFID, SDC, and OFID; **Year:**January, 2009 toDecember 2009, (intermittent input); **Location:** Project Coordination Unit, Lalitpur; Shindhupalchowk, **Client:** DoLIDAR, DTO; **Main Project Features:** (i) rural roads, (ii) supplementary infrastructure, (iii) community empowerment, (iv) intuitional capacity development, (v) project management service; **Position Held:Resettlement Officer / Social Development Expert; Activities Performed:**Review the Resettlement Action Plan, Land acquisition, Compensation and Implementation Plan and procedural guideline/manuals prepared for RRRSDP and assist to the concerned to apply in line with the Resettlement Framework (RF),Conduct central and regional level training workshops to MLD, DoLIDAR, DDC, and DTO staff. Provide guidance to the consulting organization on resettlement related matters as and when required, Provide necessary assistance to the Resettlement Specialist while working with DDCs/DTOs, District Implementation Support Team (DIST) to ensure that the requirements for resettlement and compensation works on sub-projects are minimized,Prepare Resettlement Plan (RP), Indigenous People Development Plan (IPDP), Social Action Plan (SAP), and Gender action Plan (GAP) for sub-projects,Support and advice DDCs/DTOS to reach in agreement with Project Affected Persons (PAPs) over entitlements and voluntary donation of land,Monitoring the implementation of resettlement plans by respective DDCs, Resettlement Plan Implementation Verification and report preparation,Prepare and organize land acquisition and compensation rights awareness-raising and training activities, particularly for stakeholders in the districts, andLiaising with other programs and agencies to explore the potential for collaboration in strengthening the land acquisition and compensation capacities of the DDCs, and DoLIDAR, The above activities were conducted on design and implementation of followings roads: Sildhunga-Tekanpur road, Sindhupalchok district, **23.94 km,**Chautara – Naubise –Melamchi Road **(43KM)** in Sindhupalchowk, **Client Reference:** KiranSapkota, Program Coordinator, DoLIDAR/RAIDP

Name of Assignment or Project: Implementation and Supervision Work for Land Pooling/Resettlement Action plan and Service Track in Chovar-Satungal Sector of Outer Ring Road, DoUDBC, Outer Ring Road Development Project, **Year:** June 2006 to December 2008 (Intermittent input), NCB Contact, **Location:** Kathmandu &Kirtipur Area, **Client:** GoN/ DoUDBC, **Main Project Feature:** EIA & Preparation of Resettlement Plan of Otter Ring Roads **(72KM EIA Study) Chovar – Satungal Road (12KM), Thali – Danchhi Road (7KM), Position Held: Resettlement Assistant / Social Coordinator,Activities Performed:** Responsible for Manage, mobilize and

monitor to field assistants, Discussion with DoR, CDO, DFO, DDCs' officials, related district level I/NGOs, VDC representatives and local key informants and identify major issues related with road services, Social survey for Land pooling & resettlement survey, Walkthrough observation and assess physical condition, transportation facilities and other accessibility on road section, Identify problems and issues related to environment, women, disadvantage groups and potentiality of road accessibility; Preparation of **resettlement plan & it's implementation in plan** and Report Preparation and Submission. ***Client Reference:*** *Basanta Kumar Rai& Rama Maiya Manandhar, Program Coordinator,*

Name of Assignment or Project: EIA of Outer Ring Road Development Project (72 km), DUDBC, **Year:** January 2007 to June 2008, **Location:** Kathmandu & Bhaktapur District, **Client:** GoN/ DuDBC, **Main Project Feature:** EIA & Preparation of Resettlement Plan of Road, ICB Contact,**Position Held: Resettlement Assistant / Sociologist, Activities Performed:** Responsible for Manage, mobilize and monitor to field assistants, Discussion with DoR, CDO, DFO, DDCs' officials, related district level I/NGOs, VDC representatives and local key informants and identify major issuers related with road services, Social survey for resettlement survey, Walkthrough observation and assess physical condition, transportation facilities and other accessibility on road section, Apply PRA and RRA tools (FGD, Mobility Map, Resource Map, Social map etc) and prepare brief profile of affected VDCs, Identify problems and issues related to environment, women, disadvantage groups and potentiality of road accessibility, Preparation of **resettlement plan & it's implementation in plan** and Report Preparation and Submission,***Client Reference:*** *Basanta Kumar Rai, Program Coordinator,*

Name of Assignment or Project: CAP Impact Study and Immediate Impact Study of RWSSFB under Batch IV Scheme, **Year:**April 2006 to November 2006 (Intermittent), **Location:** Nepal, **Client:** RWSSFDB, **Main Project Features:** Research & Study, **Position Held:Social Development Expert,Activities Performed:** Responsible for Research Assistant for Health KAP Impact Study, RWSSFDB, Responsible for Research Assistant for Immediate Impact Study for Community Development Activities, RWSSFDB. ***Client Reference:*** *Rajendra Shrestha- Regional Coordinator.*

Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience, and I am available to undertake the assignment in case of an award. I understand that any misstatement or misrepresentation described herein may lead to my disqualification or dismissal by the Client, and/or sanctions by the Bank.

Mr. Chintamani Sharma 5/28/2019

Name of Expert *Signature* *Date*

Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads
Development Cooperation Implementation Division
Jwagal, Lalitpur

1. **FULL NAME** : **MANISH PRATAP SINGH**
2. **PROFESSION** : Civil Engineer
3. **DATE OF BIRTH** : 1990-02-19 **NATIONALITY:** Nepali
4. **EDUCATION** :
   - School Leaving Certificate (SLC), Adarsha Vidya Mandir, HSS, Manbhawan, Lalitpur
   - Proficiency Certificate Level (PCL), Capital Higher Secondary School, Koteshwor, Kathmandu
   - Bachelor in Civil Engineering, Sagarmatha Engineering College, Sanepa, Lalitpur
5. **OTHER TRAINING** :
   - Programming: Working Knowledge of Basic Computer Skills, Microsoft Office Packages, AutoCAD, SAP, DTM, SW-Road.
6. **COUNTRIES OF WORKEXPERIENCE** : Nepal
7. **MEMBERSHIP IN PROFESSIONAL ASSIOTIATIONS:**
   - Nepal Engineering Council, 11459 Civil "A"
   - Nepal Engineers' Associations', 20807
8. **LANGUAGES** :

	Speaking	Reading	Writing
Nepali	Excellent	Excellent	Excellent
English	Good	Excellent	Good
Hindi	Good	Good	Good

9. **EMPLOYMENT RECORD** :

FROM MAY 2015 : **TO TILL DATE**
ERMPLOYER : **ERMC (P.) Ltd.**
POSITION HELD : **Civil Engineer**

10. DETAILED TASKS ASSIGNED	11. WORK UNDERTAKEN THAT BEST ILLUSTRATES CAPABILITY TO HANDLE THE TASKS ASSIGNED

Name of Assignment or Project: Consultancy Service for Design, Supervision and Management of Kathmandu Valley Wastewater Management Project.

Year: December 2018- Till Date

Client: Kathmandu Upatyaka Khanepani Limited, Project Implementation Directorate, Kathmandu Valley Water Supply & Sanitation Project, Kathmandu

Positions Held: Civil Engineer

Activities Performed:

- Assist Team Leader and Deputy Team Leader in Co-ordination and Management of the project.
- Assist Team Leader for the management and administration of the project to achieve each target.
- Designing and reviewing topographical, geotechnical and other surveys.
- Detailed engineering design of wastewater network, manholes structures, river training structures and other components of the system.
- Preparation inventory of the materials required to be used in the project and their unit price.
- Preparation of reports on the requirement of the quality, grades and specifications for the material and goods.
- Responsible for preparation of Quantity estimate and cost estimate of the project components and prepare Bill of Quantities for different categories of works in close co-ordination with International expert.
- Assist Team Leader in Documentation and Preparation of Reports.
- Assist Deputy Team Leader in preparation of Bid Document.

Name of Assignment or Project: Consulting Services for Detailed Engineering Survey and Design of Electrified Railway Line for Butwal-Lamahi Section (115 Km)

Year: June 2017- December 2018

Client: Department of Railways, Kathmandu

Positions Held: Civil Engineer

Activities Performed:

- Assist Team Leader and Deputy Team Leader in Co-ordination and Management of the project.
- Responsible for preparation of rate analysis, cost estimate and Bill of Quantities for different categories of works in the project and work in close co-ordination with International expert.
- Assist Team Leader for the management and administration of the project to achieve each target.
- Assist Structural experts in design calculations and preparation of drawings.
- Assist Team Leader in Documentation and Preparation of Reports.
- Assist Deputy Team Leader in preparation of Bid Document.

Government of Nepal, Ministry of Physical Infrastructure and Transport, Department of Roads, Development Cooperation Implementation Division, Jwagal, Lalitpur

Name of Assignment or Project: Feasibility Study, Detailed Engineering Survey, Design and preparation of DPR, Environmental and Social Study for improvement to double Lane bituminous standard, Contract Packaging and Preparation of Bidding Documents

1. Kohalpur-Surkhet(Bangesimal) Road (Ratna Highway, H012) and
2. Butwal-Pokhara Road (Siddhartha Highway, H10)

Year: January 2016- September 2017

Client: Department of Roads

Positions Held: Civil Engineer/ Structural Support Engineer

Activities Performed:

- Special inspection, maintenance design and Estimate of existing bridges of Kohalpur- Surkhet Road (38 No.s).
- Design of Retaining and River Training Structures along Kohalpur-Surkhet Road.
- Preparation of Rate analysis, quantity and cost estimate for different categories of works in the project of Kohalpur- Surkhet road.
- Assist Team Leader and Deputy Team Leader in preparation of Detailed Project Report.
- Assist in preparation of Bid Document.

Name of Assignment or Project: Consulting Service for Feasibility Study and Detail Design for Construction of New Bridges (55 No.s) and Maintenance of Existing Bridges (55No.s)

Year: May 2015-January 2016.

Client: Department of Roads

Positions Held: Civil Engineer/ Assistant Bridge Engineer

Activities Performed:

- Assist Team Leader and Deputy Team Leader in Co-ordination and Management of the project.
- Condition Survey Of Existing Bridges 55 No.s under RSDP Roads, Analysis, Estimate and Preparation of Reports.
- Responsible for designing of AutoCAD, assistance in Design Calculations and preparation of reports for construction of New Bridges.
- Rate analysis and quantity estimation of bridges under RSDP.
- Design of approach roads and River training works.
- Co-ordinate various aspects of the project.
- Assist Team Leader in preparation of Detailed Project Report.

Contact information: (email: shmanish60@gmail.com / Phone: +977- 9807650754, 9863695103)

12. REFERENCE :

S.N	Name	Designation/Organization	Contact No
1	Er. Hem Nidhi Sharma	Director, ERMC Pvt. Ltd.	01-4483064

13. CERTIFICATION :

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience, and I am available to undertake the assignment in case of an award. I understand that any misstatement or misrepresentation described herein may lead to my disqualification.

Manish

[Signature]

Date: 5/27/2019
Day/Month/Year

Manish

Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads
Development Cooperation Implementation Division
Jwagal, Lalitpur

Position Title and No.	Engineering Geologist
Name of Expert:	Dr. Prakash Das Ulak
Date of Birth:	16/11/1962
Citizen	Nepali

Education:

- Ph.D. in Sedimentlogy of the Siwalik Group of Nepal Himalaya (Geology), Department of Geo-Science, Shimane University, Japan, 2005
- Master in Geoscience (Fluvial Sedimentology), Department of Geo-science, Shimane University, Japan, 1998
- Master in Science (Engineering Geology), Central Department of Geology, Tribhuvan University, Nepal, 1989

Training:

- Scientific writing training, organized by Nepal Geological society under Association of Geoscientist for International Development (AGID) and International Union of Geological Science (IUGS), Commission on Geo-science Education and Training (COGEOD), Nepal, 1995 (4 weeks)
- Introductory Course of Applied Techniques in Natural Science Lecture, Training and Workshop, organized by Tribhuvan University, Nepal and Munich University, West Germany, 1989 (2 Months)

Employment record relevant to the assignment:

Period	Employing organization and your title /position, Contact info for references	Country	Summary of activities performed relevant to the Assignment
July 1991 To Date	**Employer:** Department of Geology, Tri-Chandra Campus, Tribhuvan University, Nepal **Position Held:** Professor / Lecturer **For Reference:** **Name:** Hari Prasad Thapaliya, **Tel:** +977-1- 4268034; **Mail:** geologytc@info.com;	Nepal	Department of Geology, Tri-Chandra Campus, Tribhuvan University, Nepal. Associate Professor / Lecturer (May 1997 to To-date) and Assistant Lecturer (July 1991 to April 1997), Responsible to conduct theoretical classes and fieldwork for B.Sc. level students, ***Preparation of Course manual*** to students, conduct training on Geology Subject matter to the students.
August 2010 To Till Date	**Employer:** ERMC (P.) Ltd. **Position Held:** Senior Geologist **For Reference:** **Name:** Uddab Raj Chaulagain (MD) **Tel:** +977 1 4483064; **Mail:** ermc@ermcnepal.com	Nepal	Responsible for the study of various Bridges and Roads of Nepal. Preparation of detail geological/engineering geological maps, Geological / geotechnical investigation.
July 2006 To July 2014 (Intermittent)	**Employer:** SILT Consultants (P.) Ltd. **Position Held:** Senior Geologist **For Reference:** **Name:** Keshav Kunwar (MD) **Tel:** +977 1 4487598; **Mail:** info@silt.com.np;	Nepal	Responsible for the study of various Bridges of Nepal. Preparation of detail geological/engineering geological maps, Geological / geotechnical investigation. (i) Transport Project Preparatory Facility-1 funded by ADB. (ii) Design and Construction supervision of Emergency Flood Damage Rehabilitation Project – Irrigation Component (Part B) (iii) Outer Ring Road (68 km) Development Project; ORRDP, DUDBC, MoPPW, Kathmandu Valley, Nepal. (iv) Study of Sector Wide Road Program (SWRP) and Priority Investment Plan (PIP).
May 2012 To To-date	**Employer:** Full Bright Consultancy (Pvt.) Ltd. **Position Held:** Engineering Geologist **For Reference:** **Name:** Min Bahadur KC (MD) **Tel:** +977 1 4468118; **Mail:** fbc@mos.com.np	Nepal	Responsible for secondary data review, geological/ geotechnical/ soil/ hill slopes/ embankments investigation/ surveys including locations and depths of borings, field and laboratory tests; analyze & interpret investigation results; provide key design parameters and information to other experts/ design team for foundation design of bridges, ROB, RUB, culverts, other drainage and river protection structures, etc.
May 2007 To March 2014 (Intermittent)	**Employer:** Soil Test (P) Ltd **Position Held:** Senior Geologist **For Reference:** **Name:** Shyam Kaji Manandhar (MD) **Tel:** +977 1 4362246; **Mail:** soiltest@info.com	Nepal	Responsible for the study of various Bridges of Nepal. Preparation of detail geological/engineering geological maps, Geological / geotechnical investigation & Detailed Study of Road Improvement Project (RIP) including Sanfebagar Mangalsen (40 km), Bhalubang Pyuthan (65 Km), Chakachake-Libang (63 Km), Tulsipur-Salyan (61 (Km), Surkhet-Dailekh (67 Km).
November 2007 To December, 2007	**Employer:** TAEC Consultant (P.) Ltd. **Position Held:** Senior Geologist **For Reference:** **Name:** Mahendra Nath Sharma (MD) **Tel:** +977 1 4781446; **Mail:** taec@mos.com.np	Nepal	Responsible for the study of Bridges of the Kaligandaki Bridge at Bhirkate, western Nepal. Preparation of detail geological/engineering geological maps, Geological / geotechnical investigation.
July 2004 To July, 2007	**Employer:** GEOCE (P.) Ltd. **Position Held:** Training Specialist **For Reference:** **Name:** Narayan Singh (MD) **Tel:** +977 1 5521175;	Nepal	Detailed Study of Road Improvement Project (RIP) Sanfebagar-Martadi (56 km). Study on geological condition of the Landfill Site of Banchare Okharpauwa area, Dhading/Nuwakot Districts, and Bharsidol Area, Lalitpur District.

	Mail: geoce@info.com		Environmental Impact Assessment of the road corridor between Nepalthok-Khurkot section, Sindhuli District. Inventory Study of the ***Slope Instability*** and Environmental Impact Assessment of the Mirchaiya-Katari-SunkoshiRoad.
January 2007 To January 2008	**Employer:** Ingwa Hydropower (P) Ltd **Position Held:** Engineering Geologist **For Reference:** **Name:** Ram Kumar, MD **Tel:** +977 1 4321452; **Mail:** ingwa@info.com	Nepal	Feasibility Study of Ingwa Hydropower Project (7 MW) for Ingwa Hydropower (P) Ltd. (January, 2007 To January, 2008) at Sunsari District; Feasibility Study of Budhiganga Khola Small Hydroelectric Project (5.5 MW), for DoED/WRC) at Bajura District. Responsibilities included Analysis of the slope stability condition of the project area, Landslide mapping, Preparation of ***geological cross-sections*** and profiles at the proposed structure sites, ***rock characteristics identification***
November 1995 To July, 2005	**Employer:** Water Resource Consult (P) Ltd. **Position Held:** Senior Engineering Geologist **For Reference:** **Name:** Dr. Bhupendra Aryal (MD) **Tel:** +977 1 4745092; **Mail:** wrc@info.com	Nepal	Environmental Impact Assessment Study of the road corridor between Syafrubesi and Rasuwagadhi, Rasuwa District. Feasibility Study of Khani Khola Micro Hydroelectric Project, Lalitpur District. Feasibility Study of Sharada-Babai Hydropower Project (70 MW), Salyan District. Preliminary study of debris flow and landslide ***on the Kamala River Watershed*** and Lothar Khola and East Rapti River Watershed.
September 2003 To February, 2004	**Employer:** District Road Support Program **Position Held:** Engineering Geologist **For Reference,** **Name:** Zimmerman shef, Chief **Tel:** +977 1 5543412 **Mail:** drsp@drspnepal.org	Nepal	Geological condition survey of the road alignment, Ramechhap District (January, 2004 To February, 2004) and Kavre District (September, 2003 To November, 2003); Kavre District, Responsibilities included (i) Preparation of geological map; (ii) Preparation of engineering geological map; (iii) Analysis of the ***slope stability condition*** of the project area; (iv) ***Devise mitigation measures***; and (v) Preparation of report.
January 1998 To January 2001	**Employer:** SMEC International (Pvt.) and CIMAT Consultant **Position Held:** Senior Engineering Geologist **For Reference,** **Name:** Ravi Rajbhandari, Director **Tel:** +977-1- 5534572 **Mail:** cimat@info.com	Nepal	Inventory Survey along the (i) Chhedegad-Jajarkot Road, Jajarkot District; Surkhet-Jumla Road, Surkhet, Dailekh and Kalikot Districts; Gorusinge-Sandhikharka road, Arghakhanchi District; Shitalpati-Khanbot road, Salyan. ***Detail geological/engineering geological maps, Geological / geotechnical*** investigation.
November 1994 to March 1996	**Employer:** WRC and Water Induced Disaster Prevention Centre (DPTC) **Position Held:** Geologist	Nepal	Responsibilities included (i) Assessment of geomorphology and geo-technical setting of the project area, (ii) Preparation of geological map, engineering geological map Analysis of the slope stability condition of the project area, (iii) Preparation of soil distribution map, hazard map; (iv) Construction material study, (iv) Preparation of report.

Membership in Professional Associations and Publications:

- Member, Nepal Geological Society

Language Skills (indicate only languages in which you can work):

LANGUAGES	Speaking	Reading	Writing
Nepali	Excellent	Excellent	Excellent
English	Excellent	Excellent	Excellent
Hindi	Excellent	Good	Good

Adequacy for the Assignment:

Reference to Prior Work/Assignments that Best Illustrates Capability to Handle the Assigned Tasks
Name of Assignment or Project: Environmental and Social Study for Kathmandu (Nagdhunga) – Naubise – Mugling Road and Bridges and Environmental and Social Assessment of East – West Highway and Bridges (Kakarbhitta – Pathlaiya Section); **Year:** September 2017 to December 2018; **Location:** Central Nepal; **Client:** Department of Roads / ERMC (P) Ltd.; **Main Project Features:** Carry out alternative analysis for Road and Bridge during Feasibility Stage Review for Part 1 and Social Assessment and Planning studies for Part 2 of Kathmandu Naubise Mugling section; provide inputs and interface with the separately contracted consultants responsible for the Feasibility Study and Detailed Design of Kathmandu Naubise Mugling Road; **Position Held:** Engineering Geologist; **Activities Performed:** Responsible for under the guidance of the Team Leader. He and his team shall assess the geology of the alignment, properties of the soil and recommend for stable alignment of road and bridge
Name of Assignment or Project: Feasibility Study and Detailed Design for Construction of New Bridges and Maintenance of Existing Bridges financed by World Bank. **Year:** July 2016 to August 2017; **Location:** Various Places in Nepal; **Client:** World Bank, DoR; **Project Cost (Approx):** US$ 90 million; **Main Project Features: Detail Design of Bridges in Chinchu Jajarot Road** (Goche Khola Bridge 48m.); **Kalangaagad-Chainpur Road (1 No.); Satbaanjh Gokuleshwor Road (1 No.); Shitalpati Musikot Road** (Salabang Bridge (35m)); **Surkhet Jumla Road** (Sija Khola Bridge (40m); Tila Khola Bridge (48.7m)) **and Narayanghat – Mungling Highway** (Jugedi Bridge (50m); Khahare Bridge (36.50m); Khor Bridge (38.50m); Lamobaluwa Bridge (28.43m); Khani Khola Bridge (28m) Bhorle Bridge (57m); Mauri Bridge (26.30m); Dumre Bridge (32.40m); Simaltar Bridge (38m); Rigid Bridge (50m); Jalbire Bridge (25.60m); Namsi Bridge

(31m); Kali Bridge (60m); Twin Khola Bridge (59.91m); Chinsenji Bridge (43m); Khahare Bridge (66m) Trishuli Bridge and Mungling (165m); Marsyangdi Bridge at Abu Khaireni 150m)). **Maintenance of Bridges in Rapti Highway** (Tui Khola Bridge (32.40m); Babai River (147m); Gauti Khola Bridge (28.25m), Sharada Khola Bridge (81.25)); **Khodpe – Chainpur Road, Bajhang** (Kalanga Gad Bridge (76.20m); Juli Gad Bridge (25.80m); Taru Gad Bridge (75.60m); Bhahuli Gad Bridge (75m); **Chhinchu – Jajarkot Road** (Goji Bridge 120 m); **Mahakali Highway** (Dhik Gad Bridge (25.25m); Thali Gad Bridge (25.50m)); **Karnali Highway** (Girighat Bridge (40.25m); Sot Khola Bridge (58.82m); Lohare Khola Bridge (117.9m).; **Position Held:** Engineering Geologist; **Activities Performed:** Engineering Geologist will work under the guidance of the Team Leader, Deputy Team Leader in close coordination with Geotechnical Engineer. Engineering Geologist shall conduct Geologist Study of the road alignment and stability of road-side slope, support Geotechnical Engineer for design of Slope Stabilization Works including Bio-engineering slope stabilization techniques as per ToR. Additionally, Engineering Geologist will support in assessment and design review of foundation of bridges.

Name of Assignment or Project: To Support and Assist Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR) for the Preparation of Follow on Project of Rural Reconstruction and Rehabilitation Sector Development Program (RRRSDP) – 2;
Year: October 2014 to June 2016;
Location: Various District of Nepal;
Client: RRRSDP / DoLIDAR;
Main Project Features: The major roads are as follows:
Panchthar: Phidim-Nagin - Sidin - Prangbung - Falot Road (Phidim - Ludintar Sector) – 35 Km; From Mangalbare - Phungfung - Aktappa Sikari Bhangyan- Phakphok - Ra.ma.bi. Khamwang - Thingepur - Aamchok - Jungetar - Phuyatappa - Rabi Road (Suru bindu khanda) – 20 Km; Morang: Khorshane - Kerawari -Singhadevi Road (23 km left to be upgraded out of 38 km) – 26 Km; Laxmimarga - Dagihat - wanol - wawiyabirta - Amahi Road (29 km left to be upgraded out of 31 km) – 29 Km; Sunsari: Inaruwa - Stteramjhoda - Chitaha - Purbakusaha - Biratnagar Road – 23 Km; Jhumka - Shingiya - Ramdhuni - Prakashpur - Shukraware - Madhuwan - pachimkusaha Secondary School along Laukahi Bhansar Road – 29 Km; Dhankuta: Phisling - Tolang - Waspur - Oralang - Mayatar - Tarse - Upradanggadi - Shaktikhor bazar Road – 35 Km; Kavrepalanchok: Dolalghat - Phalate - Kolati -Dhadkhark - Pokharichauri - Gurase Road – 31 Km; Lalitpur: Godawari Khola-Corridor Road – 25 Km; Lalit Ghumti Road – 25 Km; Rukum: Solawang Raule Waluwa Naayegaadpul Jaamaabagar Simalchaur Hukaam Ranmamaikot Road's Naayegaadpul-Jaamaabagar Sector – 22 Km; Kakri-Kole-Takaseraa-Hukaam-Maukot Road – 20 Km; Rolpa: Mijhing-Ruiniwaang-wadachaur-Gumchaal-Haarjung-Syuri-Gaam Road – 24 Km; Manang: Kote-Metaa-Naar-Phu Road – 20 Km; To Black Top Chaame Tanki Manang Road – 31 Km; Mustang: Dhusaang-Vena Road – 20 Km; Budar-Jogbuda-Lipna Road – 46 Km
Position Held: Senior Engineering Geologist;
Activities Performed: Responsible for;

- Carry out desktop studies as necessary prior to making field visit;
- Carry out walkover surveys as per the requirement for detailed geological investigation;
- Geological and Geotechnical assessment of geologically sensitive locations of road alignment as reported by field and road design team;
- Make suggestion if river banks need any remedial measures to make them suitable for bridge construction;
- Identify and mark geologically unstable sections along subproject roads and design of slope stability works;
- Study bridge sites and make suggestions of general properties (such as bearing capacity, settlement etc.) of underlying strata;
- Make geological assessment of approach roads (about 300m both sides of the bridges) and riverbanks (about 100m from bridge axis at upstream and down steam) and make any suggestion for appropriate remedial measures.

Name of Assignment or Project: Feasibility Study and Detailed Design for Construction of New Bridges and Maintenance of Existing Bridges financed by World Bank. DoR.;
Year: February 2015 to January 2016 (7 Month, Intermittent);
Location: Nepal;
Client: RSDP / World Bank;
Main Project Features: Detail Design of Bridges in Chinchu Jajarot Road (Goche Khola Bridge 48m.); **Kalangaagad-Chainpur Road (1 No.); Satbaanjh Gokuleshwor Road (1 No.); Shitalpati Musikot Road** (Salabang Bridge (35m)); **Surkhet Jumla Road** (Sija Khola Bridge (40m); Tila Khola Bridge (48.7m)) **and Narayanghat – Mungling Highway** (Jugedi Bridge (50m); Khahare Bridge (36.50m); Khor Bridge (38.50m); Lamobaluwa Bridge (28.43m); Khani Khola Bridge (28m) Bhorle Bridge (57m); Mauri Bridge (26.30m); Dumre Bridge (32.40m); Simaltar Bridge (38m); Rigid Bridge (50m); Jalbire Bridge (25.66m); Namsi Bridge (31m); Kali Bridge (60m); Twin Khola Bridge (59.91m); Chinsenji Bridge (43m); Khahare Bridge (66m) Trishuli Bridge and Mungling (165m); Marsyangdi Bridge at Abu Khaireni 150m)). **Maintenance of Bridges in Rapti Highway** (Tui Khola Bridge (32.40m); Babai River (147m), Gauti Khola Bridge (28.25m), Sharada Khola Bridge (81.25)); **Khodpe – Chainpur Road, Bajhang** (Kalanga Gad Bridge (76.20m); Juli Gad Bridge (25.80m); Taru Gad Bridge (75.60m); Bhahuli Gad Bridge (75m); **Chhinchu – Jajarkot Road** (Goji Bridge 120 m); **Mahakali Highway** (Dhik Gad Bridge (25.25m); Thali Gad Bridge (25.50m)); **Karnali Highway** (Girighat Bridge (40.25m); Sot Khola Bridge (58.82m); Lohare Khola Bridge (117.9m));
Position Held: Senior Engineering Geologist;
Activities Performed: Responsible for;

- Engineering geological mapping, stability study of road side slope and support in design of slope stability.
- Overall responsibility for assessing, testing and confirming the availability and quality of construction materials.
- Also assess the properties of the soil and provide information in designing the bridge.

Government of Nepal
Ministry of Physical Infrastructure and Transport
Department of Roads
Development Cooperation Implementation Division
Jwagal, Lalitpur

Name of Assignment or Project: Detail Design of Motorable Bridges (5 Nos);
Year: May 2014 To July 2014 (2 Months Intermittent);
Location: Arghakhachi, Pyuthan, Kaski;

Client: DoLIDAR/LRBP/SDC;
Main Project Features: Geological Study, geotechnical investigation and mapping;
Position Held: Senior Geologist;
Activities Performed: Responsibilities included Preparation of detail geological/engineering geological maps; geological / geotechnical investigation testing and confimration of availability of construction material, assignment of soil proposals etc. of **Milmile Khola Bridge Arghakhanchi, Chukaha Khola Bridge, Jhimruk Khola Bridge, Lum Khola Bridge, Pyutan District, Madi Khola Bridge** at Bhaise, Kaski.

Name of Assignment or Project: Feasibility Study and Detailed Design of Agricultural Road 20 districts, 1087 Km Length;
Year: August 2013 To September 2014 (2 Months Intermittent);
Location: Nepal;
Client: RRRSDP / DoLIDAR;
Main Project Features: The major roads are as follows:
Panchthar: Phidim-Nagin - Sidin - Prangbung - Falot Road (Phidim - Ludintar Sector) – 35 Km; Morang: Khorshane - Kerawari - Singhadevi Road (23 km left to be upgraded out of 38 km) – 26 Km; Laxmimarga - Dagihat - wanol - wawiyabirta - Amahi Road (29 km left to be upgraded out of 31 km) – 29 Km; Jhumka - Shingiya - Ramdhuni - Prakashpur - Shukraware - Madhuwan - pachimkusaha Secondary School along Laukahi Bhansar Road – 29 Km; Dhankuta: Phisling - Tolang - Waspur - Oralang - Mayatar - Tarse - Upradanggadi - Shaktikhor bazar Road – 35 Km; Kavrepalanchok: Dolalghat - Phalate - Kolati -Dhadkhark - Pokharichauri - Gurase Road – 31 Km; Lalitpur: Godawari Khola-Corridor Road – 25 Km; Lalit Ghumti Road – 25 Km; To Black Top Chaame Tanki Manang Road – 31 Km; Mustang: Budar-Jogbuda-Lipna Road – 46 Km
Position Held: Senior Engineering Geologist;
Activities Performed: Responsibilities included (a) Preparation of detail geological/engineering geological maps; (b) Geological / geotechnical investigation; (c) Construction material study in the vicinity of the project area; (d) Supervision of trenching and pitting on soil and terrace deposits and preparation of geological logs; (e) Preparation of geological cross-sections and profiles at the proposed structure sites; (f) Study of geomorphological and geo-technical condition of project area; (g) Analysis of the slope stability condition of the project area and design of **slope stabilization works of road-side slope** including bio-engineering technique; (h) Landslide mapping; (i) Preparation of hazard map; (j) Provide geological parameters for foundation and structure design to the design team; (k) Preparation of geological report.

Name of Assignment or Project: Geological Study and Detailed of the Motorable bridge site of Lam Duwari Khola Bridge (Kaski);
Year: February 2014 To March 2014 (1 Month Intermittent);
Location: Kaski, Nepal;
Client: DoLIDAR,
Main Project Features: Geological Study, Investigation and mapping of Bridge site;
Position Held: Senior Engineering Geologist;
Activities Performed: Responsibilities included Preparation of detail geological/engineering geological maps; geological / geotechnical investigation; construction material study in the vicinity of the project area; supervision of trenching and pitting on soil and terrace deposits and preparation of geological logs; preparation of geological cross-sections and profiles at the proposed structure sites; Study of geomorphological and geo-technical condition of project area; analysis of the slope stability condition of the project area; preparation of hazard map; provide geological pararneters for foundation and structure design to the design team; preparation of geological report.

Name of Assignment or Project: Detailed Design of the Motorable Bridge Site of Rupgad Khola Bridge (Dolpa) and Lali Khola Bridge (Humla);
Year: February 2014 To March 2014 (1 Month Intermittent);
Location: Dolpa, Humla, Nepal;
Client: DoLIDAR;
Main Project Features: Geological Study, investigation and design;
Position Held: Senior Geologist;
Activities Performed: Responsibilities included preparation of detail geological/engineering geological maps; geological / geotechnical investigation; construction material study in the vicinity of the project area; supervision of trenching and pitting on soil and terrace deposits and preparation of geological logs; preparation of geological cross-sections and profiles at the proposed structure sites; Study of geomorphological and geo-technical condition of project area; provide geological parameters for foundation and structure design to the design team; preparation of geological report.

Name of Assignment or Project: Soil Investigation & Detailed Design of the Motorable Bridges (5 Nos);
Year: January 2013 To February 2014 (1 Month Intermittent);
Location: Ramechhap, Dhading, Nepal;
Client: DoLIDAR;
Main Project Features: Geological Study Investigation and Detailed Design of Bridges;
Position Held: Senior Geologist;
Activities Performed: Preparation of detail geological/engineering geological maps; Geological / geotechnical investigation of **Burke Khola Bridge, Bhartauli Khola Bridge, Lurke Khola Bridge (Ramechhap) & Chalise Khola Bridge, Naubise Khola (Dhading) Bridges.** Responsibilities included preparation of detail geological/engineering geological maps; geological / geotechnical investigation; construction material study in the vicinity of the project area; supervision of trenching and pitting on soil and terrace deposits and preparation of geological logs; preparation of geological cross-sections and profiles at the proposed structure sites; Study of geomorphological and geo-technical condition of project area; provide geological parameters for foundation and structure design to the design team; preparation of geological report.

Name of Assignment or Project: Detailed Design of the Motorable Bridges (5 Nos.);

Year: November 2013 To January 2014 (1.5 Months Intermittent);
Location: Surkhet, Nepal;
Client: DoR;
Main Project Features: Geological Study Investigation and Detailed Design of Bridges;
Position Held: Senior Engineering Geologist;
Activities Performed: Preparation of detail geological/engineering geological maps; Geological / geotechnical investigation of **Bakiya-Hatisude Bridge** (Malwanpur), **Jagai Khola Bridge,** Surkhet, **Bheri River Bridge, Mehal Kuna Bridge,** Surkhet and **Bheri River Rimna Bridge**, Jajarkot-Rukum. Responsibilities included preparation of detail geological/engineering geological maps; geological / geotechnical investigation; construction material study in the vicinity of the project area; supervision of trenching and pitting on soil and terrace deposits and preparation of geological logs; preparation of geological cross-sections and profiles at the proposed structure sites; Study of geomorphological and geo-technical condition of project area; provide geological parameters for foundation and structure design to the design team; preparation of geological report.

Name of Assignment or Project: Detailed Investigation and Design of the Motorable bridges (11 Nos);
Year: September 2013 To December 2013 (1.5 Months Intermittent);
Location: Jumla, Achham, Doti, Banke, Dailekh, Nepal;
Client: DoLIDAR, LRBP, SDC;
Main Project Features: Geological Study Investigation and Detailed Design of Bridges;
Position Held: Senior Geologist;
Activities Performed: Preparation of detail geological/engineering geological maps; Geological / geotechnical investigation of **Mohana River Bridge** (Kailali), **Bhimkotigad Bridge** (Achham), **Tila River Bridge** (Jumla), **Juwa Khola Bridge** (Jumla), **Khartola Khola Bridge** (Doti), **Koili Khola Bridge** (Banke), **Jabdi Khola Bridge** (Bardiya), **Chhamghat Khola Bridge** (Dailekh), **Surmi Khola Bridge** (Kailali), **Sikhhawa Khola Bridge** (Damg), **Jethi Khola Bridge** (Dang). Responsibilities included preparation of detail geological/engineering geological maps; geological / geotechnical investigation; construction material study in the vicinity of the project area; supervision of trenching and pitting on soil and terrace deposits and preparation of geological logs; preparation of geological cross-sections and profiles at the proposed structure sites; Study of geomorphological and geo-technical condition of project area; provide geological parameters for foundation and structure design to the design team; preparation of geological report.

Name of Assignment or Project: Detailed Investigation Design of Motorable Bridges (4 Nos.);
Year: September 2013 To October 2013 (2 Months Intermittent);
Location: Jhapa, Sindhuli, Kaski, Udayapur;
Client: DoLIDAR, LRBP, SDC;
Main Project Features: Geological Study Investigation and Detailed Design of Bridges;
Position Held: Senior Geologist;
Activities Performed: Preparation of detail geological/engineering geological maps; Geological / geotechnical investigation of **Kamala River Bridge** at Belsoth (Udayapur, Sindhuli), **Biring Khola Bridge** (Jhapa), **Sabashi Khola Bridge** (Jhapa) & **Bijayapur Khola Bridge** (Kaski). Responsibilities included preparation of detail geological/engineering geological maps; geological / geotechnical investigation; construction material study in the vicinity of the project area; supervision of trenching and pitting on soil and terrace deposits and preparation of geological logs; preparation of geological cross-sections and profiles at the proposed structure sites; Study of geomorphological and geo-technical condition of project area; provide geological parameters for foundation and structure design to the design team; preparation of geological report.

Name of Assignment or Project: Detailed Investigation and Design of the Motorable Bridges (5 Nos.);
Year: August 2013 To September 2013(1 Month Intermittent);
Location: Palpa, Syanja;
Client: DoR/BP;
Main Project Features: Geological Study Investigation and Detailed Design of Bridges;
Position Held: Senior Geologist;
Activities Performed: Preparation of detail geological/engineering geological maps; Geological / geotechnical investigation of **Andhi Khola Bridge** (Galyang), **Andhi Khola Bridge** (Helu), **Andhi Khola Bridge** (Putalibazaar), **Kaligandaki River Bridge** (Damachaur, Syangja), **Nisti Khola Bridge** (Palpa). Responsibilities included preparation of detail geological/engineering geological maps; geological / geotechnical investigation; construction material study in the vicinity of the project area; supervision of trenching and pitting on soil and terrace deposits and preparation of geological logs; preparation of geological cross-sections and profiles at the proposed structure sites; Study of geomorphological and geo-technical condition of project area; provide geological parameters for foundation and structure design to the design team; preparation of geological report.

Name of Assignment or Project: Detail Survey and Design of Electrified Railway Line **Simara-Tamsariya Section of Mechi-Mahakali Railway**;
Year: September 2013 To September 2014 (4 Months Intermittent);
Location: Bara, Makawanpur, Chitwan and Nawalparasi Districts (Terai Region);
Client: Department of Railways, Nepal;
Main Project Features: Detailed survey, design, land acquisition, social/resettlement plan preparation of Electrified Railway Line; Total Length of Railway: 127.089 Km; Design Speed: 100Km/hr; Width of Bridge: 6m; Total length of bridge: 2640 m (51 nos.); Types of Bridge: PSC (Pre-stressed Concrete) Girder with 25m span and IPC (Incremental Prestressed Concrete) Girder with 30m span; Construction Technology: Bridge Construction Technology (Single Tracked) and Tunnel (3.72 Km, 3 Nos.);
Position Held: Engineering Geologist.

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Activities Performed: Responsible for carrying out field investigation and lab testing and reporting. Other works – to review of relevant part of existing feasibility reports and data; Assist the International Engineering Geologist/ Geotechnical Engineer in formulating the geological / geotechnical investigation program, including locations and depths of borings, field and laboratory tests, etc.; Coordinate, supervise and execute the planned geological/geotechnical investigations; Report the progress of the geological/ geotechnical investigations and other related; Analyze and interpret the investigation results slope stability analysis and design of slope stability works; Provide key design parameters and information to other experts of the design team for foundation design of bridges, ROB, RUB, culverts, other drainage and protection structures, etc.; Assist Team Leader in the preparation of various reports, i.e. Inception, Feasibility Review, Progress, Draft Final and Final Reports, including bidding/tender documents

Name of Assignment or Project: Detail Survey and Design of Electrified Railway Line Simara-Bardibas Section of Mechi-Mahakali Railway and Simara-Birgunj Link under Railway and Metro Development Project;
Year: May 2012 To March 2013 (4 Months Intermittent);
Location: Bara, Parsa and Rautahat Districts (Terai region);
Client: Department of Railways;
Main Project Features: DPR-Detail Survey and Design of Electrified Railway Line; Total Length of Railway= 136 Km; Design Speed= 160Km/hr; Width of Bridge= 6m; Total length of bridge = 4520 m (26 nos.); Types of Bridge= PSC (Pre-stressed Concrete) Girder with 25m span and IPC (Incremental Prestressed Concrete) Girder with 35m span; Construction Technology= Bridge Construction Technology (Single Tracked);
Position Held: Engineering Geologist;
Activities Performed: Responsible for carrying out field investigation and lab testing and reporting. Other works – to review of relevant part of existing feasibility reports and data; Assist the International Engineering Geologist/ Geotechnical Engineer in formulating the geological / geotechnical investigation program, including locations and depths of borings, field and laboratory tests, etc.; Coordinate, supervise and execute the planned geological/geotechnical investigations; Report the progress of the geological/ geotechnical investigations and other related works to the Team Leader and International Engineering Geologist/ Geotechnical Engineer; Analyze and interpret the investigation results in coordination and consultation with the International Engineering Geologist/ Geotechnical Engineer; Provide key design parameters and information to other experts of the design team for foundation design of bridges, ROB, RUB, culverts, other drainage and protection structures, etc.; Assist Team Leader in the preparation of various reports, i.e. Inception, Feasibility Review, Progress, Draft Final and Final Reports, including bidding/tender documents

Name of Assignment or Project: Transport Project Preparatory Facility-1, financed by ADB;
Year: September 2011To November 2013 (6 Months Intermittent);
Location: Nepal;
Client: DoR/ADB Directorate;
Main Project Features: Detail Design of 20 bridges, 400 Km Road and Feasibility of 500 Km Road;
Position Held: Senior Engineering Geologist;
Activities Performed: Responsible for the Preparation of detail ***geological/engineering geological*** maps; (b) Geological / geotechnical investigation; (c) ***Construction material study*** in the vicinity of the project area; (d) Supervision of trenching and pitting on soil and terrace deposits and preparation of geological logs; (e) Preparation of geological cross-sections and profiles at the proposed structure sites; (f) Study of ***geomorphological and geo-technical*** condition of project area, slope stability, analysis of road alignment and road side slope, Data interpretation and provide input on design of foundation and other structures and design of slope stability works including bio engineering.
The Road Sections where detail engineering design (bituminous) work carried out are;
(i) Kathmandu (Thankot) – Mugling (Tunnel Option at Naghdhunga) – 98 Km; (ii) Dumre – Besisahar (43 Km); (iii) Sattale – Chamme (30 Km); (iv) Bhojpur – Diktel (55 Km); (v) Besisahar – Sattale (30 Km); (vi) Kathmandu Urban Roads (30 Km); (vii) Dharan – Chatara – Gaighat – Katari (86 Km); (viii) Ridi – Rudrabeni – Wami Taksar (57 Km); (ix) Dhadingbesi – Arughat – Gorkha (71 Km); (x) Bhedetar – Rabi – Ranke (115 Km); (xi) Melamchipul – Ambathan Road (18 Km); (xii) Malekhu – Lother (Tunnel option) – 35 Km; (xiii) Udipur (F036) – Sera – Kirtipur (18 Km); (xiv) Ramapur- Lumbini- Kakrahawa Tarai Road (34 Km) (xv) Manthali-Ramechhap road(13.35 Km) (xvi) Halesi-Diktel Road (35.43 Km) (xvii) Leguwaghat- Bhojpur Road (65.55 Km) (xviii)Leguwaghat-Tumlingtar Road (24.63 Km) (xix)Mechipul-Birtamod Road (12.15 km) (xx) East West Highway (Nadaha)-Koshi Bridge-East West Highway (kanchanpur) Tarai Road (61.686 Km), Dang-Tulsipur Road (78 Km), Bhedetar Rake (99 Km)

Name of Assignment or Project: Detailed Investigation and Design of the Motorable Bridges (15 Nos.)
Year: February, 2013 To August, 2013 (2 Months Intermittent);
Location: Morang, Jhapa, Gulmi, Arghakhanchi, Rupandehi;
Client: DoR;
Main Project Features: Geological Study Investigation and Detailed Design of Bridges;
Position Held: Senior Geologist;
Activities Performed: Responsibilities included Preparation of detail geological/engineering geological maps; Geological / geotechnical investigation of **Badigad Khola Bridge,** Mygdi, **Biruwa Khola Bridge** Syangja, **Ridi Khola Bridge,** Arghakanchi; **Durga Khola Bridge,** Arghakhanchi; **Dhadhar Khola Bridge,** Arghakhanchi; **Danda Khola Bridge,** Rupndehi, **Chaldi Panaha Khola Bridge,** Gulmi, **Ramchandre Khola Bridge,** Jhapa; **Jhiljhile Khola Bridge,** Jhapa; **Lera Khola Bridge,** Morang; **Krishne Khola Bridge,** Jhapa; **Bhutlung Khola Bridge,** Jhapa; **Hadiya Khola Bridge,** Jhapa; **Barahafale Khola Bridge,** Jhapa; **Keshaliya Khola Bridge,** Morang; **Jure Khola Bridge,** Morang; **Madaha Khola Bridge,** Morang. Responsibilities included preparation of detail geological/engineering geological maps; geological / geotechnical investigation; construction material study in the vicinity of the project area; supervision of trenching and pitting on soil and terrace deposits and preparation of geological logs; preparation of geological cross-sections and profiles at the proposed structure sites; Study of geomorphological and geo-technical condition of project area; providing geological parameters for foundation and structure design to the design team; preparation of geological report.

Name of Assignment or Project: Geological Study and Detailed Design of the Motorable Bridges (20 Nos);
Year: April, 2012 To December 2012 (2 Months Intermittent);
Location: Sunsari, Udayapur;
Client: TPPF/DoR/ADB;
Main Project Features: Geological Study Investigation and Detailed Design of Bridges;
Position Held: Senior Geologist;
Activities Performed: Responsibilities included Preparation of detail geological/engineering geological maps; Geological / geotechnical investigation of **Bagh Khola Bridge,** Sunsari, **Bagundre Khola Bridge,** Sunsari; **Bairowa Khola Bridge,** Udayapur; **Bakhuri Khola Bridge,** Sunsari; **Bhalu Khola Bridge,** Sunsari; **Chhnnamastak Bridge,** Sunsari; **Gauri Khola Bridge,** Sunsari; **Gideri Khola Bridge,** Sunsari; **Harkhaha Khola Bridge,** Sunsari; **Jarayo Khola Bridge,** Udayapur; **Jogini Khola Bridge,** Udayapur; **Kali Khola Bridge,** Sunsari; **Karam Khola Bridge,** Sunsari; **Katari Khola Bridge,** Udayapur; **Khar Khola Bridge,** Sunsari; **Murti Khola Bridge,** Udayapur, **Patnali Khola Bridge, Sardu Khola Bridge, Seti Khola Bridge** (Sunsari); **Sisuwa Khola Bridge, Trijuga Khola Bridge, Yashoda Khola bridge** (Udayapur); Along Kanchanur-Pakali Road. Responsibilities included preparation of detail geological/engineering geological maps; geological / geotechnical investigation; construction material study in the vicinity of the project area; supervision of trenching and pitting on soil and terrace deposits and preparation of geological logs; preparation of geological cross-sections and profiles at the proposed structure sites; Study of geomorphological and geo-technical condition of project area; provide geological parameters for foundation and structure design to the design team; preparation of geological report.

Name of Assignment or Project: Geological Study, Geotechnical Investigation and Design of Bridges (4 Nos.);
Year: February 2012 To March 2012 (2 Month Intermittent);
Location: Kaski, Parbat, Sindhupalchowk;
Client: DRSP/LRBP/SDC;
Main Project Features: Geological Study Investigation and Detailed Design of Bridges;
Position Held: Senior Geologist;
Activities Performed: Preparation of detail geological/engineering geological maps; Geological / geotechnical investigation of **Kali Khola Bridge**, Kaski; **Tal Khola Bridge**, Kaski; **Balephi Khola Bridge**, Sindhupalchowk; **Malayang Khola Bridge**, Parbat. Responsibilities included preparation of detail geological/engineering geological maps; geological / geotechnical investigation; construction material study in the vicinity of the project area; supervision of trenching and pitting on soil and terrace deposits and preparation of geological logs; preparation of geological cross-sections and profiles at the proposed structure sites; Study of geomorphological and geo-technical condition of project area; provide geological parameters for foundation and structure design to the design team; preparation of geological report.

Name of Assignment or Project: Geological Study, Investigation and Desgin of Manahari Bridge & Rapti Khola Bridge;
Year: October 2011To November 2011 (2 Months Intermittent);
Location: Makwanpur, Rapti
Client: DoLIDAR;
Main Project Features: Geological Study Investigation and Detailed Design of Bridges;
Position Held: Senior Geologist;
Activities Performed: Responsibilities included preparation of detail geological/engineering geological maps; geological / geotechnical investigation; construction material study in the vicinity of the project area; supervision of trenching and pitting on soil and terrace deposits and preparation of geological logs; preparation of geological cross-sections and profiles at the proposed structure sites; Study of geomorphological and geo-technical condition of project area; provide geological parameters for foundation and structure design to the design team; preparation of geological report.

Name of Assignment or Project: Feasibility Study and Design of Mechi-Mahakali (about 900 km) and Pokhara-Kathmandu (about 200 km) Electrical Railway Line;
Year: December 2009 To July 2010 (8 months);
Location: Nepal;
Client: MoRT;
Main Project Features: Study of Railway Project;
Position Held: Senior Geologist;
Activities Performed: Conduct site survey of geological characteristics of the alignment, Preparation of geological map and identify erosion prone, river cutting areas & landslide areas along the road alignment. Analysis of the slope stability condition & landslides of the project area.

Name of Assignment or Project: Outer Ring Road Development Project (72 Km);
Year: July 2008 to September 2009 (10 Months Intermittent);
Location: Kathmandu Valley, Nepal;
Client: ORRDP, DUDBC, MoPPW, GoN;
Main Project Features: EIA / SIA slope stability study of the Outer Ring Road, a six lane urban highway;
Position Held: Senior Engineering Geologist;
Activities Performed: Responsible to conduct (a) Literature review on the geology, seismicity and environment of the Kathmandu Valley; (b) Conduct site survey of geological characteristics of the road alignment; (c) Preparation of geological map and identify erosion prone, river cutting areas and landslide areas along the road alignment; (d) Construction material study in the vicinity of the project area; (e) Analysis of the slope stability condition and landslides of the project area and design of slope stability works; (f) Assist the Study team in identification of impacts and devise their mitigation measures; (g) Preparation of geological report.

Name of Assignment or Project: Study of the Kaligandaki Bridge;
Year: November, 2007 To December, 2007 (2 months Intermittent);
Location: Bhirkate, Western Nepal;
Client: TAEC Consultant (P) Ltd.;
Main Project Features: Feasibility study and design of the bridge;
Position Held: Senior Geologist;
Activities Performed: Responsibilities included (a) Preparation of detail geological/engineering geological maps; (b) Geological / geotechnical investigation; (c) Construction material study in the vicinity of the project area; (d) Supervision of trenching and pitting on soil and terrace deposits and preparation of geological logs; (e) Analysis of the slope stability condition and landslides of the project area; (f) Landslide mapping, Preparation of Hazard map; (g) Provide geological parameters for design of foundation structure for the design team; (h) Preparation of geological report.

Name of Assignment or Project: Detailed Design of Road Improvement Project (RIP)- Sanfebagar-Martadi Road Section (56 km);
Year: May 2007 To July 2007 (3 Month Intermittent)
Location: Achham District, Nepal;
Client: Department of Roads / GEOCE (P) Ltd.;
Main Project Features: Geological Study and mapping of Road works;
Position Held: Senior Engineering Geologist;
Activities Performed: Responsibilities included (a) Preparation of detail geological/engineering geological maps; (b) Geological / geotechnical investigation; (c) Construction material study in the vicinity of the project area; (d) Supervision of trenching and pitting on soil and terrace deposits and preparation of geological logs; (e) Preparation of geological cross-sections and profiles at the proposed structure sites; (f) Study of geomorphological and geo-technical condition of project area; (g) Analysis of the slope stability condition of the project area and design of **slope stabilization works of road-side slope** including bio-engineering technique; (h) Landslide mapping; (i) Preparation of hazard map; (j) Provide geological parameters for foundation and structure design to the design team; (k) Preparation of geological report.

Name of Assignment or Project: Detailed Design of Road Improvement Project (RIP) including Sanfebagar-Mangalsen (40 km), Bhalubang-Pyuthan (65 Km), Chakachake-Libang (63 Km), Tulsipur-Salyan (61 (Km), Surkhet-Dailekh (67 Km);
Year: May 2007 To October 2007 (3 Month Intermittent);
Location: Achham, Pyuthan, Dang, Rukum, Salyan, Surkhet, Dailekh Districts, Nepal;
Client: Soil Test (P) Ltd, WeLink and SIDeF;
Main Project Features: Detailed design of highway and feeder roads along with Geological Study and mapping;
Position Held: Senior Engineering Engineering Geologist;
Activities Performed: Responsibilities included (a) Preparation of detail geological/engineering geological maps; (b) Geological / geotechnical investigation; (c) Construction material study in the vicinity of the project area; (d) Supervision of trenching and pitting of soil and terrace deposits and preparation of geological logs; (e) Analysis of the slope stability condition and landslides of the project area and design of **slope stabilization works of road-side slope** including bio-engineering technique; (f) Landslide mapping; (g) Preparation of hazard map; (h) Provide geological parameters for the design team; (i) Preparation of geological report.

Name of Assignment or Project: Study of Sector Wide Road Program (SWRP) and Priority Investment Plan (PIP), financed by world bank financed by World Bank;
Year: July 2005 To December 2006 (10 months);
Location: Baitadi, Darchula, Achham, Surkhet, Dailekh, Mugu, Okhaldhunga, Chitwan, Bajhang, Bajura Districts, in the Far Western, Mid Western, Central, and Eastern Nepal;
Client: Department of Roads, GoN, funded by the World Bank;
Main Project Features: Techno Economic Study, IEE, EIA and Resettlement Plan preparation for rehabilitation as well as new construction of National Highways, and major feeder roads;
Position Held: Senior Engineering Geologist;
Activities Performed: The responsibilities included (a) Detailed site survey, investigation and study of geological condition of project area; (b) Preparation of geological map, engineering geological map; (c) Preparation of hazard map and landslide mapping; (d) Preparation of the engineering log and profile of seventeen road sections covering: Satbanjh-Jhulagaht, Satbanjh-Gokuleshwar-Thaktoli (90 km), Khodpe-Jhota (78 km), Lower Dungeshwar-Upper Dungeahwar-Dailekh (27 km), Chhinchu-Pokhare (25 km), Narayanghat-Mugling (36 km), Tulsipur-Salyan (61 km), Tulsipur-Musikot 86 km), Sanfebagar-Mangalsen (38 km), Sanfebagar-Ikadigad (15 km), Martadi-Kolti (54 km), Sunkoshi-Okhaldhunga (40 km), Mangalsen-Belkhet (50 km), Tulsipur-Botechaur (78 km), Nagma-Gamgadhi (88 km) roads; (e) Analysis of the slope stability condition and landslides of the project area and design of **slope stabilization works of road-side slope** including bio-engineering technique; (f) Construction material study in the vicinity of the project area; (g) Supervision of trenching and pitting of soil and terrace deposits and preparation of geological logs; (h) Landslide mapping; (i) Preparation of hazard map; (j) Provide geological parameters for foundation and structure design to the design team; (k) Preparation of geological report.

Name of Assignment or Project: Geological Study of the Landfill Site of Banchare Okharpauwa Area;
Year: March 2005 To May 2005 (3 months);
Location: Dhading-Nuwakot Districts, and Pharsidol Area, Lalitpur District;
Client: MoLD, GoN / GEOCE Consultants (P) Ltd.;
Main Project Features: Study of geological condition of the proposed site;
Position Held: Geologist;

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Activities Performed: Responsibilities included : (i) Study on geomorphological and geo-technical condition of the landfill site areas; (ii) Preparation of geological map, engineering geological map; (iii) Analysis of the slope stability condition of the project area.

Name of Assignment or Project: Syafrubesi and Rasuwagadhi Road;
Year: June 2005 To July 2005 (2 month);
Location: Rasuwa District, Nepal;
Client: Department of Roads / WRC;
Main Project Features: EIA study of the road along with geological survey, investigation and mapping;
Position Held: Engineering Geologist;
Activities Performed: Responsibilities as Senior Geologist included (i) Detailed field assessment of geomorphology and geo-technical setting of the project area, (ii) Preparation of geological map, engineering geological map, (iii) Analysis of the slope stability condition of the project area and design of **slope stabilization works of road-side slope** including bio-engineering technique, (iv) Preparation of soil distribution map, (v) Preparation of Hazard map, (vi) Identify potential impacts and their mitigation measures, (vii) Assist in preparation of EIA report.

Name of Assignment or Project: Road Corridor between Nepalthok-Khurkot Section;
Year: January 2005 To March 2005 (3 months);
Location: Sindhuli District, Nepal;
Client: Department of Roads / GEOCE Consultants (P) Ltd.;
Main Project Features: Slope stability and EIA study of highway;
Position Held: Geologist;
Activities Performed: Responsibilities included (i) Detailed field assessment of geomorphology and geo-technical setting of the project area, (ii) Preparation of geological map, engineering geological map, (iii) Analysis of the slope stability condition of the project area and design of **slope stabilization works of road-side slope** including bio-engineering technique, (iv) Preparation of soil distribution map, (v) Preparation of Hazard map, (vi) Identify potential impacts and their mitigation measures, (vii) Assist in preparation of EIA report.

Name of Assignment or Project: Inventory Study of the Slope Instability and Environmental Impact Assessment of the Mirchaiya-Katari-Sunkoshi Road;
Year: July 2004 To December 2004 (6 months);
Location: Central Nepal;
Client: DoR, JICA / GEOCE;
Main Project Features: Inventory Study of the Slope Instability and Environmental Impact Assessment of road;
Position Held: Engineering Geologist;
Activities Performed: Responsibilities included (i) Detailed field assessment of geomorphology and geo-technical setting of the project area, (ii) Preparation of geological map, engineering geological map, (iii) Analysis of the slope stability condition of the project area and design of **slope stabilization works of road-side slope** including bio-engineering technique, (iv) Preparation of soil distribution map, (v) Preparation of Hazard map, (vi) Identify potential impacts and their mitigation measures, (vii) Assist in preparation of EIA report.

Name of Assignment or Project: Geological Condition Survey of the Road Alignment Under District Road Support Programme, Ramechhap District (January, 2004 To February, 2004) and Kavre District (September, 2003 To November, 2003); Kavre District (December, 2003 To December, 2003); Sindhupalchowk District (December, 2003), Dolakha (December, 2003);
Year: September 2003 To February 2004 (6 months);
Location: Shivalaya and Sange Danda, Ramechhap District; and Bohare Dovan and Timalbensi, Kavre District, Nala and Kashi Bhanjyang, Kavre District; Mudhe and Deorali, Sindhupalchowk District; Dolakha and Singati, Dolakha District; Virkot and Chhaude, Dolakha District; Nepal;
Client: District Road Support Program, Swiss-Nepal Project (DRSP) / SDC;
Main Project Features: Geological condition survey and training to road engineers;
Position Held: Senior Engineering Geologist
Activities Performed: Responsibilities included (i) Preparation of geological map; (ii) Preparation of engineering geological map; (iii) Analysis of the slope stability condition of the project area and design of **slope stabilization works of road-side slope** including bio-engineering technique; (iv) Devise mitigation measures; and (v) Preparation of report.

Name of Assignment or Project: Countermeasure Work of Landslide Protectors in Hill Road (January, 2000 To March, 2000) for DPTC; and Study of Slope Instability of Syanjya District using GIS application (January, 1999 To December, 1999) for ICIMOD; Debris Flow Investigation of Shrawan Danda for DPTC/WRC (January To December, 1998) at Butwal-5, Rupandehi District;
Year: January 1999 To March 2000 (15 months-Intermittent)
Location: Jyoti Nagar, Butwal, Rupandehi District and Syangja District, Nepal;
Client: Water Induced Disaster Prevention Centre (DPTC) / WRC;
Main Project Features: Landslide study and devise slope stabilization measures in Hill Roads;
Position Held: Senior Engineering Geologist;
Activities Performed: Responsibilities included (i) Assessment of geomorphology and geo-technical setting of the project area, (ii) Preparation of geological map, engineering geological map, (iii) Analysis of the slope stability condition of the project area and design of **slope stabilization works of road-side slope** including bio-engineering technique, (iv) Preparation of soil distribution map, (v) Devise slope stabilization measures, (vi) Preparation of report.

Name of Assignment or Project: (i) Chhedegad-Jajarkot Road, Jajarkot District (January, 1998 To March, 1999); Surkhet-Dunne Road, Surkhet, Dailekh and Kalikot Districts (May, 1999 To July, 1999); Gorusinge-Sandhikharka road, Arghakhanchi District (November, 1998

To January, 2000); Shitalpati-Kharibot road, Salyan (November, 1998 To January, 2000);
Year: January 1998 To January 2001 (15 months-Intermittent)
Location: Various districts as listed above, Nepal;
Client: Department of Roads / SMEC International and CEMAT;
Main Project Features: Geological Inventory Survey, geological mapping and slope stability analysis along road;
Position Held: Senior Engineering Geologist;
Activities Performed: Responsibilities included (i) Geological Inventory Survey of road including documentation of slope stability condition along the alignment; (ii) Assessment of geomorphology and geo-technical setting of the project area, (iii) Preparation of geological map, engineering geological map, (iv) Analysis of the slope stability condition of the project area and design of **slope stabilization works of road-side slope** including bio-engineering technique, (v) Preparation of soil distribution map, hazard map, (vi) Construction material study, (vii) provide input for foundation design and preparation of report.

Name of Assignment or Project: Preliminary Study of Debris Flow and Landslide on the Kamala River Watershed (November, 1995 To March, 1996) and Lothar Khola and East Rapti River Watershed (November, 1994 To January, 1995);
Year: November, 1994 To March, 1996 (17 months)
Location: Sindhuli and Udaipur districts, Eastern Nepal;
Client: Water Induced Disaster Prevention Centre (DPTC) / WRC;
Main Project Features: Geological investigation and mapping for landslide and debris flow with study of watershed of the river system;
Position Held: Geologist;
Activities Performed: Responsibilities included (i) Assessment of geomorphology and geo-technical setting of the project area, (ii) Preparation of geological map, engineering geological map Analysis of the slope stability condition of the project area, (iii) Preparation of soil distribution map, hazard map; (iv) Construction material study, (iv) provide input for foundation design and preparation of report.

Expert's contract information:
(**email:** prakashulak@yahoo.com **Phone:** +977- 9841338417)

Certification:
I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience, and I am available to undertake the assignment in case of an award. I understand that any misstatement or misrepresentation described herein may lead to my disqualification or dismissal by the Client, and/or sanctions by the Bank.

Dr. Prakash Das Ulak		5/27/2019
Name of Expert	*Signature*	*Date*

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