



Government of Nepal
Ministry of Physical Infrastructures and Transport (MoPIT)
Singhadurbar, Kathmandu,
Nepal

INITIAL ENVIRONMENTAL EXAMINATION OF KISIPIDI (MAHADEVSTHAN) FLYOVER COMPONENT



Submitted to:
Government of Nepal
Ministry of Physical Infrastructures and Transport (MoPIT)
Singhadurbar, Kathmandu,
Nepal

Submitted through:
Geo-Environment and Social Unit (GESU)
Department of Roads
Baber Mahal, Kathmandu
Nepal

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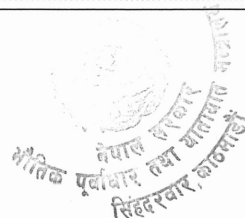
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Abbreviations

Ch:	Chainage
Ch.Na .Pa:	Chandragiri Nagarpalika
Cum:	Cubic meter
DIZ:	Direct Impact Zone
DOR:	Department of Roads
dBa:	Decibel
EMop:	Environment Monitoring Plan
EIA:	Environment Impact Assessment
GON:	Government of Nepal
GESU:	Geo-Environment and Social Units
HAC:	Hazama Ando Corporation
IEE:	Initial Environment Examination
IIZ:	Indirect Impact Zone
JYEN:	Japanese Yen
Leq:	Equivalent Continuous sound Level
MOSTE:	Ministry of Science Technology and Environment
NTCP:	Nagdhunga Tunnel Construction Project
Nrs:	Nepalese Rupees
Row:	Right of Way
Sqm:	Square meter
Tor:	Term of Reference
TRP:	Tribhuwan Raj Path
ZOI:	Zone of Impact

EXECUTIVE SUMMARY (NEPALI VERSION)

कार्यकारी सारांश

पृष्ठभूमि

किसिपिडी (महादेवस्थान) फ्लाईओभर कम्पोनेन्ट नागढुंगा सुरुङ्ग निर्माण परियोजना (NTCP) को एक उप-कम्पोनेन्ट हो जुन NTCP को निर्माण सुरु भएपछि शुरू गरिएको थियो। NTCP को मुख्य उद्देश्य त्रिभुवन राजपथ (TRP) मा सडकको ट्राफिक आवागमनमा सहज बनाउनु हो जुन काठमाण्डौ भित्र/बाहिर जाने मुख्य राजमार्ग हो। प्रस्तावित सडक चौराहा त्रिभुवन राजपथ (TRP) को चन्द्रागिरि नगरपालिका वडा नम्बर ५ किसिपिडीमा अवस्थित छ। सुरुङ्ग भएर आएको सडक बलम्बुमा त्रिभुवन राजपथमा जोडिँदा बन्ने चौराहा (Intersection) पहिले लेभल क्रसिङको रूपमा डिजाइन गरिएको थियो। तर उक्त राजमार्गमा सवारी साधनको चाप बढी हुने भएकाले लेभल क्रसिङमा सुरुङ्ग मार्ग तर्फ जाने र त्यहाँबाट आउने, तेस्तै साविकको थानकोट तर्फ जाने र त्यहाँबाट आउने सवारी साधनको भीडले गर्दा ट्राफिक जाम हुने आंकलन गरिएको छ। यससँगै सडक सुरक्षाको उच्च जोखिम हुनेछ। सडक सुरक्षा र जाम रहित सुचारु ट्राफिक आवागमन सुनिश्चित गर्न चौराहामा ग्रेडसेपरेसनको व्यवस्था (Grade Separation) अनुरूप किसिपिडी फ्लाईओभरप्रस्ताव गरिएको छ।

प्रस्तावक

किसिपिडी फ्लाईओभरको प्रवर्धकको रूपमा नेपाल सरकार, भौतिक पूर्वाधार तथा यातायात मन्त्रालय, सडक विभाग अन्तर्गत नागढुंगा सुरुङ्गमार्ग निर्माण आयोजना रहेको छ।

परामर्शदाताहरू

निप्पोन कोइ कम्पनी लिमिटेड, जापान, एट जापान इन्जिनियरिङ कन्सल्टेन्ट्स इन्क, जापान र निप्पोन सिभिक कन्सल्टिङ इन्जिनियर्स कम्पनी लिमिटेड जापानको, साथमा जिगोसिई कन्सल्टेन्ट्स (प्रा) लि, काठमाडौं र ईटेको नेपाल (प्रा) लि काठमाण्डौ, नागढुंगा सुरुङ्ग निर्माण परियोजनाको लागि तोकिएको परामर्शदाता (The Engineer) हो। यस IEE अध्ययनको तयारी गर्न जिम्मेवारी पनि यसैलाई सम्प्रेषित छ। यस आयोजनामा जापान सरकारको ऋण सहयोग रहेको हुँदा, IEE अध्ययनले JICA को वातावरणीय सुरक्षा दिशानिर्देशहरूको पनि पालना गर्नुपर्नेछ।

IEE को तर्कसंगतता

नेपालको वातावरणीय संरक्षण नियमावली, २०७७ अनुसार दुई लेगको फ्लाईओभर निर्माणका लागि प्रारम्भिक वातावरणीय परीक्षण (IEE) अनिवार्य छ। परियोजना कुनै पनि संरक्षित क्षेत्रहरू जस्तै राष्ट्रिय निकुञ्ज, संरक्षण क्षेत्र, वन्यजन्तु अभयारण्य, मध्यवर्ती क्षेत्र, सिमसार क्षेत्र, ऐतिहासिक र पुरातात्विक रूपमा महत्वपूर्ण साइटहरू, वा अन्य कुनै पनि वातावरणीय रूपमा संवेदनशील र / वा नाजुक क्षेत्रहरूमा अवस्थित छैन। तसर्थ, अध्ययनको IEE स्तर वातावरणीय संरक्षण नियमावली, २०७७ को पालना गरेमा पर्याप्त हुनेछ।

IEE का उद्देश्यहरू

किसिपिडी फ्लाईओभर निर्माण आयोजनाको (बलम्बु) IEE को मुख्य उद्देश्य परियोजनाको निर्माण र सञ्चालनसँगै भौतिक, रासायनिक, जैविक, सामाजिक, सांस्कृतिक लगायत वातावरणका विभिन्न पक्षहरूको संरक्षण गर्नु हो। IEE पर्याप्त छ वा छैन परियोजना कार्यान्वयनको लागि निश्चित हुन पनि जरुरी छ।

परियोजनाको विवरण

यो आयोजना बागमती प्रदेशको चन्द्रागिरि नगरपालिकाको वडा नम्बर ५ र वडा नम्बर १२ मा मुख्यतया त्रिभुवन राजपथ (TRP) को छेउमा अवस्थित छ। फ्लाईओभरको कुल लम्बाइ ६१३ मिटर छ। फ्लाईओभरको पुल ७.५० मिटर चौडाइ र १२८ मिटर लम्बाइको हुनेछ। फ्लाईओभरको सुरुवात त्रिभुवन राजपथको किसिपिडी बाट सुरु हुन्छ। यद्यपि त्रिभुवन राजपथको सडक सिमान्कन ५० मि

भनियता पनि हाल उक्त राजमार्गमा कुल २२ मिटर चौडाईको कालो पत्रे सडक बनेको छ। तर नेपाल सरकारको तर्फबाट १६ मिटर सडक चौडाईको मात्र मुआब्जा दिएको हुनाले फ्लाईओभर खण्डमा अवस्थित सडक चौडाई २२ मिटर भएता पनि सर्वोच्च अदालतले १६ मिटरभन्दा बढी सडक विस्तारका लागि आवश्यक पर्ने जग्गा वा सम्पत्ति क्षतिपूर्ति दिनुपर्ने फैसला गरेको थियो । त्यसैले आयोजनाका लागि १६ मिटरभन्दा बढीको जग्गा अधिग्रहण गर्नुपर्ने हुन्छ।

परियोजना क्षेत्रको स्थिति।

बलम्बु फ्लाई ओभर निर्माणका लागि ३५८ टन स्ट्रक्चरल स्टील, १,१३४ घ.मी. कंक्रीट, २६० टन रिइन्फोर्समेन्ट स्टील, ४,१५४ घ.मी. बेस कोर्स, ६,१५४ घ.मी. सब-बेस कोर्स र ९६० वर्गमिटर ५० मिमी बाक्लो वेयरिङ कोर्स आवश्यक हुनेछ। ढुङ्गा, वालुवा, रोडा सुरुङ्गाबाट उपलब्ध हुनेछ। सिमेन्ट र रिबार स्वदेशबाट तथा बिटुमिन विदेशबाट ल्याइनेछ। कुल निर्माण लागत रु. ८३,९०,०१८६.४५ अमेरिकी डलर १,७४६,८१७.७५ र जापानी येन १०९,७९६,३६३।०० रहेको छ। दक्ष जनशक्ति २५८५ व्यक्ति-दिन र अदक्ष ४२४ व्यक्ति-दिन आवश्यक पर्ने अनुमान गरिएको छ । किसिपिडी फ्लाईओभर (बलम्बु) NTCP को मुख्य निर्माण ठेक्का अन्तर्गत सम्पन्न हुनेछ। मुख्य NTCP ठेक्कामा भएको व्यवस्था किसिपिडी फ्लाईओभरका लागि पनि लागू हुनेछ।

पद्धति

यो IEE प्रतिवेदन आवश्यक डेस्क र फिल्ड अध्ययन र परिभाषित प्रक्रिया अनुसार तयार गरिएको छ साथै भौतिक योजना तथा यातायात मन्त्रालयले २०७८।१।१५ मा स्वीकृत गरेको TOR को आधारमा नेपाल सरकारको वैधानिक आवश्यकता पूरा गरिनेछ। प्रारम्भिक वातावरणीय परीक्षण प्रतिवेदनको निष्कर्ष र सोको अध्ययन अवधिमा आयोजना क्षेत्रबाट संकलन गरिएको जानकारी र पुनर्वस सर्वेक्षण र विस्तृत सर्वेक्षणमा काम गर्ने सामाजिक र प्राविधिक टोलीहरूद्वारा पूरक माध्यामिक जानकारीको विश्लेषणमा आधारित छ।

अवस्थित वातावरणीय अवस्था

आयोजना क्षेत्रको जग्गा प्रयोग मुख्यतया अवस्थित सडकसँगै शहरी परिवेश हो। जलवायु अवस्था sub-tropical छ। प्रस्तावित फ्लाई ओभरबाट एक स्थानीय नाली बगेको छ। यस क्षेत्रमा बाक्लो Semi-consolidated fluvio-lacustrine sediment ले ढाकिएको यी बाक्लो sediment मुख्यतया वरपरका पहाडहरूबाट निस्केको देखिन्छ।

आयोजना क्षेत्र सहरी वातावरणीय परिवेशमा अवस्थित भएकाले आयोजना क्षेत्र र नजिकै कुनै जंगल छैन। आयोजना क्षेत्र र वरपरको क्षेत्रमा कुनै पनि वन्यजन्तु छैन । आयोजना जैविक वा पुरातात्विक संवेदनशील क्षेत्रमा अवस्थित छैन।

आयोजना त्रिभुवन राजपथसंग चन्दागिरि नगरपालिकाको वडा ५ र वडा नं १२को किसिपिडी बस्तीको ८१ घरधुरीको ४७३ जना असर गर्नेछ। जसमध्ये ७४ % नेवार, १८ % बाह्यजन, क्षेत्री, ६ % अन्यजनजाती र २ % दलित रहेका छ।

सर्वेक्षण गरिएको घरपरिवारको आयको प्रमुख स्रोत व्यापार/ व्यवसाय, भाडा, सेवा र रेमिट्यान्स हुन्। आयोजना प्रभावित जनसंख्याको वार्षिक औसत प्रतिव्यक्ति आय रु.१४,३९६।०० छ जसले राम्रो आर्थिक अवस्था जनाउँछ। आयोजना प्रभावित जनसंख्याको समग्र साक्षरता दर ८४ प्रतिशत रहेको छ। आयोजना क्षेत्रमा स्वास्थ्य सेवा, सडक सञ्जाल र सञ्चार सुविधाको राम्रो पहुँच छ।

पर्यावरण प्रभाव

लाभदायक प्रभावहरू

निर्माणको क्रममा प्रमुख प्रत्यक्ष लाभदायक प्रभावहरू मध्ये एक रोजगारी सिर्जना हो। आयोजनाका लागि २५ सय ८५ व्यक्ति दिनको दक्ष र ४ हजार २ सय ४१ व्यक्ति दिनको अदक्ष जनशक्ति आवश्यक पर्ने छ । डकर्मी, कन्क्रिटिङ, ग्याबियन बुनाई, सडक कालो पत्र गर्ने। त्रिभुवन राजमार्गसंग जोडिएको जग्गाको प्रस्तावित मुआब्जा दर प्रति आना ५२ लाख रुपैयाँ रहेको छ जुन काठमाडौँ उपत्यकामा हालसम्मकै उच्च हो । आयोजनाको मुख्य फाइदा भनेको कुनै पनि ट्राफिक जाम बिना ट्राफिकको सहज प्रवाहमा सुधार हुनेछ। सवारी साधनको सञ्चालन लागत घटाएर ढुवानी खर्च पनि कम हुनेछ । यात्रा सहज हुनेछ र यात्रा समय बचत हुनेछ। त्यसैगरी, सवारी साधनको मर्मत संभार खर्च कम हुनेछ र सवारी साधनको इन्धन खपत पनि कम हुनेछ जसले गर्दा यी वस्तुहरूको आयातमा विदेशी कडा मुद्रामा बचत हुनेछ।

प्रतिकूल प्रभाव र न्यूनीकरण उपायहरू

आयोजनाको मुख्य प्रतिकूल असरले निर्माण कार्यको असर बाहेक ८१ व्यक्तिको निजी जग्गाको ४,८५३.९९ वर्ग मिटर र ५६ वटा संरचनाहरूले क्षतिपूर्ति पाउनेछन्। परियोजना क्षेत्रमा अवस्थित सडक २२ मिटर छ। तर त्रिभुवन राजमार्ग पीडितको निवेदनमा सर्वोच्च अदालतले केन्द्र लाइनभन्दा ८.० मिटर माथिको जग्गाको मुआब्जा तिर्न आदेश दिएको छ। आयोजनाले अदालतको फैसलालाई सम्मान गर्दै सडक केन्द्र लाइनबाट ८ मिटरभन्दा माथिको जग्गाको मुआब्जा तिर्नेछ। क्षतिपूर्तिको दर राजमार्ग संग जोडिएको प्रतिआना रु ५२ लाख हो जुन कुनै पनि विकास आयोजनाका लागि सरकारले उपलब्ध गराएको सबैभन्दा उच्च क्षतिपूर्ति दर हो। जग्गाको मुआब्जा प्रभावित सबै संरचनालाई सहरी विकास तथा भवन विभागको मापदण्ड अनुसार क्षतिपूर्ति पनि दिइनेछ। यस परियोजनाले व्यावसायिक उद्यमीहरूको लागि विस्थापन लागत पनि तिर्नेछ। यस कम्पोजेन्टको लागि कुल क्षतिपूर्ति लागत नेरु ८७ करोड ९८ लाख ९३ हजार ६ सय ७० अनुमान गरीएको छ। यस मध्ये जग्गाको मुआब्जामा रु ७३,४५,४४,९१५।६६, घरहरूको मुआब्जामा रु १४,१७,८५,७५७।७६ र व्यवसायिक उद्यमीहरूको मुआब्जामा रु ३५,६३,०००।०० अनुमान गरीएको छ।

त्यस बाहेक आयोजनाले ४० वटा बिजुलीको पोल, १० वटा टेलिफोन पोल ९४ मिटर ढल, केही internet लाईनहरू र केही भूमिगत दूरसञ्चार केबललाई असर गर्ने छ जसलाई सम्बन्धित संघ संस्थाको पदाधिकारीसँग परामर्श गरी स्थानान्तरण गरिनेछ।

किसिपिडी (महादेवस्थान) फ्लाईओभर NTCP को उपकम्पोजेन्ट हो-, यो उपकम्पोजेन्टले छुट्टै श्रम शिविर र कार्य शिविर सञ्चालन - गर्नेछैन। NTCP को टनेलबाट निस्केको मकबाट आवश्यक निर्माण सामग्रीहरू जस्तै ढुङ्गा, एग्रीगेट्स र बालुवा आपूर्ति गरिनेछ। परियोजनाले बिटुमेन र पेट्रोलियम पदार्थको व्यवस्थापन गर्दा रासायनिक वातावरणमा केही प्रभाव पार्नेछ जसको प्रभावकारी व्यवस्थापन गरिनेछ।

सार्वजनिक परामर्श र सार्वजनिक सुनुवाई

प्रस्तावित फ्लाईओभर नजिकै बसोबास गर्ने स्थानीय जनता, स्थानीय संघ संस्थाका सदस्य र स्थानीय नेताहरूसँग यस उप-आयोजनाबाट हुन सक्ने सम्भावित फाईदा र प्रतिकूल प्रभावहरूको पहिचान गर्न IEE प्रतिवेदनको मस्यौदा तयार गर्ने क्रममा सार्वजनिक परामर्श गरिएको थियो। मस्यौदा IEE प्रतिवेदन तयार भएपछि, सार्वजनिक सुनुवाई र सम्बन्धित सरोकारवालाहरूसँगबाट लिखित राय लिनको लागि सार्वजनिक सूचना नेपाल समाचार पत्र, एक राष्ट्रिय नेपाली दैनिक पत्रिका २०८१/१०/२३ प्रकाशित गरिएको थियो। मस्यौदा IEE रिपोर्ट सहित कार्यकारी सारांश, पहिचान प्रभावहरू, सिफारिस गरिएको लाभ वृद्धि र न्यूनीकरण उपायहरू र EMP टिप्पणी र सुझावको सार्वजनिक खुलासाको लागि तयार गरिएको थियो। IEE प्रतिवेदनमा सरोकारवाला निकायहरूसँगबाट टिप्पणी र सुझावहरू माग गर्दै थप ७ दिनको सूचना राष्ट्रिय दैनिक पत्रिका नेपाल समाचार पत्रमा २०८१/११/०४ मा प्रकाशित भएको थियो। चन्द्रागिरि नगरपालिका र चन्द्रागिरि नगरपालिकाको वडा नं ५ र १२ को कार्यालयबाट आयोजनाले आयोजना कार्यान्वयनका लागि सुझाव र सुझाव प्राप्त गरेको थियो। IEE प्रतिवेदनमा GESU, DCID बाट सुझाव र प्रतिक्रिया प्राप्त भएको थियो। प्राप्त सुझावहरू समावेश गरी यो प्रारम्भिक वातावरणीय परीक्षण (IEE report) तयार गरी स्विकृतिको लागि मन्त्रालयमा पेश गरिएको छ।

वैकल्पिक विश्लेषण

प्रस्तावित फ्लाईओभरको विकल्प त्रिभुवन राजमार्गबाट सुरुङ्ग मार्ग जाने सडक चौराहमा लेभल क्रसिङ राख्दा काठमाडौं उपत्यकाबाट भित्रिने र बाहिरिने सवारी साधनहरूको चाप उच्च हुने हुनाले लेभल क्रसिङको चौराहा चोकमा ट्राफिक जाम निम्त्याउन सक्छ। तसर्थ उक्त स्थानमा फ्लाईओभर प्रस्ताव गरिएको छ।

निर्माण प्रविधिमा

शिनसो पाइल फाउन्डेसन (Shinso Pile Foundation) अन्य विकल्पहरू भन्दा उपयुक्त देखिएको छ। Flyover को राम्पको (Ramp) लागि Reinforced Soil Wall कंक्रीटको पर्खालभन्दा राम्रो विकल्प देखिएको छ। त्यस्तै फ्लाईओभर संरचनाका लागि स्टील गर्डर उपयुक्त जनाइएको छ।

नेपाल सरकार
मौलिक पूर्वाधार तथा यातायात विभाग
सिंहदरबार, काठमाडौं

वातावरण व्यवस्थापन योजना:

यस प्रतिवेदनमा सम्भावित प्रभावहरू र तिनीहरूको न्यूनीकरणका उपायहरू, अनुगमन विधिहरू, र अध्याय 9 मा तालिकाको रूपमा पहिचान गरिएका मुद्दाहरू सहित एक वातावरणीय व्यवस्थापन योजना (EMP) प्रस्ताव गरिएको छ। साथै, वातावरणीय न्यूनीकरण उपायहरू कार्यान्वयन गर्न जिम्मेवार निकायहरू र अनुगमन यस वातावरणीय व्यवस्थापन योजना मा पहिचान गरिएको छ। साथमा भौतिक, जैविक, सामाजिक आर्थिक र सांस्कृतिक वातावरण का विभिन्न अनुगमन सूचकहरूपनि पहिचान गरिएका छन्।

अनुगमन गर्नुपर्ने कुराहरू:

परामर्शदाता टोलीसँग नागदुङ्गा सुरुङ्ग निर्माण आयोजनाको वातावरणीय अनुगमनका लागि एक वरिष्ठ वातावरण विशेषज्ञ र एक सहायक वातावरणीय अधिकारी छन्। यो टोलीले फ्लाईओभरको वातावरणीय अनुगमनको जिम्मा पनि लिनेछ। टोलीले अनुपालन र अनुगमन गर्नेछ। टोलीले वातावरणीय वृद्धि र न्यूनीकरण उपायहरूको कार्यान्वयनको पनि पर्यवेक्षण गर्नेछ, अनुपालन अनुगमन सञ्चालन गर्नेछ, र प्रभाव अनुगमन पनि गर्नेछ। टोलीले स्थानीय तहका संघसंस्था र DOR को GESU सँग पनि समन्वय गर्नेछ। तिनीहरू प्रतिवेदनहरू तयार गर्न र पेश गर्न जिम्मेवार हुनेछन् जसमा वातावरणीय वृद्धि र न्यूनीकरण उपायहरू र वातावरणीय अनुगमनको कार्यान्वयनको अवस्था समावेश हुनेछ।

निष्कर्ष:

ट्राफिक जाम कम गर्ने यो आयोजना काठमाडौंको पहिलो फ्लाईओभर हो जसले सडक सुरुङ्गमा सीधा पहुँच प्रदान गर्नेछ। आयोजना (NTCP) प्रस्तावित उप-अवयव (Sub-component) किसिपिडी फ्लाईओभरले ८२ जनाको निजी जग्गा ४८५३.९९ बर्ग मिटर र ५६ वटा संरचनालाई असर गर्ने छ। यी क्षतिहरूको लागि उचित क्षतिपूर्तिका उपायहरू प्रस्ताव गरिएको छ। यसबाहेक आयोजनाले कम महत्व र छोटो अवधिको साथै कम गर्न मिल्ने प्रकृतिका केही निर्माण सम्बन्धी प्रतिकूल असरहरू पनि पर्नेछ। पहिचान गरिएका र अनुमान गरिएका प्रभावहरूलाई ध्यानमा राखी, वातावरणीय सुधार र न्यूनीकरणका उपायहरू कार्यान्वयन गरी वातावरणीय अनुगमन गरिएमा यस परियोजनालाई वातावरणीय आधारमा कार्यान्वयन गर्न सकिन्छ। तसर्थ, यस अध्ययनले देशको त्यो भागको समग्र सामाजिकआर्थिक विकासका लागि परियोजनालाई स्तरोन्नति गर्न सिफारिस गर्दछ। प्रस्तावित सडक उप-परियोजनालाई न्यूनीकरण उपायहरू र वातावरणीय व्यवस्थापन योजना समावेश गरी कार्यान्वयन गर्न सिफारिस गरिएको छ।

EXECUTIVE SUMMARY

Background

Kisipidi (Mahadevsthan) Flyover component is a sub-component of the Nagdhunga Tunnel Construction Project (NTCP) which was introduced after the commencement of the construction of NTCP. The main objective of the NTCP is to ease the traffic movement in TRP which is the main highway leading in/out of Kathmandu. The proposed intersection is located at Kisipidi; ward no 5 of Chandragiri Municipality of Tribhuvan Raj Path (TRP). Earlier the proposed intersection between the NTCP road and TRP was a level crossing earlier. Since the number of vehicles passing is significantly high most of the time, there will be traffic congestion during the divergence of vehicles at the level crossing. Along with that, there will be a high risk of road safety. To ensure road safety and smooth traffic movement Kisipidi (Mahadevsthan) flyover is proposed at the intersection.

Proponent

The Proponent of the Kisipidi (Mahadevsthan) Flyover is the Nagdhunga Tunnel Construction Project, The Department of Roads (DoR).

Consultants

The joint venture of Nippon Koei Co Ltd, Japan, Eight Japan Engineering Consultants Inc, Japan, and Nippon Civic Consulting Engineers Co. Ltd Japan in association with GEOCE Consultants (P) Ltd, Kathmandu, and ITECO Nepal, Kathmandu is the nominated Engineer for the Construction of Nagdhunga Tunnel Construction. The Engineer is also responsible for preparing the IEE study as per the EPR of Nepal. As the project is being funded by the JICA. The IEE Study will also have to comply with JICA environmental safeguard guidelines.

Rationality of IEE

As per the EPR 2077, the Initial Environmental Examination (IEE) is mandatory and obligatory for the construction of a double-lane flyover. The project is not located in any of the protected areas such as national parks, conservation areas, wildlife sanctuaries, buffer zones, wetlands, historically and archaeologically important sites, or any other environmentally sensitive and/or fragile areas. Hence, the IEE level of the study would be sufficient to comply with EPR 2077.

Objectives of IEE

The main objective of IEE of the Kisipidi (Mahadevsthan) Flyover Construction Project is to safeguard the different aspects of the environment namely physical, chemical, biological, social, and cultural along with the construction and operation of the project.

Project Description

The project is located in ward no 5 and ward no 12 of the Chandragiri Municipality of Bagmati Province mainly along the Tribhuvan Raj Path (TRP). The total length of the Flyover is 613 m. The bridge of Kisipidi (Mahadevsthan) Flyover will be 7.50 m in width and 128 m in length. The ramp of the flyover starts at the chainage of TRP 8+300. Though the RoW of TRP is supposed to be 50 m, the existing road width at the Fly over section is 22 m (11m from the road center line). The Supreme Court had made a verdict that any land or property required for the road extension beyond 16 m needs to be compensated. Therefore, the project requires acquiring land beyond 16 m.

The contractor has made provision for the storage of construction materials at the different storage yards. Apart from that right of way of the approach road is 50 m. This area could also be used as a temporary storage site.

Solid wastes from the work site and labor camps are collected by the Chandragiri Municipality wastes collector. Whereas the provision of septic tanks and soak pits are made for the disposal of liquid wastes from the work camp and labor camps. The construction wastes will be disposed of at the designated sites only.

A crushing plant is located at Totipakha. The plant will be operated from 8.00 AM to 6.0 PM only.

The Kisipidi (Mahadevsthan) Flyover would require 358 tons of structural steel, 1134 cum of concrete, 260 tons of reinforcement steel, 4154 cum of base coarse, 6154 cum of sub-base coarse, and 960 sqm of 50 mm wearing coarse. The sand and aggregates will be produced at the site itself from the muck of the tunnel whereas the materials like cement and rebar will be directly procured from the manufacturers within the country and bitumen will be imported from a foreign country. The total construction cost of the Project is NRs 83,900,186.45, US \$ 1,746,817.75 and Japanese Yen 109,796,363.00. As the project is being funded under the loan assistance of the Government of Japan, the estimate is being prepared under 3 currencies. Total skilled and unskilled human resources requirement is estimated to be 2585 person-days and 4241 person-days respectively.

The Kisipidi (Mahadevsthan) Flyover will be executed under the main construction contract of NTCP. The provision made in the main NTCP contract will be applicable for component also.

Methodology

This IEE report has been prepared following necessary desk and field study and defined procedure and also based on the ToR approved on December 29 2024 by the Ministry of Physical Planning and Transport to fulfill the statutory requirement of GoN. The findings and conclusions of the initial environmental examination report are based on the analysis of the information collected from the field during the study period and secondary information supplemented by the social and technical teams working on the resettlement survey and detail survey.

Existing Environmental Condition

The land use of the project area is mainly urban setting along the existing road. The climatic condition is sub-tropical. A local drain cross through the proposed flyover. The area is covered by thick semi-consolidated fluvio lacustrine sediments. Based on the borehole log carried out by DMG in 2005 at the central part of the valley, the maximum depth of the valley sediments is more than 550 m. These thick sediments are mainly derived from the surrounding hills by the ancient drainage channel system.

As the project area is located in the urban environment setting, the project area has no forest either in the project area or nearby vicinity. There is no wildlife in the project area and its vicinity. The project is not located in a biological or archeologically sensitive area.

The project is located along the TRP of ward no 5 and ward no 12 of Chandragiri Municipality at the Kisipidi settlement. The project will be affecting 81 households with a population of 473. Among them 74.24 %, are from newar ethnic group and 19.18 are Brahmin/cherty 6.06 are janjati and 1.52 are dalit.

The major sources of household income of the surveyed households are trade/business, rent, services, and remittance. The average per capita income of project affected population is NRs. 214,396 indicating sound economic condition. The overall literacy rate of project affected population is 84.66 percent. The project area has good access to health service, road networks, and communication facilities.

Environmental Impact

Beneficial Impacts

One of the major direct beneficial impacts during construction is the creation of employment. The project would require 2585 person-days of skilled and 4241 person-days of unskilled human resources. Local people will get an opportunity in some specialized works such as masonry, concreting, gabion weaving, road pavement, and bio-engineering. The proposed compensation rate for the land located along the TRP is Rs 52.00 lakhs per anna which is the highest compensation paid so far in the Kathmandu Valley. The main benefit of the project would be the improvement in the smooth flow of traffic without any traffic congestion. This will provide better service to the inbound and outbound vehicular traffic. The vehicle operating cost will be reduced thereby transportation costs will be decreased. The journey will be comfortable and the travel time will be saved. Similarly, the wear and tear of the vehicles will be less, and fuel consumption of the vehicles will also be less resulting in savings in the hard currency for the import of these commodities

Adverse impact and Mitigation Measures

Apart from the impact of the construction-related activities, the main adverse impact of the project would loss of 4853.99m² of private land belonging to 82 people, 56 structures which will be compensated. The existing road width in the Project area is 22.0 m. But on the petition of the affected people of TRP, the Supreme Court made a verdict to pay the compensation for the land beyond 8.0 m from the road center line. The Project respected the court verdict and land compensation will be paid for the land beyond 8.0 m from the road center line. The rate of compensation for land adjacent to the highway is Rs 57 lakhs per anna (31.81 m²) which is the highest compensation rate that has been provided by the Government for any development project. All the affected structures will also be compensated as per the norms of the Department of Urban Development and Building. The project will also be paying displacement costs for business entrepreneurs. The total compensation cost for this component is NRs 879,893,673.00. Out of that Rs 734,544,915.66 will be for the land compensation, Rs 141,785,757.76 will be for the structural compensation and Rs 3,563,000.00 will be for the business loss compensation.

Apart from that project will be affecting no of 40 electric poles, 10 no of telephone poles, 94 m of sewer drains, some internet connection lines and some underground telecommunication cables which will be relocated in consultation with the respective authority.

Kisipidi (Mahadevsthan) Flyover is a sub-component of the NTCP, this sub-component will not be operating a separate labor camp and work camp. The required construction materials such as stone, aggregates, and sand will be supplied from the tunnel muck of NTCP.

The Project will be having some impact on the chemical environment during the handling of the bitumen and petroleum products which will be effectively managed.

Public Consultation and Public Hearing

A public consultation was done with the local people living near the proposed flyover, members of local organizations and local leaders during the preparation of draft IEE report to identify the possible beneficial and adverse impacts due to this sub-project. After the preparation of the draft IEE report, public notice was published in Nepal Samachar Patra, a national daily newspaper on 5th February 2025 for a public hearing and seeking written opinions from concerned stakeholders. Draft IEE report along with executive summary, identified impacts, recommended benefit augmentation and mitigation measures and EMP was prepared for public disclosure for comments and suggestion. Further 7 days' notice was published in Nepal Samachar Patra, a national daily newspaper on 16th February 2025 seeking comments and suggestions from the concern bodies on the IEE report. The project received the suggestions and recommendation for the implementation of the project from office of ward no 5 and 12 of Chandragiri Municipality and Chandragiri Municipality. Final IEE Report is prepared and submitted to MoPIT through GESU, DOR for the approval process.

Alternative Analysis

The alternative to the proposed Flyover is the level crossing at the intersection of Tunnel road and TRP. As the traffic flow moving in/out from the Kathmandu valley is significantly high, the level crossing could lead to traffic congestion at the intersection. Hence level crossing intersection is ruled out.

Environmental Management Plan

An Environmental Management Plan (EMP) has been proposed in the present report including issues identified as possible effects and impacts, measures for their mitigation, monitoring methods, and schedule in Chapter 9. In addition, agencies responsible for executing environmental mitigation measures and monitoring have been identified in the EMP. Different monitoring indicators on the physical, biological, socio-economic, and cultural environment have also been identified.

Matters to be monitored:

The Consultant team has a sr. environmental specialist and an assistant environmental officer for the environmental monitoring of the Nagadhunga Tunnel Construction Project. This team will also be responsible for the environmental monitoring of the Flyover. The team carry out compliance monitoring. The team will also supervise the implementation of the environmental enhancement and



mitigation measures, conduct compliance monitoring, and will also carry out impact monitoring. The team will also coordinate with local-level organizations and GESU of the DOR. They will be responsible for the preparation and submission of reports which shall include the state of implementation of the environmental enhancement and mitigation measures and environmental monitoring.

Conclusion:

The project is the first flyover in Kathmandu to ease the traffic congestion which will provide direct access to the road tunnel. The proposed sub-component of the NTCP, Kisipidi (Mahadevsthan) Flyover will be affecting 4853.99 m² of private land of 82 people and 56 structures which are the major impact. Good compensatory measures have been proposed for these losses. Apart from that project will have some construction-related adverse impacts of low significance and short term, as well as of reversible nature.

Taking into consideration the impacts identified and predicted, this project could be implemented on the environmental ground provided that environmental enhancement and mitigation measures are implemented and environmental monitoring is conducted. And hence, this study recommends to upgrading the project for the overall socio-economic development of that part of the country. The proposed road sub-project is recommended for implementation with the incorporation of mitigation measures and the environmental management plan.

1 NAME AND ADDRESS OF THE INSTITUTION PREPARING THE REPORT

1.1 NAME OF PROPOSAL

The name of the Report is " Initial Environmental Examination of Kisipidi (Mahadevsthan) Flyover Component: Nagdhunga Tunnel Construction Project".

1.2 PROPONENT AND ADDRESS

The Proponent is the Nagdhunga Tunnel Construction Project, The Department of Roads (DoR). DoR is the leading agency for road development under the Ministry of Physical Planning and Transport. (MoPIT) and is responsible for translating government policies for the road sub-sector into the provision of services. The services it provides include planning, design, construction, and maintenance of the Strategic Road Network, and provisions to ensure a reasonable level of safety for all road users.

The address of Proponent is:

Nagdhunga Tunnel Construction Project (NTCP),
Department of Roads
Baber Mahal, Kathmandu, Nepal.
Phone/ Fax 977-1-5261024

1.3 NAME OF THE CONSULTANTS

The joint venture of Nippon Koei Co Ltd, Japan, Eight Japan Engineering Consultants Inc, Japan, and Nippon Civic Consulting Engineers Co. Ltd Japan in association with GEOCE Consultants (P) Ltd, Kathmandu, and ITECO Nepal, Kathmandu is the nominated Engineer for the Construction of Nagdhunga Tunnel Construction. The Engineer is also responsible for preparing IEE study as per the EPR of Nepal. As the project is being funded by the JICA. The IEE Study will also have to comply with JICA environmental safeguard guidelines.

Address of the Consultant:

Joint Venture of

NIPPON KOEI CO., LTD.,

NIPPON KOEI CO., LTD. Japan

EIGHT-JAPAN ENGINEERING CONSULTANTS INC, Japan

NIPPON CIVIC CONSULTING ENGINEERS CO., LTD., Japan

In Association with

GEOCE Consultants (P) Ltd., Kathmandu, Nepal

ITECO Nepal (P) Ltd, Kathmandu, Nepal

Phone: 01 4310193 Fax

Email: jv-nk.ejec.ncc@nkntcp.com.np

The study team of the IEE report preparation is presented in Table 1.1

Table 1-1: IEE Study Team

SN	Name of Team Member	Position	Educational Qualification	Work Experience	IEE/EIA Studies	Remarks (As per EPR)
1.	Subarna B Joshi	Environmental Specialist / Team Leader	• ME Environmental • BE Civil	39 years	32	Schedule 13.1
2.	Utsav Subedi	Highway Engineer	• M. Sc in Construction Management, Pokhara University, 2012 • B.Sc. in Civil Engineering, Tribhuwan University, 1998	22 years	4	Schedule 13.2
3.	Dr. Rabindra Kumar Shrestha	Biologist	• Ph. D. in Indigenous Agro-forestry Practices and Soil Conservation, University of Agriculture Sciences, Vienna, Austria, 1994 - 1997. • M. Sc. In Environmental Forestry, University College of North Wales, Bangor, U. K., 1986 - 1988. • P. G. Diploma in Forestry (AIFC), Indian Forest College, Forest Research Institute, Dehradun, India, 1974 - 1976	42 years	9	Schedule 13.3
4.	Prof. Dr. Vishnu Dongol	Geologist	• Ph.D. (Geology) Azerbaijan State University, Baku, 1989 • M.Sc. (Geology) Azerbaijan State University, Baku, 1980	40 years	3	Schedule 13.4
5.	Padam Raj Sharma	Sociologist / Resettlement Expert	• M.A. in Sociology, Tribhuwan University, Nepal, 2000 • Bachelor of Arts (B.A.), Tribhuwan University, Nepal, 1995	20 years	11	Schedule 13.6
6.	Madhab Raj Ghimire	Policy Specialist	• LLM, Master of European Regulation Network Industries (MERNI), University of Bonn, Bonn, Germany, 2009 • Bachelor's Degree in Law (Company Law, Contract Law, International Law, Environmental Law), Tribhuwan University, Kathmandu, Nepal, 1998	20 years	5	Schedule 13.9

The Consultant will also mobilize necessary assistants and other support staff to collect the field level data, verify secondary information, and data analysis.

2 THE PROPOSAL

2.1 GENERAL INTRODUCTION

The Kisipidi (Mahadevsthan) Flyover will be constructed in Bagmati Province, Kathmandu District, within Chandragiri Municipality, Ward No. 5. This flyover is a component of the NTCP, designed to connect the Tribhuvan Raj Path (TRP) with the eastern approach road of the Nagdhunga Tunnel. The flyover will be built along the existing TRP at the Kisipidi (Mahadevsthan) intersection, providing direct access to the tunnel without traffic congestion.

2.2 RELEVANCY OF THE PROPOSAL

The primary objective of the NTCP is to ease traffic movement on the TRP, which serves as the main highway leading in and out of Kathmandu. Previously, the proposed intersection at Kisipidi (Mahadevsthan) was a level crossing, leading to significant traffic congestion due to the high volume of vehicles. Additionally, the level crossing posed a high risk to road safety. To enhance road safety and ensure smooth traffic movement, the Kisipidi (Mahadevsthan) Flyover is proposed at this intersection.

2.3 OBJECTIVES OF PROPOSAL

The main objectives of this proposal are:

- To construct a double-lane flyover to facilitate the smooth movement of road traffic to and from the proposed Nagdhunga Tunnel.
- To comply with the Environmental Protection Rules (EPR) of Nepal (2077).
- To provide a direct and congestion-free access route for vehicles traveling from Kathmandu toward the tunnel approach road.

2.4 RATIONALITY OF IEE

Conducting an Initial Environmental Examination (IEE) is a mandatory requirement under EPR 2077, Schedule 2 (Gha), Road Sector (6), Rule 3, which specifies that an IEE is necessary for flyover construction intended for the operation of four-wheel vehicles.

The project is not located within any protected areas such as national parks, conservation areas, wildlife sanctuaries, buffer zones, wetlands, historically or archaeologically significant sites, or any other environmentally sensitive or fragile regions. Hence, an IEE is deemed sufficient to comply with EPR 2077.

This IEE report is prepared in accordance with the format specified in Schedule 1, Rule 7, Sub-rule 5 (Kha) and Rule 5.1(b) of EPR 2077, following the template for IEE of Roads and Bridges provided by GESU, DOR.

As the project is funded by foreign investment, this IEE has been prepared in English, in compliance with Rule 7, Sub-rule 8 of EPR 2077, which allows documents to be in English for foreign-funded projects.

The Terms of Reference (TOR) was originally approved for the IEE of the Balambhu Flyover. However, upon formal written request from the office of Ward No. 5 of Chandragiri Municipality, the flyover has been renamed as the Kisipidi (Mahadevsthan) Flyover.

2.5 OBJECTIVES OF IEE

The IEE for the Kisipidi (Mahadevsthan) Flyover Construction Project aims to safeguard various environmental aspects during the construction and operation phases. The specific objectives include:

- Collecting baseline information on the physical, biological, socio-economic, cultural, and chemical environment of the project area.
- Assessing, analyzing, and evaluating the project's impact on these environmental factors.
- Identifying and implementing enhancement measures for beneficial impacts and mitigation measures for adverse impacts.
- Preparing and implementing an Environmental Management Action Plan (EMAP) and an Environmental Monitoring Plan (EMoP).
- Providing decision-makers with comprehensive information and suggesting mitigation measures and alternatives for environmental impacts.
- Determining whether an IEE is sufficient for project implementation.
- Communicating the project details with the local population and stakeholders.

2.6 IMPACT ON LAND

A total of 4,853.39 square meters of private land across 114 parcels will be affected by the flyover's construction. This land, located along the Tribhuwan Raj Path (TRP), holds high commercial value. Additionally, 56 private structures will be impacted, categorized as follows:

- 23 RCC frame structures with RCC roofs
- 3 load-bearing brick masonry structures with RCC roofs
- 10 load-bearing cement brick masonry structures with CGI roofs
- 1 RCC frame structure with a CGI roof
- 2 load-bearing mud brick masonry structures with CGI roofs
- 4 concrete block masonry structures with CGI roofs
- 9 CGI sheet structures
- 4 miscellaneous structures (e.g., gates, walls, ladders)

Table 2-1: Land use type and total land required for project

Project Component	Land use	Land requirement	Area (ha)
Approach road	Private land	Permanent	0.485339
		Total	0.485339

Source: Field survey

2.7 REQUIREMENT OF TREE CUTTING

There are no trees in the project area; thus, tree cutting is not required

2.8 IMPACT ON HOUSEHOLDS AND POPULATIONS

A total of 82 households will be affected by the project. With an average household size of 5.77, the estimated affected population is 473 individuals.

Table 2-2: Detail of project affected household and population

S.no	Place	No of household	Affected population
1.	Ch na Pa Ward no 5	70	404
2.	Ch Na Pa Ward no 12	12	69
	Total	82	473

Source Field survey, 2021 updated 2025

2.9 IMPACT ON LOCAL INFRASTRUCTURES AND PUBLIC PROPERTY

The project will affect approximately 162.4 meters of TRP, where the flyover will be constructed. Additionally, the following public infrastructure will need to be relocated:

- 40 electric poles
- 8 telephone poles
- 94 meters of drainage systems

Various internet provider cables and underground telecommunication cables.

2.10 OTHER NECESSARY MATTERS

The Project received comments and suggestion from the local bodies and Department of Roads on the IEE report. These suggestions and recommendation have been incorporated to the extent possible.

2.10.1 Suggestion of Local Bodies

There was serious concern of the local community of ward no 5 on the dust pollution and nonpayment of the compensation amount for the affected parcel of lands. The project made an agreement with ward no 5 of Chandragiri municipality on 2081/5/7. The project received suggestion and recommendations during the public hearing held on 2082/10/29 that is officially minute and the project also received written suggestions and recommendations from the office of Chandragiri Municipality, ward no 5 of Chandragiri Municipality and ward no 12 of Chandragiri Municipality. Most of the suggestions of public hearing s, Chandragiri Municipality and Ward no 5 of Chandragiri Municipality are similar in nature but the suggestions of the ward no 12 of Chandragiri Municipality mostly related with Nagadhunga Tunnel Construction Project. The suggestions of all five institutions/events and their implementation status is presented in Table 2.3.

Table 2-3 : Suggestions and Recommendations for Flyover Construction

Suggestion and recommendation	Agreement between the Project and ward office 2081/5/27	Public hearing	CM	Ward no 5	Ward no 12	Status
Dust air pollution and sound pollution due to construction activities must addressed daily		√	√			Complied
The construction activities will have depositing of the construction materials and will affect the existing traffic which needs to be addressed			√			Complied
The foot path and road side drain is not timely maintained may lead to vehicle accident. They shall be addressed before the monsoon season			√	√		Complied
Use of safety measures shall not be weak			√			Complied
The project shall be completed in scheduled time		√	√			Delayed
Project shall be constructed and operated considering biological and ecological balance		√				Road side tree plantation and bioengineering measures were proposed at embankment slope
Over bridge to be constructed Kisipidi intersection	√	√				Planned

Suggestion and recommendation	Agreement between the Project and ward office 2081/5/27	Public hearing	CM	Ward no 5	Ward no 12	Status
Consider 20 ft wide road crossing	√	√				Road crossing at Kisipidi intersection is not practical. Please refer note below.
Agreed compensation to be disbursed ASAP and remaining affected land compensation to be decided from CDO office	√			√		Mostly complied.
A committee of 5 people will make coordination with the contractor, consultant and Project for the construction of the Flyover.	√					Complied
The ward office, the consultant and contractor will be coordination in minimizing the air pollution, noise pollution due to the construction activities CTBC pavement to be constructed at the access road	√					Complied
The road shall have enough wide foot path either side with hand railing		√		√		Project made provision of 5 ft. wide footpath. This area is encroached to provide the steps to enter in the private property. It is suggested to raise the height of footpath so that provision footpath width could be maintained.
The road shall have street light at both side				√		Will be complied
Ensure 50 % employment to the local people in the project				√		Employment will depend on the qualification. Priority will be given to the local people
The construction drain will prevent water flowing on the road during rainy season				√		Will be complied
Traditional cultural important track from Kisipidi to Kalikasthan shall not be interrupted should be kept to open				√		Only pedestrian crossing has been proposed.
Name of the Flyover shall be Kisipidi Mahadevsthan	√			√	√	Complied
Kisipidi-Doorsanchar intersection has lot of movement of the student and people, proper arrangement shall be made for the pedestrian crossing	√			√		Planned
The agreement between the Project and local people made on 2081/05/27 in the premises of ward no 5 shall be implemented				√		Complied

Suggestion and recommendation	Agreement between the Project and ward office 2081/5/27	Public hearing	CM	Ward no 5	Ward no 12	Status
Balambhu Banasthali Thankot road completely blocked					√	Related with NTCP
The service lane is built at one side only near Jwaladevi temple. It should be constructed at both side as committed during preparation of DPR					√	Related with NTCP
As alternative Jwaladevi to Manmohan bridge road to be black topped					√	Related with NTCP
The project has blocked number of local road such as from Manmohan bridge to Akash tole, another road to Akash tole, Alternative service track to be constructed					√	Related with NTCP
The bank of the Khola at the south of the Manmohan to be protected by providing the shear wall					√	Related with NTCP
Irrigation problem to be resolved					√	Related with NTCP
Demarcation of the acquired land to be redone in the presence of ward office, Use of the acquired land other than road to be made in mutual coordination.					√	Complied

Justification for not providing 20 ft. road crossing at Kisipidi intersection

The primary objective of constructing the flyover is to enhance traffic flow and ensure dedicated access to the tunnel road. Introducing a 20 ft. road crossing at Kisipidi intersection would require installing a traffic signal, which would disrupt the smooth movement of vehicles traveling between Thankot and Kathmandu, as well as those using the tunnel road.

The roads at this intersection experience high traffic volume. Stopping vehicles at a signal would not only cause delays but also increase vehicle emissions. When vehicles idle or restart from a stationary position, they produce higher emissions, contributing to pollution. Additionally, traffic interruptions would reduce overall efficiency and create congestion.

As an alternative, providing U-turns approximately 250 to 300 meters upstream and downstream of the intersection would allow vehicles to change direction without stopping. This approach aligns with international traffic management practices and ensures a smoother flow, reducing travel time compared to waiting at a signal.

2.10.2 Comments of Department of Roads (GESU and DCID)

The Project received comments on IEE report from Development Cooperation Investment Division (DCID) and Geo-Environmental and Social Unit (GESU) of Department of Roads. The comments and their status is presented in Table 2.4 and Table 2.5.



Table 2-4: Comments of GESU

S.no	Comments	Status of the comments
1	Approved TOR should be placed in final report Annex	It is presented in Annex 2
2	Place approved design copy of at least cover page of approved design copy in annex.	It is presented in Annex 15
3	Elaborate and explain social data more	They have been explained in Section 5.3
4	In alternative analysis make clear and explain reasoning of why sinsho pile used as best alternative. (sub structure)	It is explained in section 8.3.1.2
5	Write in detail about muck disposal site, from where muck is generated and stored. Write what is beings practiced in the projects.	It is written, in section 3.9.2
6	Safety measures and gender equality provision for the project...	Safety of the project is explained in section 3.9.6 (iv) Gender related benefit and impacts is presented in section 7.1.1 (v) and 7.2.2 (ii)
7	Organization chart is missing please include in the report	It is included as Figure 10.1
8	Grievance record of the flyover section to be included in annex.	It is included as Annex 12
9	EHS report sample if possible place in annex.	A monthly Environmental Monitoring Report and Monthly Health and Safety Report is presented in Annex 13 and Annex 14
10	land acquisition progress should be included in report... and related issues	Status of land acquisition is presented in 7.2.1.3 (i)
11	Monitoring budget section of the report should be revised...	Monitoring budget is explained in section 10.5
12	In the biological impacts section please include 'that greenery will be maintained by bioengineering and plantation... and more detail to include	It is included in table 9.2
13	Air pollution control practices should be updated. like will spray water if not controlled will do CTBC and a dedicated tanker will be kept as there is too much traffic volume	Only water spraying at regular interval did not controlled the dust pollution. Cement treated base coarse was applied on the surface of the temporary roads
14	Attach the Brief CV of the Experts and Declaration	They are attached.
15	Make titles and tables symmetrical, e.g. All 'content' words Capital and all 'Function words' small or so!	It is done
16	Read and Reread, update and correct yourself to avoid possible mistakes! Come up with fine-tuned one!	It is done



Table 2-5: Comments of DCID

S.no	Comments	Status of the comments Addresses
1	Follow the guidelines of EPR-2020 throughout whole document	They are followed
2	Include the Nepali synopsis report to fulfill the requirement of EPR-2020.	It is included in Annex 18
3	Revise the Nepali executive summary with proper proof read	It is revised
4	Prepare the chapter legal requirement in the tabular format with significance of laws, policies, and guidelines to this proposed project.	The relevant policies, acts, regulations and guidelines have reviewed
5	Mention the location and construction material required for the construction. In one section it has been written as the <u>muck disposal from tunnel will be sufficient as a construction material</u> - please correct this statement.	Section 3.9.2 is on muck disposal. The tunnel muck would be adequate as the construction materials
6	The flyover related specific should be impact need to the categorized	Identified impacts in the TOR are related to the flyover
7	Impacts between ex. summary and chapter needs to be compatible and matched with baseline data and Ex. Summary between Nepali and English should match	It is matched
8	This IEE should say RAP needs to be prepared or not and separate loss of private and public structures	IEE assessed the impact.
9	Include one para about absentee households	Included
10	Add the details of public hearing and recommendation from the respective municipalities/wards and relevant agencies clearly in the annex and also mention the issue raised by the public and which has been included or not with specific reason.	The details of recommendations of the municipality and wards are answered in Public hearing proceedings
11	Critically analysis of potential impacts and its relevant mitigation measures	They are analyzed
12	Need re-phrase the section 5.4.9.1 & 2 and move into section 5.4.8.3	They are rephrased.
13	Check the formatting and grammar throughout the report.	It is checked



3 DESCRIPTION OF THE PROPOSAL

3.1 TYPE OF PROPOSAL

Nagadhunga Tunnel Construction Project (NTCP) is planned to improve the road alignment of the existing Tribhuwan Raj Path (TRP) to reduce travel time and improve the safety of traffic. The proposed NTCP starts at Ch 8+300 of TRP at Kisipidi (Mahadevsthan). The proposed NTCP comprised 2.630 km of the dedicated tunnel access road at the east (including 613 m Flyover), 2.688 km of tunnel, and 0.565 km of the dedicated access road at the west. The Environmental Impact Assessment (EIA) report of the NTCP was approved by the Ministry of Science, Technology, and Environment (MoSTE) in June 2014. The detailed design of the Kisipidi (Mahadevsthan) Flyover was completed and approved on February 9, 2020. The construction of the project commenced on November 13, 2019. To ease the traffic movement between the tunnel access road and the existing TRP, a Flyover is introduced at Kisipidi (Mahadevsthan). The Kisipidi (Mahadevsthan) Flyover (Figure 3-1) is one-way which aims to give a pathway for vehicles coming from Kathmandu to move toward the tunnel entrance portal.

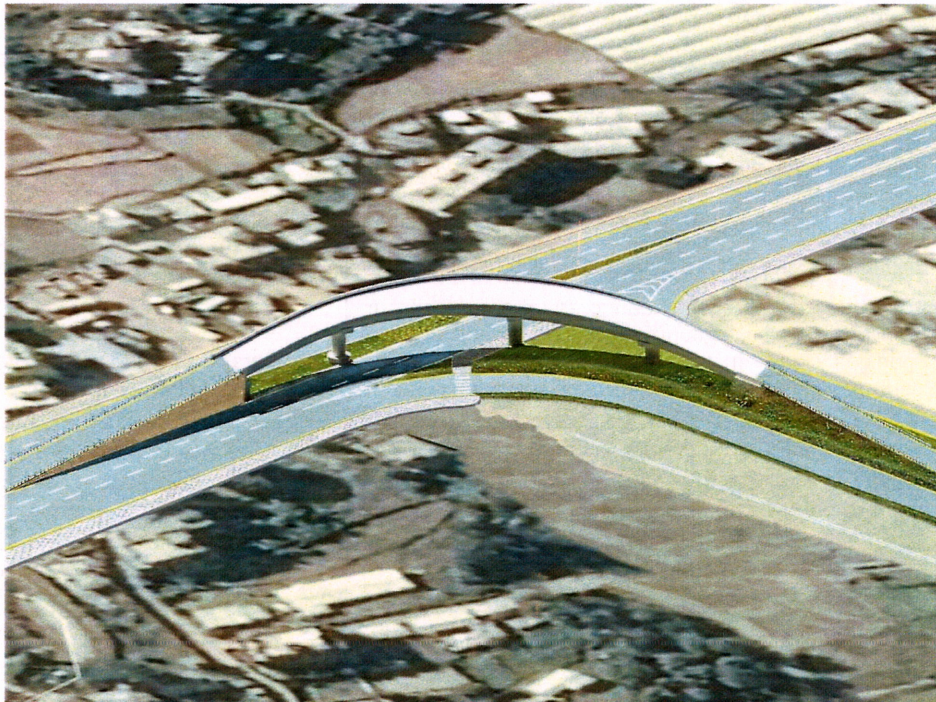


Figure 3-1: Proposed Kisipidi (Mahadevsthan) Flyover at Intersection of NTCP

To accommodate the Flyover, the existing TRP will be realigned. There will be a ramp at the side of the flyover for vehicles coming from Nagadhunga to move towards the tunnel approach road. There will be another ramp on another side for vehicles coming from the tunnel approach road toward Kathmandu. The total length of the Flyover is 613 m. The bridge of Kisipidi (Mahadevsthan) Flyover will be 7.50 m in width and 128 m in length. The project lies in Chandragiri Municipality ward no. 5 of Kathmandu district in Bagmati Province.

Though the RoW of TRP is supposed to be 50 m, the existing road width at the Fly over section is 22 m (11m from the road centre line). The Supreme Court had made a verdict that any land or property required for the road extension beyond 16 m needs to be compensated. Therefore, the project requires acquiring land beyond 16 m.

3.2 EXISTING STATUS OF THE PROJECT AREA

The proposed Flyover is located chainage - Ch 8+300 of TRP. The existing road width in the Project area is 22.0 m (11.0 m from the centre line). The project area comprises many permanent and

temporary structures along the road having shops and residences. Figure 2 presents the project area. TRP is one of the main roads for the inbound and outbound traffic of Kathmandu, the vehicular traffic on the road is quite heavy. Daily traffic volume in this road is 10000 at Nagadhunga pass.

3.3 LOCATION MAP OF PROJECT

The Project site is located in ward no 5 of Chandragiri Municipality of Kathmandu district in Bagmati Province. The Figure 3-2 and Figure 3-3 present the location map and detailed plan of the flyover.

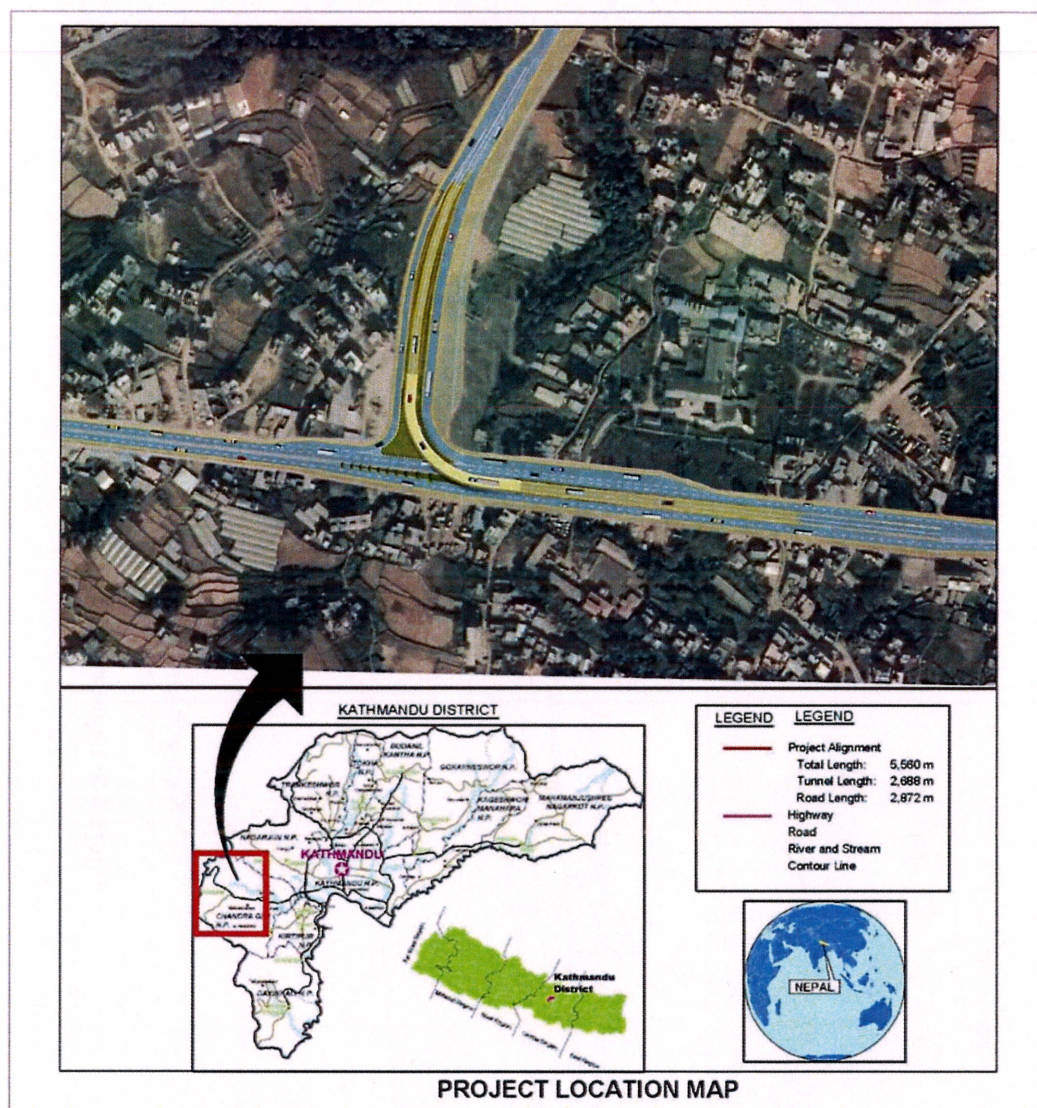


Figure 3-2: Location Map of the Project Area

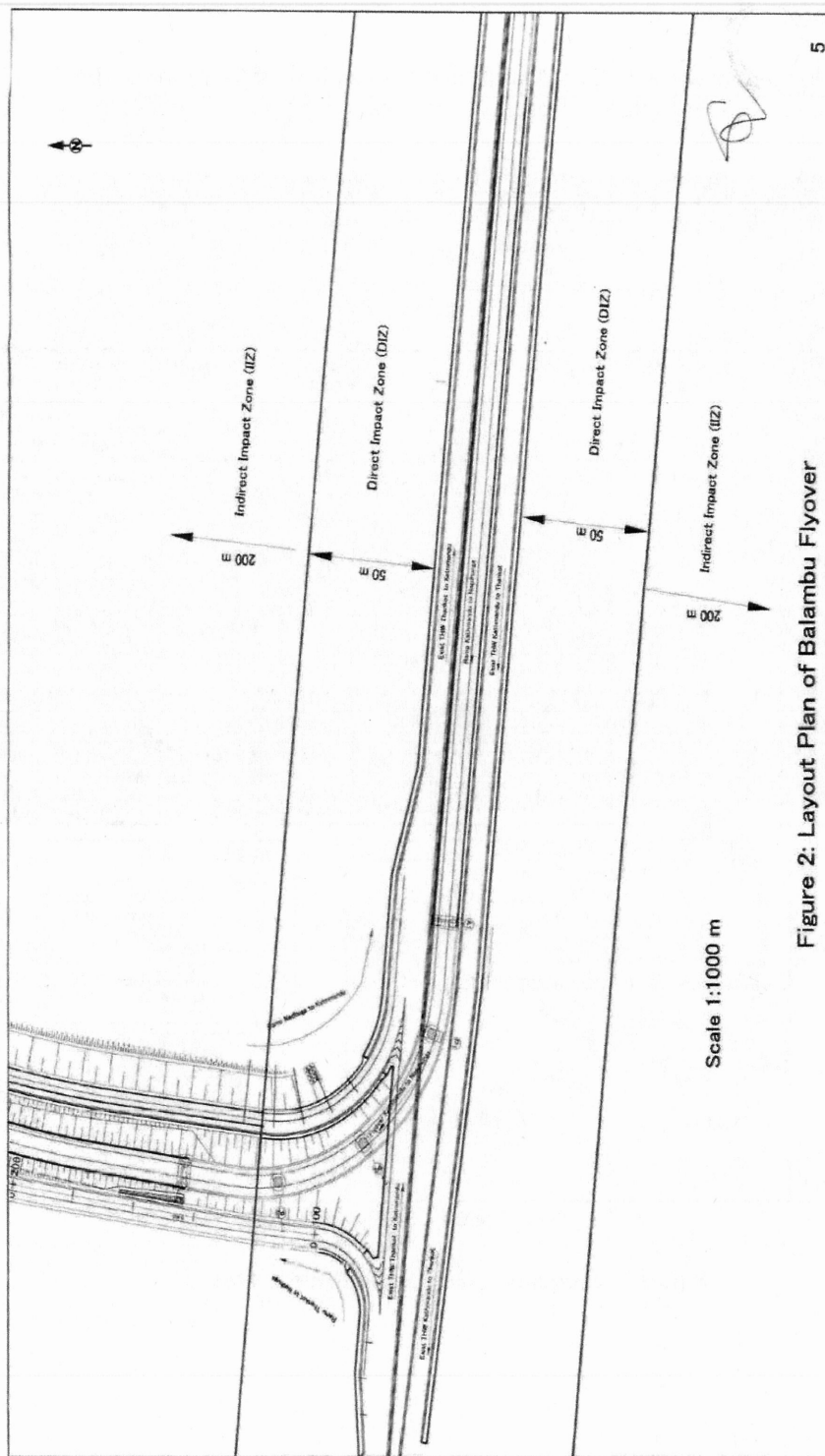


Figure 2: Layout Plan of Balambu Flyover

Figure 3-3: Layout Plan of the Proposed Flyover

3.4 SALIENT FEATURES

The salient features of the project are given in Table 3.1.

Table 3-1: Salient Features of the Project Kisipidi (Mahadevsthan) Flyover

Characteristic Features	Description
Name of the Project	Nagdhunga Tunnel Construction Project
1.Geographical Location	
Province	Bagamati
District	Kathmandu
Start Point Coordinate	Easting (X) – 622494.391 m Northing (Y) – 3063885.265 m
End Point Coordinate	Easting (X) – 622143.594 m Northing (Y) – 3063997.307 m
Influenced Municipality	Chandragiri Municipality
Major Settlement	Kisipidi (Mahadevsthan)
Geological Feature	Kalimati Formation
Climatic Condition	Subtropical
Type of Soil	Silty clay, Clayey layer, fine to medium grained sand.
2.Road Characteristics	
Type of Road	National Highway Class II
Highway Code	H02
Present Surface of the Road	Black Top(Asphalt Concrete) at THW Section
Design Speed	60 km/h
Right of Way (ROW)	50 m
3.Flyover Details	
Length of Flyover	128 m
Type of Flyover	Shinsho Pile and Steel Girder and Ramps
Formation Width	9 m (at Flyover section)
Carriageway Width	7.5 m
Shoulder Width	None, Concrete Kerb 0.75 m
Maximum Gradient	5 %
Camber	2.5 %
4.Ramp Details	
i) Kathmandu-Nagdhunga Tunnel ii.Nagadhunga-Kathmandu iii.Thankot-Nagdhunga Tunnel iv.Kathmandu Thankot (Existing THW)	502 m 364 m 368 m 682 m
5.Drainage System	
i. Masonry Drain ii. Concrete Cover Drain	872 m 898 m

Characteristic Features	Description
6. Earthwork	
Soil Excavation	1,968 cum (including Ramp)
Soil Filling	46,900 cum (including Ramp)
7. Major Construction Materials For Ramp and Flyover	
Structural Steel	358 ton
Concrete Works	1,134 cum
Reinforcement Steel	260 ton
Base Course	4,154 cum
Sub-base Course	6,150 cum
Wearing Course(t= 50 mm)	960 sqm (except Ramp)
8. Cost of the Project	
i. NRs.	83,900,186.45
ii. US\$	1,746,817.75
iii. JYEN	109,796,363

Source: Design Report of Kisipidi (Mahadevsthan) Flyover, 2076

3.5 DETAILS OF CONSTRUCTION MATERIAL REQUIRE FOR THE PROJECT

The Construction material requirement for the Flyover Component of NCTP is presented in Table 3.1

Table 3-2: Construction Material Requirement

Cement ton	Sand cum	Aggregates cum	Boulder cum	Rebar ton	Bitumen ton
857	945	1,861	61	299	6

The sand and aggregates will be produced at the site itself from the muck of the tunnel whereas the materials like cement and rebar will be directly procured from the manufacturers within the country and bitumen will be imported from a foreign country.

3.6 DETAILS OF FUEL REQUIREMENT FOR THE PROJECT

The NTCP is likely to require 8.3 million liter of fuel. The fuel requirement for flyover component could be 10 % of the total requirement.

3.7 DETAILS OF HUMAN RESOURCES REQUIREMENT FOR THE PROJECT

Total skilled and unskilled human resources requirement is estimated to be 2585 person days and 4241 person days respectively.

Source: Detail Engineering survey and detail design report.

3.8 DELINEATION OF THE PROJECT AREA

The project is a short-span flyover but the existing road needs to be extended on both sides for the regular flow of vehicles which requires land acquisition and demolition of existing structures. The impact zone of the project delineation is presented in Table 3.3.

Table 3-3: Construction Material Requirement

S.N.	Category	Area Delineation
1.	Direct Impact Zone (DIZ)	25 m either side of the road center line.
2.	Indirect Impact Zone (IIZ)	250 m either side of the flyover 500 m before the start of ramp to flyover
3.	Zone of Influence (Zol)	Chandragiri Municipality



3.9 OTHER FACILITIES

3.9.1 Labor Camp

The Contractor is operating two labor camps at Basundol. The camps have a residence capacity of 239 laborers. The Construction labor for the Flyover will also be housed in the same labor camp. The camps have drinking water, sanitation, and kitchen facilities.

3.9.2 Quarry site

The Project will not be operating any quarry site as such. All the required local construction materials such as sand and aggregates are planned to be fulfilled from the tunnel muck. The Tunnel construction will be generating about 453,011 m³ muck. A crushing plant is located at Totipakha. The required local construction materials like sand and aggregates will be produced in the crushing plants. The required construction materials aggregates and sand for the flyover will be fulfilled from this crushing plant. A layout plan of the crushing plant is presented in Figure 4. The capacity of the crushing plant is 100 tons/hour.

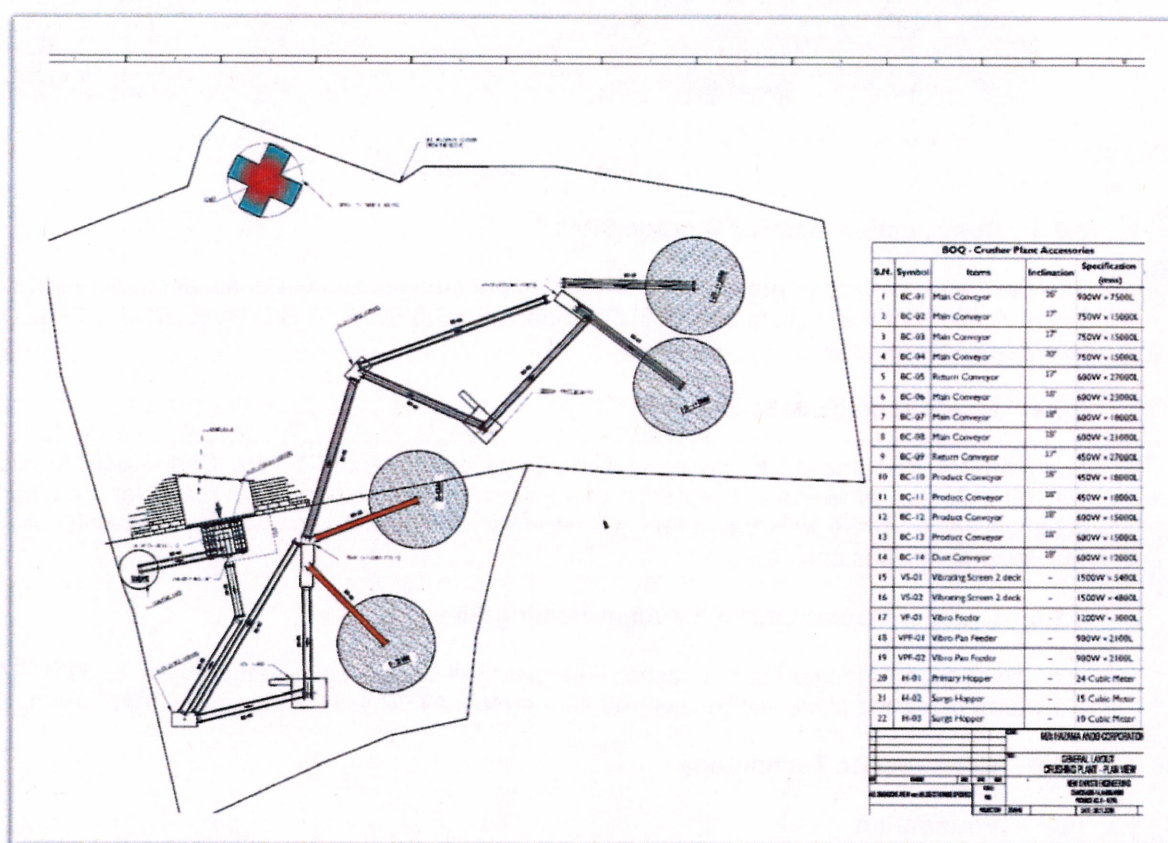


Figure 3-4: A Layout Plan of the Crushing Plant



Figure 3-5: Crusher Plant

3.9.3 Construction Material Storage Sites

The contractor has made provision for the storage of construction materials at the different storage yards. Apart from that right of way of the approach road is 50 m. This area could also be used as a temporary storage site.

3.9.4 Waste Management Sites

Solid wastes from the work site and labor camps are collected by the Chandragiri Municipality wastes collector. Whereas the provision of septic tanks and soak pits are made for the disposal of liquid wastes from the work camp and labor camps. The construction wastes will be disposed of at the designated sites only.

3.9.5 Crusher Operation and Bitumen Heating Site

A crushing plant is located at Totipakha. The plant will be operated from 8.00 Am to 6.00 PM only. No bitumen heating place will be required as a premix ATBC will be carried out from nearby plant.

3.9.6 Construction Technology

(i) Foundation

It is a 4-span continuous box bridge. It consists of two abutment and 3 piers. Height of pier is less than 12 m and diameter of pier is 2.5-5m. The construction of foundation is to be carried out in very busy road. It is difficult to adopt spread foundation Hence a Shinso pile was adopted as foundation to make possible in working at narrow space and avoid use of heavy equipment.

Shinsho Pile is a Japanese style Caisson type well foundation with different method of excavation. Shinso pile is excavated manually with normal excavating hand tools. Excavated diameter control and surface is protected by permanent corrugated metal liner plate with height about 50 cm. Excavation is advanced towards the depth adding on liner plate after each excavation cycle of depth about 50 cm. Hence excavation proceeds toward the underneath from liner plate unlike Sinking in Well Foundation. After reaching the required depth, bottom is cleaned, lean concrete is casted, rebar cage is installed and concrete poured. The concrete cage is assembled outside and installed by use

of crane/s. Concrete with required design mix would be prepared in Contractor's own batching plant, transported by transit mixer and would be poured by use of concrete pump.

(ii) Superstructures: 4-Span Continuous Steel Girder

Out of various available options, 4-span continuous steel bridge is selected for the construction after considering various advantages over other structures (like RC-Deck slab which is very heavy due to its self-load). This bridge intersects with existing roads and there is curve in road alignment as well. Since there is horizontal curve and gradient, it would be a challenging job for fabrication correctly and its installation. Fabrication works is carried going on Jalap Nepal fabrication yard at Bhagalpur, Chitwan. It is reported that the fabrication work is in final stage. The installation of girder will be carried out after the completion of construction of pier and abutment. Installation of box girder would be done by use of crane/s with direct supervision of the Japanese personnel of the Contractor, Hazama-Ando.

(iii) Construction of Ramp (Kathmandu-Nagdhunga Tunnel)

The approach for the flyover in the Kathmandu side is constructed by applying RSW (reinforced soil wall) with precast concrete panels. Materials for the construction of reinforced wall consists of precast concrete panels as facing units, high strength Geo-straps as soil reinforcement element, Geo-core as connections, Geo-composite drainage system, filling materials with angle internal friction at least 30 degree etc. This work consists of reinforced earth structure comprising of construction of internally stabilized soil built in layers, duly compacted, use of Geo-synthetic straps properly connected with concrete panels with help of Geo-straps, providing drainage facilities etc. For lifting and erection of precast concrete panel light crane is generally used. 6-10 t capacity vibrating roller can be used for compaction. Main advantage of RSW wall with concrete panel are:

- There wide range of choice available selection of concrete panels to enhance aesthetic view.
- And it can be constructed vertically with higher height saving the construction width.

(iv) Safety during Construction

Since the construction of these works includes excavation of Shinso pile in higher depth, use of cranes for lifting and erection of heavy loads like reinforcing cage, steel girder etc. additional precaution will be made for the safety issue. Following are the points but not limited to that must be ensure during construction:

- Sufficient barricade shall be provided with warning sign board, single man at working area.
- Provide safe access to the working area.
- Provide sufficient PPE to the workers.
- Ensure sufficient ventilation during excavation and construction of Shinso pile foundation.
- Ensure sufficient capacity of lifting equipment
- Restrict strictly unauthorized person to the working area.
- Restrict traffic movement if it affects during lifting and erection activities.
- Alert workers during the lifting and erection time.

(v) Environment

Following are the potential but not limited to the impact on environment during construction

- Air pollution
- Noise pollution
- Water pollution
- Solid waste
- Chemical contamination etc.

The Contractor will take proper measure to minimize parameter and keep in acceptable limit during the construction activities.

3.9.7 Construction Schedule

A revised construction schedule of the Kisipidi (Mahadevsthan) Flyover is presented in Figure 3.6.

Conrtuction Schedule of Kisipidi Flyover																																														
			2021			2022												2023												2024												2025				
Activities	Start	Finish	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3		
Excavation above Shinso Piles HEads	25-Oct-21	8-Aug-23																																												
Excavation of Shinso Piles with Steel Lining Concrete	1-Feb-22	25-Aug-23																																												
Shinsoi piles (Concrete class B)	13-Mar-22	30-Aug-23																																												
Sub structure (Reinforced Concrete Class B)	10-Feb-22	17-Apr-24																																												
Super structure steel works for the main girder	17-Jan-24	30-Apr-25																																												
Completion of the Balamhu Flyover Bridge		30-Apr-25																																												

Figure 3-6: Construction schedule



4 METHODOLOGY

4.1 DATA REQUIREMENT

The IEE report will require the baseline quantitative data, to the extent possible, on the physical and chemical, biological, socio-economic, and cultural environment as follows. Necessary data and information will be collected for DIZ, IIZ, and the surrounding area depending upon the nature of data required and foreseeable environmental impacts. The following information is required for the IEE of the project:

4.1.1 Physical and Chemical Environment

The study of different physical aspects of the project area such as topography, geology and soil, existing drain facilities, and land use was made. The baseline information on air, water, and noise quality was collected. The project has established hydro-meteorological stations on the east and west side of the project area. The public utilities present in the project area and IIZ were documented. The survey found that there is an underground wire of the Nepal Telecommunications Authority (NTA). The wire will have to be relocated in coordination with NTA without affecting any service to the people.

4.1.2 Biological Environment

No major forest area is present nearby in the project area. There is no trees in the project area.

4.1.3 Socio-economic and Cultural Environment

Required data on the socio-economic and cultural environment in the project area and its vicinity will be as follows:

- Demography including population, ethnicity, etc. in the project area;
- Settlement pattern in the project area;
- Land and property ownership and their possible acquisition and compensation;
- Total land required by the project components, type of land use (temporary/permanent)
- Existence of educational institutions and their proximity;
- Household income and expenditure of the Project Affected Families (PAFs);
- Health and sanitation facilities;
- Infrastructures such as drinking water supply, irrigation, electricity, and roads;
- Availability of labor force in the project area and its vicinity;
- Status of women and disadvantaged groups of people;
- Status of marginalized/vulnerable community;
- Ongoing development activities in the project area and its vicinity;
- Historic and cultural monuments in the project area and its vicinity;
- Existing cultural practices;
- Listing of communities that have been using natural resources in the project area;
- Production and demand of agriculture and livestock products in the project area;
- Livelihood of the project area;

4.2 PROCEDURE FOR DATA COLLECTION

4.2.1 Literature Review, Maps

The intensive desk study of the available Chandragiri municipality profile was carried out to know the environmental aspects of the project area. The detailed design report of the Kisipidi (Mahadevsthan) Flyover was studied. The different tests were carried out at the Kisipidi (Mahadevsthan) intersection during the detailed design. The reports were reviewed to obtain the required information. Nepal Environment Impact Assessment Guidelines (1993) were followed for impact analysis. The review of the Environment and Social Management Framework (2070), EPA (2076), and EPR (2077) was done in every step of the IEE and the given rules were followed.



Similarly, available topographic maps published by the Survey Department of the Government of Nepal in 1996 were studied to find out the different physical aspects such as topography, slope stability, and land use. The different software programs such as Computer-aided design (CAD) and Geographic Information systems (GIS) were applied to prepare the maps and assessment of different possible impacts.

4.2.2 Field Study

The survey of all aspects of the physical, biological and social-economic and cultural environment was done through field observation and regular site visits.

Physical Environment: The assessment of air and noise quality was done using required monitoring devices at two locations viz. CH – 0 + 050 and 0 + 300 to prepare and record the baseline information of the project area. Similarly, the water quality of the rivulet present in – 0 + 010 and 0 + 330 was recorded using the probe method and laboratory analysis.

Biological Environment: No tree was present during survey within the ROW.

Socio-Economic and Cultural Environment: The survey of utilities (such as electric poles) presented inside the DIZ of the project was carried out by a field survey counting all the electric poles present in DIZ. This would help to relocate the utilities during the construction phase of the project. Every parcel of the land located within the ROW was enumerated and a household survey of the available landowners was carried out. A survey of the affected structures was also carried out.

4.2.2.1 Focus Group Discussion (FGD)

During the field survey for different environmental aspects, the number of FGD was carried out at the major settlement of Kisipidi (Mahadevsthan) (Kisipidi) with the residents who have been living there for many years. The Key-Informant Interview (KII) was carried out with the representatives of local government bodies and local stakeholders.

4.2.2.2 Walk Through Survey

The walk-through survey along the existing road was done for GPS tracking to prepare the maps and find out if any different than the design period is present.

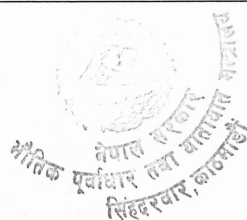
4.2.3 Public Hearing and Public Notice

4.2.3.1 Public Hearing

After the approval of TOR from Ministry of Physical Infrastructure and Transport (MOPIT) on dated 29th December 2024 and According to EPR 2077, rules 6 (1), (2), (3), (4), and (5), a public hearing is deemed necessary to carry out the public hearing in project-affected areas for the collection of grievances and suggestions and also to communicate the project to the Project Affected People (PAF). A notice was published in the Nepal Samachar Patra a national daily newspaper on February 5th 2025, inviting the project-affected people and local stakeholders to be present at the meeting to communicate the possible environmental impacts of the project. The notice included the name of the proposal with some details on the proponent and consultant along with the date, time, and location of the meeting. A leaflet of the project briefing was prepared for the Public hearing. The meeting was chaired by the Mayor of Chandragiri Municipality. A proceedings of the Public hearing is presented in Annex 3.

Table 4-1: Detail of public hearing program

S.no	Location of public hearing program	Date	Total Participants		
			Male	Female	Total
1.	Urban Health center meeting hall Ward no 5, Chandragiri municipality	11th Feb 2025	31	14	45



4.2.3.2 Public Notice

A 7 days public notice as specified in the given format in Schedule 7 of EPR, 2077 is published in the Nepal Samachar Patra, a national daily newspaper on February 16th 2025 seeking written suggestions along with possible environmental impacts to the project area due to implementation of the project. The published notice is posted on the notice board of the local concerned stakeholder's office ward no 5 of CM, ward no 12 of CM and office of CM. The letter of declaration regarding the pasting of the notice are included in the Annex 4

4.2.3.3 Recommendation letter

According to EPR 2077, rules 8 (9), (10), the received opinions and suggestions from the concerned stakeholders, concerned local government bodies (Chandragiri municipality ward no 5 and ward no 12 and from the Chandragiri municipality itself) are presented in (Annex 5).

4.3 DATA ANALYSIS

The data such as air, water, and noise quality collected from baseline field visits are analyzed using simple statistics such as mean, maximum, and minimum values and represented in graphs. The logarithmic average of the noise level is calculated on an hourly basis to find the equivalent sound level (Leq). The other physical environment information is accessed from secondary sources such as topographical maps from the Department of Survey, satellite images, etc. The biological and socioeconomic data are presented in respective sections.

4.4 IMPACT ANALYSIS

Impacts are identified by employing the methods such as expert judgment, checklist, and map overlays. Matrix methods are used to identify the possible beneficial and adverse impacts due to the implementation of the proposed project. For easy understanding, direct impacts are identified through map overlays.

The main base for the identification of impacts is the baseline information, which is carefully collected and presented in terms of the physical, biological, socio-economic, and cultural environments of the project area. Impact Evaluation was carried out according to The National Environmental Impact Assessment Guideline, 1993 where each identified impact will be predicted in magnitude, extent, and duration. The magnitude of the impact is predicted in terms of high, medium, and low. The extent of the impact is classified in terms of regional, local, and site-specific, and the duration of the impact is predicted in terms of long term, medium-term and short term. Each of these predictions is assigned a score for the evaluation. Finally, the significance of each identified impact will be classified.

The development projects have both positive and negative impacts on the environment. The benefit impacts could be further enhanced by considering certain activities. These steps are generally taken during design which will enhance the mitigation measures in terms of specific mitigation design, cost estimation of the mitigation measure, and specific implementation criteria.

4.5 REPORT PREPARATION AND PRESENTATION

The Draft IEE report is prepared as per the approved TOR in the given format under Schedule 11 of EPR, 2077, and the template prepared by GESU which has been approved by the ministry and will be submitted to MoPIT through GESU. The Draft Report presentation will be made in the MoPIT. The final IEE will be prepared to incorporate the comments.



5.1 PHYSICAL ENVIRONMENT

The land use of the project area is mainly road (18 %) and urban area (82 %).

5.1.2 Climate

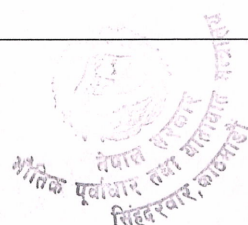
The climatic condition is sub-tropical. The project has established the weather station in the Project area itself. The mean monthly climatic data for last 12 months is presented in Figure 5.1.

Table 5-1: Mean Monthly Climatic Data of Project Area

	January	February	March	April	May	June	July	August	September	October	November	December
Avg. Temperature °C (°F)	9.2 °C (48.6) °F	11.3 °C (52.4) °F	14.6 °C (58.3) °F	17.9 °C (64.2) °F	19.1 °C (66.4) °F	20.5 °C (68.8) °F	20.3 °C (68.6) °F	20.3 °C (68.6) °F	19.5 °C (67) °F	16.8 °C (62.2) °F	13.6 °C (56.4) °F	10.7 °C (51.2) °F
Min. Temperature °C (°F)	4.9 °C (40.9) °F	6.4 °C (43.5) °F	9.1 °C (48.4) °F	12.2 °C (54) °F	14.8 °C (58.6) °F	17.6 °C (63.6) °F	18.4 °C (65.2) °F	18.2 °C (64.8) °F	17 °C (62.7) °F	13.4 °C (56.2) °F	10 °C (50.1) °F	7 °C (44.6) °F
Max. Temperature °C (°F)	14.2 °C (57.5) °F	16.3 °C (61.4) °F	19.7 °C (67.5) °F	23 °C (73.4) °F	23.5 °C (74.3) °F	23.9 °C (75) °F	23.2 °C (73.7) °F	23.4 °C (74.1) °F	22.8 °C (73) °F	20.7 °C (69.3) °F	17.8 °C (64.1) °F	15.2 °C (59.4) °F
Precipitation / Rainfall	44	56	59	79	205	460	778	643	334	98	30	26
mm (in)	(1)	(2)	(2)	(3)	(8)	(18)	(30)	(25)	(13)	(3)	(1)	(1)
Humidity(%)	73%	69%	57%	54%	72%	85%	92%	91%	88%	80%	75%	76%
Rainy days (d)	5	7	8	10	16	19	22	22	20	12	6	4
avg. Sun hours (hours)	7.1	7.6	9.3	10.0	8.6	6.0	4.3	4.8	5.6	7.0	6.5	6.5

5.1.3 Hydrology and Drainage System

The proposed flyover overpasses a local drain. In order to accommodate the additional lane for the flyover this drain has been realigned. The realigned plan of the local drain is presented in Figure 7. The catchment area of the drain is fairly small. The realigned section of the drain is designed to accommodate flood discharge of 100 year return period.



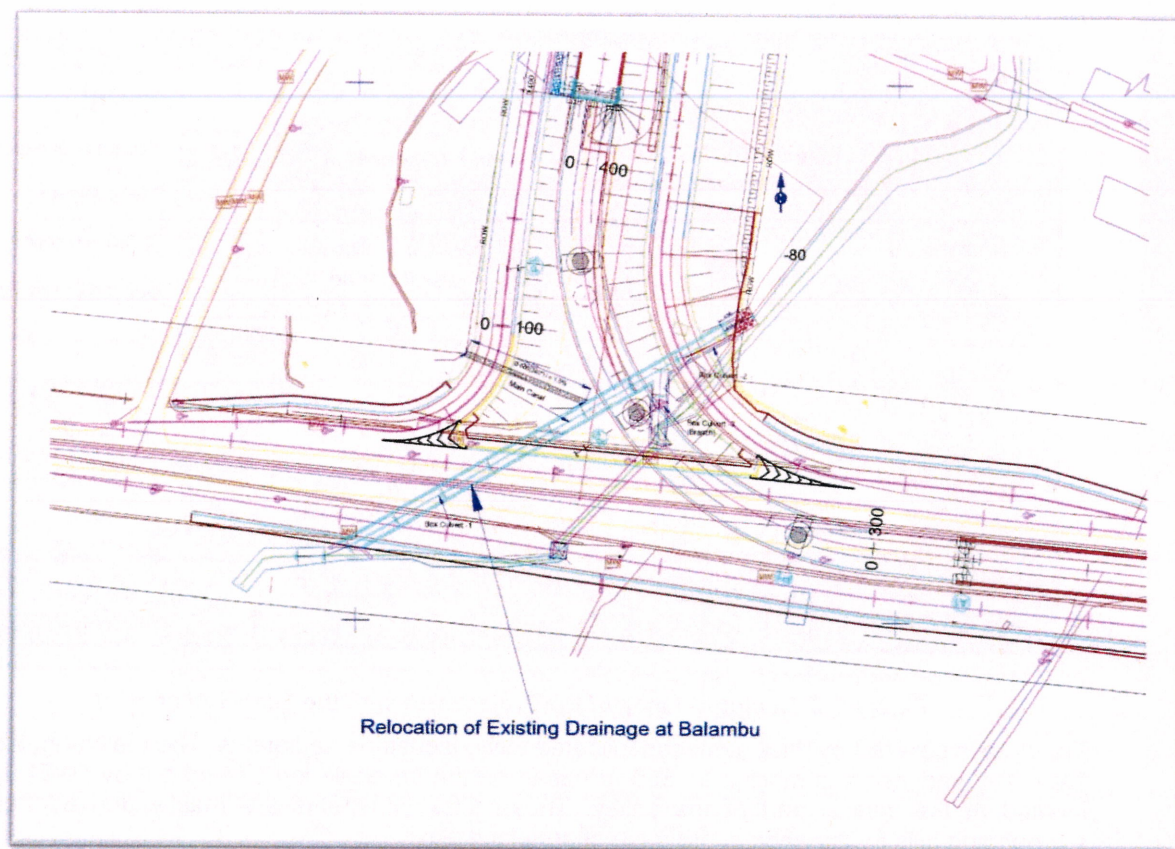


Figure 5-1: Realigned Plan of Local Drain

5.1.4 Geology

The lacustrine, as well as fluvial deposits in the Kathmandu valley, mainly consist of peat, clay, carbonaceous clay, sand, silt, and gravel. These sediments lie unconformable and rest on the Palaeozoic Phulchauki Group of Kathmandu Complex. The presence of Upper Pliocene sediments at the bottom of the Kathmandu valley extends the episode back to the Middle to Late Pliocene. The basement geology as shown in Figure, the area consists of a highly weathered zone of Phyllite partings with metasandstone (Tistung Formation) and slope Scree/ talus deposits covering the rocks on the hillside slope. And, in the lower valley, Kalimati Formation as a quaternary deposit which is lake sediment covers these base layers as shown in Figure 5.2.

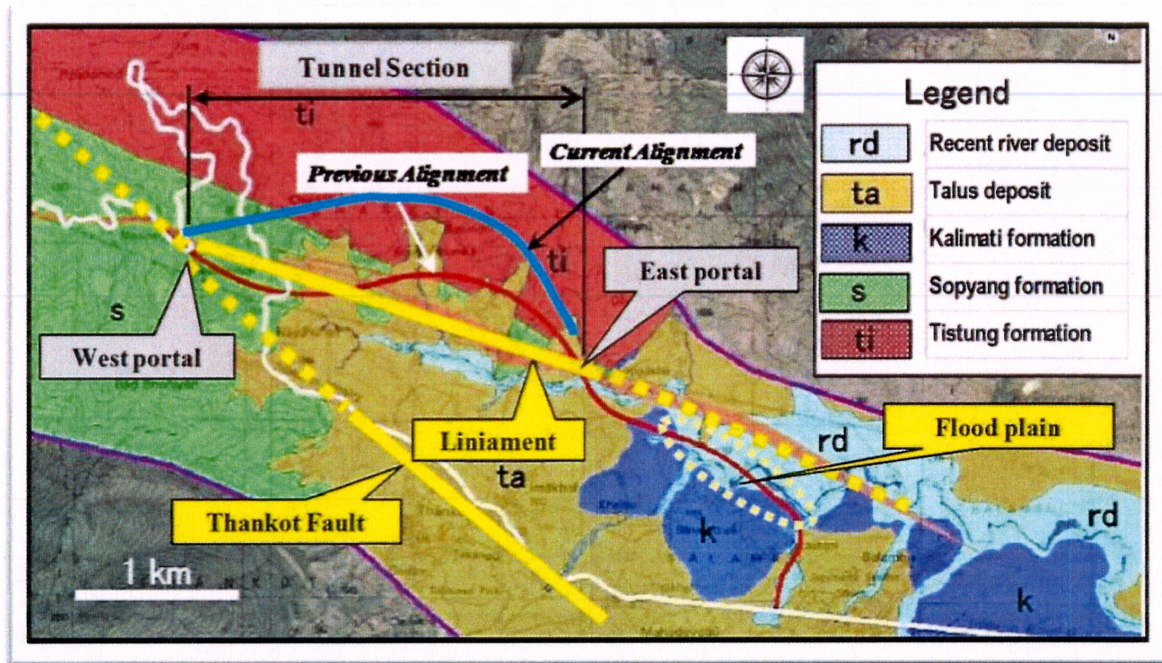


Figure 5-2: Geological map of the Project area with the Tunnel Alignment

The area is covered by thick semi-consolidated fluvio lacustrine sediments. The maximum depth of the valley sediments is more than 550 m based on the borehole log carried out by DMG in 2005 located at the central part of the valley. These thick sediments are mainly derived from the surrounding hills by the ancient drainage channel system.

The Drilling Report provided by the Hazma Ando Corporation up to 30 m and 101.5 m in total at five boreholes reveals that the horizon consists of the five-layer sediments. In addition, the Standard Penetration Test was carried out every 1.5 m in depth and suggests that the layer is loose to medium dense consistency. The water static water table was encountered during drilling at 6.0m depth.

The first layer between 0 m to 4.50 m below ground level consists of brown to black micaceous silty, clay, and occasionally organic clayey layer is dominated. The second layer consists of a firm to stiff grey silty clay with fine sand and occasional grains of muddy fine sand at the depth of 4.5 m to 6 m. The third layer consists of variously colored (Grey to yellowish-brown) Silty clay with an appreciable amount of silty layer along with the thin lamina of the dark grey organic clay is observed frequently to a depth of 6 m to 9 m. The fourth layer, 9 m to 21 m, consists of grayish-colored fine-grained silty sand with a thick clayey to silty layer at the depths of 17 m to 19 m and 20 m to 21 m. The fifth layer, to the depth of 30 m consists of a firm and moist grey to black mixtures of silty clay. Thin lamina of dark grey organic clay is also observed in between the layer.

5.2 BIOLOGICAL ENVIRONMENT

As the project area is located in the urban environment setting. There is no forest neither in the project area nor nearby vicinity.

There is no wildlife in the project area and its vicinity. The project is not located in a biological or archeological sensitive area.

5.3 SOCIO ECONOMIC AND CULTURAL ENVIRONMENT

5.3.1 Location of Project Area

The project area covers Chandragiri Municipality of Kathmandu district. The project area is located in an urban area. The population density of Kathmandu is 4,416 persons/square kilometer. The

major settlement located in the project area includes Gurjudhara, Kisipidi (Mahadevsthan), and Kisipidi. The settlements of the project area are clustered type

5.3.2 Demography of Project District

The population of the project districts is 2,041,587. The population of the male is 1,035,726, which is 50.7 percent of the total population. Similarly, the population of women is 1,005,861, which is 49.3 percent of the total population. The average household size of the project district is 3.75.

Table 5-2: Population Distribution in the Project District

Districts	No. of HH	Male	Female	Total	Average HH Size
Kathmandu	542,892	1,035,726	1,005,861	2,041,587	3.75

Source: National Population and Housing Census of Nepal 2021

5.3.3 Demography of Project Municipality

The total population of the project-affected municipality is 136,860. The population of the male is 49.9 percent and the population of the female is 50.1 percent. The average household size of the project-affected municipality is 3.8 which is slightly higher than the district household size.

Table 5-3: Population Distribution of Project Affected Municipality

Municipality	No. of HH	Male	Female	Total	Average HH Size
Chandragiri	35,994	68,303	68,557	136,860	3.8

Source: National Population and Housing Census of Nepal 2021

5.3.4 Ethnic Composition of Project District

The project district is dominated by Brahman/Chhetri, Janajati/Newar, Chhetri, and Dalit. According to the National Population and Housing Census of Nepal, 2021, the population of Brahman (21.95), Chhetri is 20.77 percent followed by Janajati (23.2%), and Newar (19.16%), Dalit (2.47%), and other groups (12.42%).

Table 5-4: Ethnic Population of Project Affected District

S.N.	Caste/Ethnicity	Population	Percent
1	Brahman/Chhetri	793,020	45.47
2	Janajati	456,241	26.16
3	Newar	383,136	21.97
4	Dalit	50,453	2.89
5	Others	61,390	3.52
Total		1,744,240	100.00

Source: National Population and Housing Census of Nepal 2021

5.3.5 Literacy Rate of Project District

According to National Population and Housing Census, 2021, the overall literacy rate of Nepal is 76.2 percent for both sexes. The literacy rate of males and females is 83.6 percent and 69.4 percent respectively. The overall literacy rate of the Kathmandu district is 89.2 percent where male literacy is 94.2 percent and female literacy is 84.2 percent.

Table 5-5: Population Aged 5 Years and Above by Literacy Status

S.N.	Sex	Literate		Illiterate		Total Population
		Number	Percent	Number	Percent	
1	Male	975,654	94.2	60,072	5.8	1,035,726
2	Female	846,935	84.2	158,926	15.8	1,005,861
Total		1,822,589	86.25	224,441	13.75	2,041,587

Source: National Population and Housing Census of Nepal 2021

The population of the project districts is 1,744,240. The population of the male is 913,001, which is 52.3 percent of the total population. Similarly, the population of women is 831,239, which is 47.7 percent of the total population. The average household size of the project district is 4.0.

5.4 PROFILE OF PROJECT AFFECTED HOUSEHOLDS

Altogether 81 households have been affected by the project by losing land and structures. That includes 3 under institutional ownership. Detailed list is presented in Annex 7. A total of 66 households were surveyed during the field study. The rest of households were not available in the project area during the survey period. These absent households reside somewhere else outside the project area and the field study team was not able to contact them for the household survey.

Table 5-6: Project Affected Household and Surveyed Households

Total Affected Household	Surveyed Household	Absent Household	Absent Percent
81	66	16	18.52

Source: Field Study, 2021, Updated in January 2025

5.4.1 Sex of Project Affected Household Head

Among the total project-affected households, 66 households were surveyed during the field study. Among them, 86.36 percent were male-headed and 13.64 percent were women-headed households. The number of the surveyed household head with sex is given below.

Table 5-7: Sex of Household Head of Project Affected Surveyed Household

S.N.	Sex	Number	Percent
1	Male	57	86.36
2	Female	9	13.64
Total		66	100.00

Source: Field Study, 2021, Updated in January 2025

5.4.2 Demography of Project Affected Households

Altogether 81 households will be affected by the project. Among them, 66 households were surveyed during the field study. Among the total affected households, the population of the male is 48.82 percent whereas the population of the female is 51.18 percent. The average household size of the project-affected households is 5.77.

Table 5-8: Population Distribution of Surveyed Household

Male		Female		Total Population	Total Household	Average Family Size
Number	Percent	Number	Percent			
186	48.82	195	51.18	381	66	5.77

Source: Field Study, 2021, Updated in January 2025



The age distribution of the surveyed population is categorized into four groups less than 6 years, 6-15, 16-60, and above 60 years. Among the total population, 65.88 percent is within the age group of 16-60 years or economically active population. The population of children or dependents is 18.11 percent. The population above 60 years is 16.01 percent.

Table 5-9: Population Distribution by Age Group

S.N.	Age Group	Male		Female		Total	
		Number	Percent	Number	Percent	Number	Percent
1	Below 6 Years	17	9.14	17	8.72	34	8.92
2	6-15 Years	19	10.22	16	8.21	35	9.19
3	16-60 Years	120	64.52	131	67.18	251	65.88
4	Above 60 Years	30	16.13	31	15.90	61	16.01
Total		186	100.00	195	100.00	381	100.00

Source: Field Study, 2021, Updated in January 2025

5.4.3 Ethnic Composition of Project Affected Households

The project area is multi-ethnic composition. Brahmin, Chhetri, Janajati and Newar are major groups in the project area. Among the affected households, 74.24 percent is Newar where 18.18 percent is Brahmin/Chhetri, 6.06 percent is Janajati and 1.52 percent is Dalit. Caste/ethnic composition of project affected households is given below.

Table 5-10: Caste/Ethnic Composition of Project Affected Household

S.N.	Caste/Ethnicity	No. of Household	Percent
1	Brahmin/Chhetri	12	18.18
2	Dalit	1	1.52
3	Newar	49	74.24
4	Janajati	4	6.06
Total		66	100.00

Source: Field Study, 2021, Updated in January 2025

5.4.4 Occupational Status of Project Affected Population

Among the economically active population of the affected households, the majority are engaged in trade and business, which is 26.69 percent. Similarly, 26.32 percent population is engaged in house maker (household chores). The population engaged in service is 19.17 percent. The population engaged in foreign employment is 7.89 percent. Only 3.76 percent population is engaged in agriculture. The occupational status of the project-affected population has been presented below.

Table 5-11: Occupational Status of Project Affected Population

S.N.	Occupation	Number	Percent
1	Agriculture	10	3.76
2	Governmental Service	13	4.89
3	Non-Governmental Service	38	14.29
4	Trade and Business	71	26.69
5	Non-Agricultural Labor	1	0.38
6	Foreign Job	21	7.89
7	House maker	70	26.32
8	Pension	5	1.88
9	Aged People	26	9.77
10	Jobless	11	4.14

S.N.	Occupation	Number	Percent
	Total	266	100.00

Source: Field Study, 2021, Updated in January 2025

5.4.5 Income of Project Affected Households

Income and expenditure are also major indicators to observe the living standards of affected people. The major sources of household income of the surveyed households are found in trade/business, rent, services, and remittance. Though agriculture is the main source of income in Nepal, the contribution of the agriculture sector to household income is non-significant. Different sources of household income of the project-affected households are presented below.

Table 5-12: Source of Household Income of Affected Households

S.N.	Source	Income (NRs.)	Percent
1	Service	13,365,000	16.36
2	Trade/Business	29,195,000	35.74
3	Rent	24,644,000	30.17
4	Remittance	9,220,000	11.29
5	Labor	300,000	0.37
6	Pension	2,962,000	3.63
7	Agricultural	1,999,000	2.45
	Total	81,685,000	100.00

Source: Field Study, 2021, Updated in January 2025

The average annual household income of the project-affected household is NRs. 1,237,652. Similarly, the average per capita income of project affected population is NRs. 214,396. The annual household income of the project-affected households is presented below.

Table 5-13: Annual Household Income of Affected Households

Total Household Income (NRs.)	Average Household Income (NRs.)	Per Capita Income (NRs.)	Total Household	Total Population
81,685,000	1,237,652	214,396	66	381

Source: Field Study, 2021, Updated in January 2025

Based on the income range of project-affected households, most of the households have more than NRs. 1,000,000 income, which is 51.52 percent of the total household. None of the households has been found to have less than NRs. 200,000 income. The range of annual household income of the project-affected households is presented below.

Table 5-14: Range of Annual Household Income of Affected Households

S.N.	Income Range (NRs.)	No. of HH	Percent
1	Less Than 200,000	0	0.00
2	200,000 to 300,000	4	6.06
3	300,000 to 500,000	5	7.58
4	500,000 to 1,000,000	23	34.85
5	More Than 1,000,000	34	51.52
	Total	66	100.00

Source: Field Study, 2021, Updated in January 2025

5.4.6 Expenditure of Project Affected Households

The average annual household expenditure of the project-affected households is NRs. 705,230. Likewise average annual per capita expenditure is NRs 122,166. The expenditure of the surveyed households is presented below.

Table 5-15: Annual Household Expenditure of Affected Households

Total Expenditure (NRs.)	Average HH Expenditure (NRs.)	Per Capita Expenditure (NRs.)	Total Household	Total Population
46,545,175	705,230	122,166	66	381

Source: Field Study, 2021, Updated in January 2025

5.4.7 Food Sufficiency Status of Project Affected Households

The contribution of agricultural income and livelihood were assessed by measuring food sufficiency from agricultural products. The household survey revealed that the livelihood option of most of the project-affected people depends on the non-agriculture sector. 62.12 % of the surveyed households did not have any agricultural production. The food sufficiency of the project affected households from their agricultural production for 0-3 months is 22.73 percent, 3 to 6 months is 13.64 percent, and 6 to 9 months is 1.52. The food supply during the deficit period is covered through income from non-agricultural sectors.

Table 5-16: Food Security Status of Affected Households from Own Production

S.N.	Food Security Month	No. of HH	Percent
1	12 Months and Above	0	0.00
2	9 to 12 Months	0	0.00
3	6 to 9 Months	1	1.52
4	3 to 6 Months	9	13.64
5	0-3 Months	15	22.73
6	No Production	41	62.12
Total		66	100.00

Source: Field Study, 2021, Updated in January 2025

5.4.8 Social Services

5.4.8.1 Educational Status of Project Affected Population

The overall literacy rate of project affected population is 84.66 percent. The literacy rate of males and females is 92.00 percent and 77.40 percent respectively. Among the total population, 19.03 percent is graduate and 9.66 percent is Masters's and above level. The educational status of school-going age and above of the affected population is presented below.

Table 5-17: Educational Status of Project Affected Population

S.N.	Educational Status	Male		Female		Total	
		Number	Percent	Number	Percent	Number	Percent
1	Illiterate	14	8.00	40	22.60	54	15.34
2	Basic Level	41	23.43	34	19.21	75	21.31
3	Secondary Level	11	6.29	9	5.08	20	5.68
4	SLC/SEE Level	19	10.86	20	11.30	39	11.08
5	Plus 2 Level	39	22.29	24	13.56	63	17.90
6	Graduate Level	36	20.57	31	17.51	67	19.03
7	Master's & Plus	15	8.57	19	10.73	34	9.66
Total		175	100.00	177	100.00	352	100.00

Source: Field Study, 2021, Updated in January 2025

5.4.8.2 Health Service

Being located in very close proximity to Kathmandu Metropolitan City, the project area has good access to health services. Each ward of the Palika has its health post and there are some private



clinics. The nearest hospital, Nepal APF hospital Kisipidi (Mahadevsthan) has located about 2.00 km from the project site.

5.4.8.3 Water Supply and Sanitation

All the affected households have a drinking water supply facility and toilet facilities. All the houses are connected to the sewer drain.

5.4.8.4 Communications

The communication facilities are good and project area. Mobile phones are widely used by people. Internet facility is easily available.

5.4.8.5 Transportation

Kalanki - Nagdhunga road, the main entry/exit point of Kathmandu passes through the project area. The proposed flyover is to ease the likely traffic congestion due to the intersection crossing of the access road to the tunnel and Kalanki-Nagadhunga Road.

5.4.8.6 Energy

The major sources of energy used by households are electricity for lighting and LPG gas for cooking.

5.4.9 Social, Cultural and Religious Activities

5.4.9.1 Social Activities

People are actively involved in social services. The drinking water supply is being managed by the water users group of the beneficiaries. Senior citizens are organized and women groups are active and youths are organized under the youth clubs.

Project-affected families were organized in a short period into a Pressure Group to negotiate the rate compensation with the project. The subcommittee of the Compensation Determination Committee made a consultation with the local Pressure Group in recommending the compensation rate for the land.

5.4.9.2 Cultural Activities

The major cultural practices of Newar, Brahmin, Chhetry, , ethnic groups of backward class, and other occupational ethnic groups include Nwaran (giving the name to the child for the first time), Pasni (feeding grains to a child for the first time), Bratabhanda (shaving the hair of male child for the first time), Gufa Rakhne (keeping female child in a dark room for 12 days at the time of puberty), marriage, rituals during the death of a family member (cremation of dead body) and Sharadha (offering of food to the dead member of the family).

Apart from that local community take the chariot process during the particular route.

5.4.9.3 Religious Activities

The people of the area celebrate Dashain (biggest festival of all Nepalese worshipping goddess Durga Bhawani), Tihar (festival of worshipping Laxmi, the goddess of wealth), Shreepanchami (the festival of worshipping Saraswoti, the goddess of knowledge), Ram Nawami (the festival of worshipping god Ram), Teej (festival of worshipping god Shiva by women). People celebrate these festivals with joy.

5.4.9.4 Cultural Sites within ROW

Gurjudhara, a stone sprout with historical value is located just before the start of the flyover. Though it is not located within the project area, attention would be required during the construction period so that the sprout is not disturbed. A cultural path of the local people crosses the proposed flyover access road. The initial design of the flyover ramp was affecting the cultural path, and the path was proposed to relocate. But on the suggestion of the local community, the ramp of the flyover moved forward so that the cultural path is not disturbed.



6 RELEVANT POLICIES, ACTS AND RULES PROJECT DESCRIPTION

6.1 INTRODUCTION

This Chapter describes the relevant Policies, Acts, and Rules for the Initial Environmental Examination of Kisipidi (Mahadevsthan) Flyover. There are many overarching and sectoral policies, legislations, and guidelines of the Government of Nepal (GoN) attracted by the project. Environmental Assessment (EA) activities are enthusiastically betrothed by GoN for its developmental projects since the implementation of the National Environmental Impact Assessment Guidelines, 1993 and other sectoral EIA Guidelines. These guidelines have facilitated proponents to screen and prepare EIA/IEE/Brief Environmental Assessment reports. The amalgamation of Environmental assessment in development projects has further been reinforced with the enforcement of the Environment Protection Act, 2076 (2076), and Environment Protection Rules, 2077 (2020). The EPR, 2077 (2020) obligates the proponent to follow legal proceedings.

6.2 CONSTITUTION OF NEPAL

Article 30 of the Constitution of Nepal, 2072 (2015) proclaims that (1) "every citizen shall have the right to live in a clean and healthy environment; (2) the victim shall have the right to obtain compensation, following the law, for any injury caused by environmental pollution or degradation; and (3) this Article shall not be deemed to prevent the making of necessary legal provisions for a proper balance between the environment and development, in development works of the nation. To meet this Constitutional right, EIA/IEE and additional compliance measure is mandated through the implementation of the Brief Environmental Study (BES) through Environment Protection Act, 2076 (2076) provides impact-based measures to mitigate environmental pollution, facilitate environmental enhancement, and balance environment and development.

Under Policies of the State, Article 51 (G) (policies relating to protection, promotion, and use of natural resources) includes assertion to protect, promote, and make environmental-friendly and sustainable use of natural resources.... to make multi-purpose development, to conserve, promote, and make sustainable use of, forests, wildlife, birds, vegetation and biodiversity, by mitigating possible risks to the environment ... and to pursue the principles of environmentally sustainable development,".

6.3 SUPREME COURT VERDICT ON LAND ACQUISITION OF TRP

On the petition of the affected land people of the Tribhuwan Raj Path. The Supreme Court has made the verdict that land acquisition could be made by paying the proper compensation to the land owner. In the case of the TRP, the compensation will have to be paid for the land beyond 8.0 m from the center line of the road. Based on this verdict, the land compensation has been proposed for the Project.

6.4 RELEVANT POLICIES AND STRATEGIES

GoN started to integrate environmental aspects in development planning and administration in the 1980s. From Sixth Plan (1980-1985) government policies emphasized carrying out EIA study of major development projects. The policy commitment was reinforced in Seventh Plan (1985-1990), and to 14th Plan (2016-'19). The 14th Plan focused on the development of sectoral guidelines and manuals, environmental monitoring and auditing, and the use of strategic environmental assessment (NPC, 2016).

The Approach Paper of the 15th Plan (BS 2076/77-2080/81) on the environment has, *inter alia*, considered EIA/IEE as an integral part of infrastructure development, and committed to making the report approval process transparent and easy, and allocate a certain percentage to minimize impacts-generated risks (NPC, 2019). The 15th Plan has the vision to make Nepal prosperous through the sustainable development of the road network. Furthermore, the Plan has an objective of increasing productivity, production, and environmental services from forests, biodiversity, and watershed. It has the working policy of, *inter alia*, integrating bio-engineering as an integral part of



infrastructure and development projects. The Plan has planned to ensure compensatory plantation through the Nepal Forest Agency (Nigam), which is established in early August 2019.

Fourteenth Plan, 2073/74-2075/76 B.S aimed for economic growth through infrastructure development, commercialization of agriculture, and social development. Regarding road transportation, it has aimed to rehabilitate and reconstruct the road damaged by the earthquake. The concept of greenery on either side of the road has been introduced and environmental consideration during construction and maintenance of the road is pointed

20 Years Road Plan 2059- 2079 has main objectives of the development of Strategic Road Networks (SRN), the implementation strategies 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

National Environment Policy, 2076 (2019) has the objectives of mainstreaming environmental concerns in all aspects of development, and ensuring environment conservation and sustainable management of natural resources. It calls, *inter alia*, for compliance with the environmental standards; implementation of environment-friendly technologies; control activities related to disposal and/or discharge of polluted water, sewage, and wastes into the river; internalize environmental aspects in development projects; mitigating adverse impacts and augment beneficial impacts of development projects, construction of physical infrastructure in , environmentally friendly manner in line with sustainable development and carry out environmental monitoring and auditing.

National Policy on Land Acquisition, Resettlement and Rehabilitation in Infrastructure Development Projects 2071 (2015) provides clear guidelines to screen, assess and plan land acquisition and resettlement aspects in development projects. The Policy highlights the need to handle resettlement issues with utmost care and forethought, particularly in the case of vulnerable groups. There are provisions for voluntary land donation by non-poor owners. A voluntary donation will be accepted if a) donation of land is <10% of his/her agricultural land; b) If the affected families and individuals do not fall under the category of the deprived and marginalized people; c) If the donating family is aware about its right to decline or accept the proposal of land donation; d) The donation is unforced, not the result of community pressure or intimidation and has accepted to donate land voluntarily and through the written agreement made in the presence of the third party;) d) If donating party is consulted and informed about procedures and has concluded such as land measurement and ownership transfer which had been completed during the period of detailed engineering design; e) Should be no issues of subjudice in the court of law, stake claim from partner, nor leased out or mortgaged the land. Furthermore, squatters are entitled to receive compensation for their land, including crops and trees, which should be assessed scientifically and valued at no less than the current market rates.

Climate Change Policy, 2076 (2019) has a goal of contributing to the socio-economic prosperity of the country by developing a climate-resilient society. The Policy has the objectives of advancing capacity on climate change adaptation, developing ecosystems resiliency, promoting a green economy by adopting low carbon economic development concept, mobilizing national and international finance, making the information service effective, mainstreaming or internalizing climate change into relevant policy, strategy, plan, and programs, and also mainstreaming gender and social including in climate change mitigation and adaptation programs.

The Land Use Policy, 2069 (2015) to make optimum use of available land and land resources, and sustainably manage lands. The Policy has the objectives of (a) categorizing entire lands of the country into various land use zones; (b) devising level-wise (Federal, Provincial, and Local) land use plans; (c) ensuring land uses based on land use plans; and (d) mitigating natural and human created-disastrous hazards . The Policy has classified the entire land of the country into several zones namely agriculture, residential, commercial, industrial, mines and minerals, cultural and archaeological, river and lake-reservoir, forest, public use and open space, and building materials excavation, and other zones. The Policy provides provisions to prepare and implement land use plans at the Federal, Provincial and Local levels while the Provincial and Local Plans will conform to the Federal plans. The Policy promotes to use of land and land resources based on specific land use zones and land use plans. The Policy equally emphasizes conservation and optimum use of forests and other natural heritages with the strategy of afforestation of equivalent area if forest area is to be used for national priority projects. The Policy has set strategies to identify vulnerable zones



to keep a balance between development and the environment to mitigate natural and human created-hazards. *The National Transport Policy, 2058 (2001)* emphasizes constructing and improving the road and transport infrastructure that provides beneficial environmental impacts and to develop the transport system compatible from the view of environment in the urban and rural areas by developing the transport system of international standards. The Policy stressed on by evaluating the environmental effect, minimizing side effect, the work of design, construction and maintenance of road to be managed. Taking into account the assessment of environmental impacts and the minimization of adverse effects, the policy underscores the effective management of road design, construction, and maintenance.

The National Transport Policy and 20 Years Road Plan emphasized that the entire process of land acquisition and transferring the land ownership to the project shall be established before the commencement of road project implementation. Equally, a basis for livelihood shall be established for the fully displaced families by way of rehabilitation or by any other means.

These policies and strategies open avenues to ensure the integration of environmental aspects in hydroelectricity development. These have been given due consideration during the preparation of this report.

6.5 REVIEW OF ACTS AND RULES

Existing regulatory instrument – the law that includes Acts and Rules – provides the proponent with an opportunity to identify and mitigate environmental problems associated with the projects. The regulatory agency is also obliged to assist the proponent in achieving environmental management goals.

Nepal has a wide range of regulatory frameworks for the protection of the environment and the promotion of development activities. They provide an opportunity to mobilize the natural resources for the benefit of the nation and to protect the environment and also to prevent further damage due to physical development activities including that in the water resources development sector. The following are the relevant laws that are attracted to the development of the proposed project.

6.5.1 Environmental Law

The Environment Protection Act (EPA), 2076 (2019) includes multiple provisions aimed at integrating an environmental assessment system to safeguard and promote a clean and healthy environment by mitigating adverse impacts on human beings, wildlife, and physical structures. It emphasizes that prior to the implementation of any development project, an environmental assessment must be conducted. This assessment, whether it be a BES, IEE, or EIA, is determined based on factors such as project location, type, and scale.

The Act provisions for preparing a separate report of (a) brief environmental study; (b) Initial Environmental Examination (IEE); (c) Environmental Impact Assessment (EIA); (d) Strategic Environmental Analysis (SEA); and (e) Supplementary EIA for the prescribed proposals. The first three types of studies are kept under 'environmental study report' (ESR). The Act also provisions for preparing EST for all prescribed proposals and submitting the reports for approval by complying with the prescribed procedures. As per Section 3 of the Act, the proponent shall submit the brief environmental study report or IEE report to the prescribed agency, and the EIA report to the Ministry of Forests and Environment.

Section 8 of the Act prohibits implementing any proposal without approving its ESR. The Act includes provisions for conducting SEA for specified policies, programs, or projects (Section 9). (b) Preparing an environmental management plan with clear mitigation measures for adverse impacts for project construction, and post-construction or implementation stages; and (c) Supplementary EIA, if necessary. The Act obliges the Ministry or prescribed agency to carry out environmental auditing after two years of services by the project and then within six months (it means within two and half-year). The Act also provisions for immediate stop and/or may punish according to the degree of offense for any activities if implemented without approving the ESR or non-compliance with the approved report. MoPIT approve this IEE based on Section 3 (3) of Act.



6.5.2 Road Laws

The Public Road Act, 2031(1974) has been applicable legislation provides provisions to ensure the construction and operation of this road projects smoothly. The Act provisioned that, GoN has power to collect development tax from landlords near the roads who benefit from the public roads. Section 3 of the Act empowers GoN may prohibit through notification in the Nepal Gazette, the construction of any permanent structure (other than walls) within 6 meters of the road formation edge. The DOR may acquire temporarily the land and other property adopting compensatory measures during the construction, rehabilitation, and maintenance of the public road. The Act obliges the DOR to plant trees on both sides of the road and handover them over to the local bodies (rural municipality or municipality) for their management. The Act also empowers the DOR to operate quarries and borrow pits and other facilities during road construction. In a nutshell, the Act facilitates the construction of this road and acquires land and property for the extraction of construction materials and development of other facilities through compensation as negotiated and as well as to maintain greenery along the roadside.

6.5.3 Land Use and Land Acquisition Law

Land Use Act, 2076 (2019) empowers the government to implement a land use program and categorize land into agriculture, residential, commercial, industrial, mineral, forests, wetland, public use, cultural and archaeological, and other zones. The Act stipulates the formulation of land use plans for the Government of Nepal, provincial governments, and local authorities. It mandates that prior to formulating such plans, a comprehensive assessment must be conducted based on factors including land conditions, population growth rate, food and housing requirements, economic development, and the demand for land for infrastructure construction.

Land Acquisition Act, 2034 (1977) empowered to GoN acquires lands for public purpose. By providing compensation for the private land and properties, as determined by the Compensation Fixation Committee. Government can acquire land at any place in any quantity by giving compensation, for the land acquired for any public purpose or for operation of any development project initiated by government institutions.

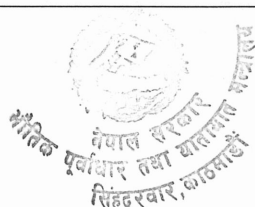
Immovable Property Requisition Act, 2013 (1956) empowered to requisition of immovable property from the Government of Nepal for any public purpose and requisition. The Act provides that no queries or challenges may be raised in any court regarding the order of requisition issued in accordance with this Act.

6.5.4 Other Relevant Laws

The Land Act, 2021 (1964) contains provisions related to compensation issues, particularly on the maximum size of individual landholdings. According to the Act, a landowner may not be compensated for more than he/she is entitled to hold the land. The Act also specifies the compensation entitlements of registered tenants on land sold by the owner or acquired for development purposes.

The Road Board Act, 2058 (2002) is promulgated to make necessary provisions on having the roads repaired and maintained, making cost effective the expenditures to be incurred in repairing and maintaining the roads and making transparent and effective the repairing and maintenance works of the roads.

The Act has established the Road Board to carry out routine, recurrent periodic and emergency repair and maintenance works of the road and to make arrangement for imposition on and collection of tolls from the motor vehicles plying on the road as well as collecting levy from the fuel tax. The primary objective of the Act is to ensure a sustainable fund for the planned maintenance of roads. The aim of planned maintenance is to keep existing maintainable roads in serviceable condition, reduce vehicle operating cost and provide more comfort to the road users. The board is empowered to collect the tolls prescribed by the government through public notification in the Nepal Gazette. The board provides fund for repair and maintenance of roads included in the integrated annual programme prepared.



Local Government Operation Act, 2074 (2017) is enacted to make legal provisions for providing qualitative services through the local governments. Under Section 11 (5), local government is empowered under the heading of additional functions, duties, and powers to formulate land use policy, plan, action plan, and implementation as per federal and provincial level laws.

Relating to environmental protection and biodiversity, local government is empowered to prepare local policy, law, standard, plan formulation, implementation, monitoring, and regulation. It also provisions for reducing local level environmental risk and pollution and sanitation and solid waste management, adoption of low emission and environmental-friendly development, conservation and promotion of green areas, determination and management of local-level environmental protection area, and other activities related to environmental protection and biodiversity.

Relating to the watershed, wildlife, and minerals, the Act provides provisions to formulate local policy, law, standards, and formulation and implementation of a plan, including water source protection, watershed management, use of gravels, stones, sands, soil, and minerals and mineral products.

During the construction stage, the project is expected to use explosives in small quantities. If the project uses explosive materials, it will comply with the provisions of the *Explosives Act, 2018 (1961)*. But this Project will not be using the explosive.

Inter-Governmental Fiscal Management Act, 2074(2017) is enacted for the inter-governmental fiscal management of the center, state, and local government. Section 7 has provisioned that GoN shall create the federal divisible fund to deposit obtained from the royalty following Federal law and subsequently Schedule-4 of the Act has provisioned that Natural Resources Revenue distribution mechanism in federal, provincial, and local level government. But the distribution of the toll tax has not been worked out yet.

The Labor Act, 2074 (2017) has been enacted to make provisions for the rights, interests, facilities, and safety of workers and employees working in enterprises of various sectors including construction industries. The Act has regulated eight hours per day and forty-eight hours per week as working hours. Similarly, overtime-related issues as well-provisioned, which allows 4 hours per day and 24 hours per week. The overtime wages is also continued to be one and half times his/her ordinary rate of wages.

The Act has made a condition that where twenty or employees are engaged, the employer entails constituting a Safety and Health Committee. Similarly, the Act provisioned that where ten or more employees are engaged in the entity, the employer entails constituting the Collective Bargaining Committee. The Act has required the engagement of outsourced employees can be hired for specific or prescribed work in an entity by the Ministry by publishing a notice in Nepal Gazette upon recommendation of the Central Labor Advisory Council (CLAC).

Child Labor Prohibition and Regulation Act, 2056 (2000) is the major Act related to child labor in Nepal. Section 3 (1) of the Act prohibits the employment of any child, as labor, below the age of 14 years.

Section 4 of the *Solid Wastes Management Act, 2068 (2011)* makes the person or institution responsible for the processing and management of wastes. The Local Body may manage the solid waste or allow the institution to use the Sanitary Landfill Site by levying fees as determined by the Local Body. The Act emphasizes on 3R (reduce, reuse, and recycle) principle for waste management.

Solid Waste Management Regulation, 2070 (2013) is provisioned that the local government is responsible for the segregation and disposal of solid wastes. In the meantime, Regulations have made everyone responsible for harmful waste.

Considering the road as a public product, the *Consumer Protection Act, 2075 (2018)* states that every consumer has the right to obtain quality goods and services along with the right to easy access to goods and services, and the right to obtain compensation against any harm and injury caused with the use goods or services. The Act empowers the Government to determine the standards or quality of goods or services by fulfilling the process as prescribed. The Act also provisions for compensation committee and compensation realization. However, this Act is more related to the consumable product produced, imported, hoarded, transported, sold, and distributed.



A review of the existing legal regime on the environment and sectoral legislation calls upon the proponent to integrate and implement environmental protection measures to avoid, mitigate or compensate for adverse environmental impacts.

As the road does not pass through any forest area as such, the *Forest Act, 2076 (2019)* and the *Forest Rules, 2079 (2022)* are not applicable. Similarly, the road does not pass through any declared protected areas (national park, wildlife reserve, conservation area, hunting reserve, or strict nature reserve) and also declared watershed area, the *National Parks and Wildlife Conservation Act, 2029 (1973)*, and the *Soil and Watershed Conservation Act, 2039 (1982)* and their Rules are not attracted.

6.6 ENVIRONMENTAL ASSESSMENT GUIDELINES AND MANUALS

Before and after the enforcement of obsolete EPA (1997) and EPR (1997), various environmental guidelines have been developed to integrate the environmental aspects in development projects and programs. Before the mid-1990s, GoN endorsed and implemented the procedural environmental guidelines such as National Environment Impact Assessment Guidelines in, 2050 (1993), and separate EIA guidelines for Forestry and Industry Sectors in 1995 (NPC, 1993, and MFSC and MOI, 1995). These Guidelines assist the proponent to identify the likely impacts of the projects on the environment, proposing mitigation measures, and conducting monitoring to make the projects environmentally sound, less costly (economically feasible), and technically appropriate. These guidelines, including the draft EIA guidelines for Road Sector (1996), facilitate the proponents to prepare the project-level environmental assessment (IEE or EIA) reports

Reference Manual for Environmental and Social Aspects of Integrated Road Development, MPPW/DoR, 2003 has been prepared by DOR under RMDP. The Manual is designed to help integrate social and environmental considerations, including public involvement strategies, with technical road construction practices. It suggests a stepwise process of addressing E&S issues alongside the technical, financial, and others. The Manual is based on the experiences of Nepal, as well as incorporates the national (EPA, 1996; EPR, 1997/1999) and international 'best practices'. It suggests a process of the environmental and social assessment process, roles and responsibilities of stakeholders at various stages of the project, advice on impact mitigation action plans, and process for involving the public.

Environmental Management Guidelines, GESU/DoR, May (2054)1997 and reprinted version (1999) has been a part of operational practices for all road maintenance, rehabilitation, and construction activities under DOR. The Guideline consists of environmental mitigation measures to be incorporated into DOR projects, the procedure for public participation, and socio-economic considerations. The environmental mitigation measures are broken down into twelve categories including (i) Quarries; (ii) Borrow Pits; (iii) Spoil and Construction Waste Disposal; (iv) Work Camp Location and Operation; (v) Labor 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. Implementation methods for undertaking mitigation measures for each of the activities are also given in the Guideline. The Guideline suggests methods for determining how and when the public should be included in the environmental analysis. The Guideline also advises on socio-economic impacts, and strategies for reducing or avoiding the potential negative impacts, and maximizing the beneficial impacts to residents. The Socio-economic impacts include important issues of land acquisition and compensation and other economic impacts related to markets for agriculture production, agriculture inputs, nutrition, extraction of natural resources beyond replenishment, migration, and influx of migrants, land speculation, illegal logging, and mining, pottering, etc. It also includes impacts on cultural heritage.

The Interim Guidelines for Enhancing Poverty Reduction Impacts of Road Projects, 2064 (2007), has been prepared in the backdrop of the Poverty Reduction Strategy and the Tenth Plan of the Government of Nepal (GON) has emphasized the need for addressing the issues related to the chronic poverty and social exclusion. The document has endorsed PWD directives and proposed additional measures to enhance the poverty reduction impact of roads projects incorporating experience from different DOR or other agency-executed road projects in Nepal, as provided in different project reports, and other relevant DOR guidelines/procedures



The Environmental and Social Management Framework report (ESMF) prepared by the Department of Roads (DoR) is a complete package of guidelines for the preparation of IEEs, EIAs and SIAs to be used as standard operational assessment and management models for future sub-projects becoming selected under the SRN road program. It provides:

- A matrix of mitigation measures to manage the identified impacts.
- Gives practical, feasible, credible, and cost-effective measures to offset or reduce adverse environmental and social impacts to an acceptable level, and ways to enhance positive impacts. As applicable, also address secondary, induced, and cumulative impacts that may be associated with the forthcoming road construction activities.
- With public consultation process and the consultation framework, with the participation of local people focusing on local employment, gender issues, empowerment, and local control instruments.
- Resettlement Policy Framework.
- Vulnerable Community Development Framework.
- Measures to strengthen project implementation mechanisms and institutional arrangements at different phases of the project cycles.

DoR has completed an integrated 10-year sector-wide plan and a *Priority Investment Plan (2007-2016)* for the development and management of strategic roads, including institutional development requirements. The PIP is based on the GoN's accessibility targets, namely to bring the entire hill population within a four-hour walk to an all-season road and the Terai population within two hours. This objective has been formulated in the 2004 Local Infrastructure Development (LID) policy, itself based on the National Strategy of Rural Infrastructure Development (1997). The policy also commits GoN to a decentralized governance system for rural road development and operation in districts. GoN's policies also recognize the significant returns of rural road maintenance.

The Gender Equality and Social Inclusion Operational Guidelines 2074 (2017) emphasize the importance of policy formulation in acknowledging several overarching points. The Guidelines underscore understanding the abilities and challenges faced by women, impoverished individuals, vulnerable populations, and marginalized groups in accessing and utilizing services within sectors overseen by the MoPIT. Additionally, it has highlighted the significant impact of gender, income, caste/ethnicity, religion, and geographical location, which act as barriers limiting access to and utilization of sector resources for these demographics. The guidelines advocate for implementing differentiated strategies and approaches tailored to promote access and utilization of resources by these groups, recognizing them as key stakeholders with specific skills and capacities, and emphasizing the protection and promotion of their rights.

The Guidelines incorporate provisions for mainstreaming GESI within the Strategic Roads Sector, encompassing requisites from the pre-feasibility stage onwards. This includes utilizing participatory tools to identify marginalized communities, conducting mandatory labor surveys with disaggregated data on skills levels, and engaging in consultation and coordination with local groups, representative organizations, and governmental bodies. The guidelines also advocate for revising committee functions to ensure representation of women and excluded groups, integrating GESI issues into pre-feasibility studies, and reporting findings and recommendations with disaggregated data to address the specific challenges experienced by women, the poor, and marginalized individuals. Furthermore, recommendations are made to include GESI-related activities, identify appropriate technologies that empower marginalized groups (such as construction methods utilizing local materials and equipment accessible to women and the poor), and enhance the skills of these groups in using construction equipment. Additionally, GESI components to be incorporated into project appraisal, implementation, design, construction, monitoring, and evaluation procedures to ensure compliance with GESI requirements throughout all stages of road sector projects.

Occupational Safety and Health Guidelines, 2080 (2023): The Guidelines applicable to the OHS Unit of GESU within the DoR plays a pivotal role in fostering cooperation, coordination, and communication among diverse stakeholders contributing to the safe and efficient operation of projects and the management of worksite emergencies involved in various projects. Initiatives have been established such as the DoR must establish a comprehensive coordination and communication network among all relevant stakeholders, including provincial and local authorities, to ensure effective OHS performance and emergency management through, seamless communication. The



DoR's OHS Unit to serve as the central focal point responsible for facilitating communication among stakeholders and ensuring consistent engagement.

Furthermore, the DoR, OHS Unit to compile a list of stakeholders involved in road infrastructure development and devise clear procedures for their engagement and partnership and form Standard protocols for information collection and disclosure pertaining to OHS matters should be developed and communicated to all stakeholders. Additionally, the DoR to facilitate communication at different project phases, including pre-bid, ongoing construction, and project completion stages. It is also imperative for the DoR to identify relevant national and international organizations and modalities for cooperation to strengthen OHS practices. The OHS Unit to record communications and ensure accessibility to the OHS committee and other stakeholders. Moreover, employers and organizations are urged to integrate national and international best OHS practices into their construction sites, setting an example for others while adhering to intellectual property protocols.

6.7 INTERNATIONAL INSTRUMENTS

Nepal is also a Party to the ILO Convention 169 (Convention concerning Indigenous and Tribal Peoples in Independent Countries, 1989) which provides opportunities for consultation and participation of indigenous people, in the Nepalese context, in development programs if their livelihood is going to be affected. Although the Convention entered into force in September 1991, Nepal ratified this on 14 September 2007. The project will make efforts to ensure the participation of indigenous people is affected by the project activities if any.

Nepal is a Party to the Convention on Biological Diversity (CBD), Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES), Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar Convention), and World Heritage Convention, which are related to species conservation, international trade of species and their products, and conservation of wetlands, and natural and cultural heritage. Gurju Dhara with a cultural value is located in very close proximity to the project site and a cultural traditional path of the Newar community is affected by the original design of the Flyover. Necessary amendments are made in the design to retain the traditional cultural path.

6.8 RELEVANT INSTITUTIONS

During the construction and operation of this project, some organizations will be directly involved. They are grouped under local and national level institutions. The local institutions include both village and district-level organizations.

6.8.1 Local Governments

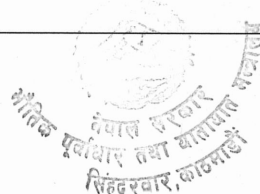
The Kisipidi (Mahadevsthan) Flyover is located in ward no 5 and ward no 8 of Chandragiri Municipality. The affected Municipality can facilitate the project in land and property acquisition and compensation issues, and educate the local people in assisting project construction in time. Based on the Local Government Operation Act, 2074 (2017), the Municipality can plan and implement the environmental conservation programs and the project can assist in such activities of the Municipality.

6.8.2 District Administration Office (DAO)

The District Administration Office (DAO), of the Kathmandu district, could assist the project with land and property acquisition and compensation issues, and avoid and/or resolve any conflicts during the project construction and implementation.

6.8.3 District Coordination Office (DCO)

The Kathmandu DCOs could play a pivotal role in educating local people and coordinating local governments in relevant activities for the timely completion of the project.



6.8.4 Other District Organizations

The Land Revenue Office might provide technical assistance in transferring the land ownership in the name of the proponent once the private lands and properties are compensated.

6.8.5 National Institutions

(i) *Department of Roads*

As the proponent of this project, DoR intends to make this project environment-friendly and sustainable by implementing all applicable mitigation measures. At the central level, the DOR, in particular, its Geo-Environmental and Social Unit (GESU) could facilitate the integration of environmental aspects in road upgrading, and maintenance. The GEU could also provide technical inputs on environmental matters and may provide technical assistance in environmental monitoring and/or instruct the project to comply with the environmental requirements during its upgrading and maintenance.

(ii) *Ministry of Physical Infrastructure and Transport*

MoPIT is the concerned agency of this IEE study. It has authority for the approval of terms of reference of the IEE Study and the IEE report itself. It can also facilitate the land and property acquisition process for the smooth implementation of the project. As per the EPR (2020), the ministry should be involved in environmental monitoring.



7 SPECIFIC IMPACTS OF THE IMPLEMENTATION OF THE PROPOSAL ON THE ENVIRONMENT

The main benefit of the Project is to provide the direct access to the inbound and outbound traffic to the Nagdhunga Tunnel. Apart from that the project will create employment opportunities during the construction phase. However, it will also generate some adverse environmental impacts during its construction and operational stage. These impacts may be direct or indirect, and reversible or irreversible. The magnitude of the impacts may be high, medium or low and such impacts may be of site-specific, local, regional or national nature. Furthermore, some impacts may be short-term, particularly related to the upgrading stage, and medium-term and long-term duration related with the operational stage.

The ToR for the IEE study has been approved by MoPIT as per the EPR of GON. The ToR identified the issues that may have impact from the proposed road upgrading

7.1 BENEFIAL IMPACT

7.1.1 Construction Stage

(i) Generation of employment

One of the major direct beneficial impacts is the creation of employment. The project would require 2585 person days of skilled and 4241 person days of unskilled human resources. Assuming 12 months of the construction period, about 7 skilled 12 unskilled labours will be required every day which gives the ample opportunity for the local people to works as the construction labour. The workers involved will have additional income and it will contribute to improving their living conditions. This identified direct impact related to employment and increase in income level is considered high in magnitude, regional in extent, and of short-term duration.

(ii) Opportunities of new income-generating activities

Local people will get the opportunity in some specialized works such as tunneling, concreting, gabion weaving, road pavement, and bio-engineering. This will enhance the skills of the workers. Skill and know-how would provide them with additional opportunities in road construction and upgrading works in the future as well. This is also a direct predicted impact having high magnitude, local extent, and long-term duration.

(iii) Enhancement in technical skills and know-how

Local people will get an opportunity in some specialized works such as tunneling, concreting, gabion weaving, road pavement, and bio-engineering. This will enhance the skills of the workers. Skill and know-how would provide them with additional opportunities in tunnel construction, road construction and bioengineering works in the future as well. This is also a direct predicted impact having high magnitude, local extent, and long-term duration.

(iv) Poverty alleviation

The economic level of the PAP is much higher compared to the average national poverty level. The proposed compensation rate for the land located along the TRP is Rs 52.00 lakhs per anna which is the highest so far in the Kathmandu Valley. The Project will be making a significant contribution to the national economy giving impetus to the overall poverty alleviation of the country. This is a direct impact with high magnitude, local in extent, and long-term duration.

(v) Gender specific benefits

The project document has provisions to provide equal opportunity to males and females while providing employment. But the employment of the female is less than 10 % in the main contract of NTCP. This is an indirect impact with low magnitude, site-specific in extent and long-term duration.

7.1.2 Operation Stage

(vi) Improved access to services

The proposed flyover leads to dedicated access road to the Tunnel. Flow of traffic would be smooth without any disturbance. This will provide the better service to the inbound and out bound vehicular traffic. The vehicle operating cost will be reduced thereby transportation cost will be decreased. The journey will be comfortable and travel time will be saved. Similarly the wear and tear of the vehicles will be less; and fuel consumption of the vehicles will also be less resulting saving in the hard currency for the import of these commodities. This is an indirect impact with medium magnitude, local in extent and long-term duration.

(vii) Increase in land values

The implementation of the Project will increase the value of land to great extent. After the construction of the Flyover, the land cost is likely to be further appreciate. This is a direct impact with high magnitude, site-specific in extent for long-term duration.

(viii) Road safety

The construction of the Flyover will overall improve the inbound and outbound road traffic in TRP which would result in an improvement in the road safety. This is a direct impact with medium magnitude, site-specific in extent and long-term duration.

7.2 ADVERSE IMPACT

7.2.1 Pre-construction Phase

7.2.1.1 Physical Environment

(i) Relocation of the Infrastructures

The construction activities will be affecting 162.5 m of Tribhuwan Raj Path (TRP). There are number of public utilities such as electric poles, telephone poles, underground telecommunication lines, water supply lines, road side drains, sewer lines, communications lines along the TRP which will have to be relocated before the actual construction.

7.2.1.2 Biological Environment

(i) Loss of vegetation

The project area is located in the urban setting. There are no forest neither in project area nor near vicinity.

There is no wildlife in the project area and its vicinity. The project is not located in a biological or archeological sensitive area.

7.2.1.3 Socio-economic Environment

(i) Loss of land (private, public and community)

The existing road (Tribhuwan Raj Path) was extended to 22 meters width from 16 meters width without land compensation by Department of Roads (DOR). On the petition of the land owners, The Court decided to pay the compensation of the land beyond 8 meters from the road center line i.e. beyond 16 meters. Based on the court decision, land acquisition plan is being prepared.

A total of 4,853.39 square meter private land of 114 parcels will be acquired beyond 16 meters width for the construction ramp and flyover. The details of project affected private land is given in Annex-7. As the impact is loss of the private property, the magnitude of the impact is high, extent is site specific and duration is long term.



(ii) **Loss of private and community structures**

Total 56 private structures will be affected by the Project. Out them 23 are RCC frame with RCC roofed houses, 3 load bearing brick masonry wall with RCC roofed houses, 10 load bearing structure cement brick masonry wall with CGI roofed houses, 1 RCC frame with CGI roofed house, 2 load bearing mud brick masonry wall with CGI roofed houses, 4 concrete block masonry wall with CGI roofed structures and 9 CGI sheet structures. Moreover, 4 structures include steel ladder, boulder masonry wall, brick masonry wall and steel compound gate. The detail of project affected private structures is presented in Annex-8. Type project affected structures is presented in Table 7.2.

Table 7-1: Type of Project Affected Private Structures

S.N.	Type of Structure	Full	Partial	Total
1	RCC Frame Structure	13	10	23
2	Load Bearing Structure RCC Roof	3	0	3
3	Load Bearing Brick Masonry with CGI Roof	8	2	10
4	RCC Frame Structure with CGI Roof	1	0	1
5	Load Bearing Mud/Brick Masonry with CGI Roof	2	0	2
6	Concrete Block Masonry with CGI Roof	2	2	4
7	CGI Sheet Structure	7	2	9
8	Other Structures (Gate, Wall, Ladder)	4	0	4
Total		40	16	56

Source: Field Study, 2020 Updated in 2025

The present use of the affected structures is presented in Table 7.3.

Table 7-2: Present Use of Project Affected Private Structures (Number)

Affected Households	Residential Structure	Residential cum Trade Structure	Trade Structure	Rented Structure	Empty Structure	Other Structure	Total Structure
47	3	18	27	2	2	4	56

Source: Field Study, 2020 Updated in 2025

(iii) **Impact on religious asset**

The project was affecting the traditional path of local festival, on the suggestion of the local people the design was modified to address the concern of the local people.

(iv) **Damage of community infrastructures**

The project will be affecting community structures such as electrical pole, telephone poles, underground telecommunication lines, internet facilities, drainage lines. Impact on these community infrastructures could be significant if they are not relocated. But project will be relocating all these community infrastructures prior to the construction of the flyover. Relocation of the community structures is the part of the construction cost in the construction contract. Hence separate estimate has not been prepared.

(v) **Disturbance in livelihood**

The project affecting number 70 of shops along TRP. This will be directly affecting the livelihood of the 70 shop owners. A list of the affected business entrepreneurs is presented in Annex 9. As the impact is directly related with the income level of the people, the magnitude of the impact high, extent is site specific and duration is long term.



7.2.2 Construction phase

7.2.2.1 Physical Environment

(i) Change in land use

The existing TRP is 22.0 m (11.0 m from either side of the road center line). The land use beyond that points is urban settlement. The existing road width will be extended to from 11 m to maximum 25 m. Within that area the land use will be changed to road surface. This is a direct impact with low magnitude at site specific in extent for long term duration.

(ii) Operation of quarry sites and crusher plants

The construction of Flyover is the part of NTCP. The Project will not be operating quarry site such. The require aggregates and sand is planned to produce in the crushing plants from the muck materials. The required aggregates and sand for the Flyover is planned to be produced in the crushing plant of 30m³ located within the right of way of the approach road at the eastern side. The operation of crushing plants could lead to air pollution and noise pollution. The contractor will be operating the crushing plant site at his convenience. Since the operation of the crushing plant sites have been one of major issues in the past, this is categorized as an identified impact of high magnitude, site specific in extent, and of long-term duration.



Figure 7-1: Batching Plant Site

(iii) Operation of labor camps

The Contractor of NTCP has been operating labour camp at Basundol. It has capacity in-house 280 number of people. The required land has been leased in. The camp has facilities of drinking water from deep tube well, has sanitation facilities, wastes water is discharged in the septic tank, solid wastes are collected separately in 2 wastes bins and they are collected by the wastes collector of the Municipality. In other words, the labour camp is well maintained. The camp is being inspected regularly by the environmental monitoring team of the Consultant and the Contractor. Same facility will be used for the Flyover component. With these facilities the predicted impact is of low magnitude, site specific in extent, and of short-term duration.



Figure 7-2: Labor camp (Basundol) and Contractor's camp

(iv) Scarification of the pavements/waste disposal management

The construction Flyover will produce large quantity of spoils or construction wastes due to scarification of the existing road pavement, demolition of existing infrastructure within the construction sites. Demolition activities will lead to air pollution. Although it is a direct and identified impact, its magnitude, extent and duration will be low, site-specific and short-term respectively. In other words, this impact could be rated as insignificant.

(v) Use of bitumen and their storage

The road pavement is asphalt concrete. Bitumen will be heated in the Asphalt concrete plant. The asphalt concrete plant will be established for the access road. Production of asphalt concrete is the part of NTCP main contract. The Asphalt concrete for the Flyover component will be supplied from Asphalt Plant of NTCP. But the use of bitumen is one of the most hazardous materials used for road construction and maintenance activities. Bitumen storage is a frequent environmental problem that can only be met by special precautionary measures. Bitumen drums often get damaged during transit, leading to a leakage in storage places which often are not or not adequately cleaned up afterwards. It is an indirect impact, its magnitude, extent and duration will be low, site-specific and long-term respectively. In other words, this impact could be rated as insignificant.

(vi) Change Air quality, Water quality and Noise pollution

Air quality will be deteriorated at the crushing plant sites, pavement scarification, structure dismantling etc. The vehicles emission could be another source that would be deteriorating the air quality at the construction site. A typical dust pollution was observed in the project. The existing road section within the project area was scarified and it was dusty. The existing vehicle movement (traffic) has to be continued. Water spraying was carried out at the regular interval for the dust control. The road surface became wet. The tires of the vehicle passing the project area carried the mud and they were dropped off beyond project area vicinity resulting dust pollution. This became one of the major issue in the Project.

Similarly noise level will be increased at the crushing plant sites, work sites, camp sites etc. when the heavy equipment's are in operation. Whereas the water quality of the natural streams will be deteriorated if the constructions wastes or oil spills are disposed or discharged into them. Deteriorated air quality and increase in the noise level will have direct effect on the health of the people working in the vicinity whereas poor quality water will not be palatable. This is an identified impact of high magnitude, site specific extent, and of short term duration.

(vii) Groundwater flow modification

The project will not make any groundwater water modification

(viii) Contamination of soil

Soil may be contaminated due to the spillage of the bitumen and cement slurry. As the cement concretes is prepared in the batching plant and asphalt concrete is also supplied from the plant. Their management will be controlled way. Soil contamination has not been foreseen.

(ix) Vibration due to heavy equipment

Heavy construction equipment likes excavator, grader, road roller, transit mixture etc. will be in use during the construction phase. The operation of these equipment likely to create some noise and vibration but it is normal in the construction works. This is direct impact of low magnitude, site specific extent, and of short term duration.

(x) Occupational health and safety

The traffic of TRP will have to be opened during the construction site and there will be movement of local people at the site. In spite of precautions occurrence of accident may not be completely ruled out. Hence construction activities pose safety concerns to the local people. Construction activities and plying of vehicles in the road will increase dust and gaseous emission and respiratory diseases may threat health of the local people and workers. Although the health and safety will be major concerns during the construction stage, magnitude of the impacts has been evaluated as low since provisions of health and safety measures are mandatory in any of the construction contract. The extent will be site specific and duration will be short term.

7.2.2.2 Chemical environment**(i) Hazard caused by chemical materials/fuel**

Contractors may store fuel, oil and lubricants, diesel and petrol, bitumen, solvents and other toxic chemicals for use in construction work. Inappropriate storage of such materials or accidents of tankers may cause spillage or leakage, polluting surface and groundwater, contaminate soil, cause fire and explosion hazards and nuisance to human health.

Combustible materials mostly comprise fuels and lubricants, bitumen, and jute netting. The most common risk involved is bitumen distributors catching fire. Cement, a widely used material but can cause minor chemical burns and skin problems to the users. Protective clothing is rarely provided or used. In hot weather, it may be uncomfortable and therefore its use difficult to enforce. Health and safety will be major concerns during the construction stage, hence the magnitude of the impacts has been evaluated as high. The extent will be site specific and duration will be short term

(ii) Bitumen Storage and heating

The use of bitumen is one of the most hazardous materials used for road construction and maintenance activities. Bitumen storage is a frequent environmental problem that can only be met by special precautionary measures. Bitumen drums often get damaged during transit, leading to a leakage in storage places which often are not or not adequately cleaned up afterward: Examples could be seen at a number of construction sites where pools of split bitumen can be found at construction sites after completion of the construction works. During application, workers are often (for various but unacceptable reasons) not adequately protected. Bitumen is applied at a high temperature, leading to a considerable risk of burns. However, it is most often applied in hot weather, making protective clothing uncomfortable, and enforcement of its use difficult. This impact will be due to the oversight of the contractor. But its impact could be high in magnitude site-specific in extent and short-term in duration

7.2.2.3 Biological environment

Impact on biological environment is insignificant.

7.2.2.4 Socio-economic and cultural environment**(i) Impact of human health**

The construction activities will add some environmental pollution such as increase in noise level, air pollution. Although the health and safety will be major concerns during the construction stage, magnitude of the impacts has been evaluated as low since provisions of health and safety measures are mandatory in any of the construction contract. Extent is site specific for the short period.

(ii) Conflict in or with nearby host communities (between local and outsiders)

As the existing TRP has very high traffic movement. Reallocation of the road and construction activities with TRP is likely to disturb the road traffic and lead to the traffic jam which could lead to the resentment among the road users and nearby community. The magnitude of the impact could be medium, duration short term and extent local.

(iii) Gender-related impact (discrimination in opportunity and wage)

The project NTCP does not make discrimination in the wage rate of males and females. It will be applicable in the flyover component also.

(iv) Road safety (Accidents)

The construction of the flyover is to be carried out keeping the road traffic of the TRP open. The section of fly-over within TRP will have to be realigned. Hence the utmost precautionary measures will be required to avoid a possible accident. As the term accident itself is unpredictable, the magnitude of the impact could be medium, duration short term and, extent local.

7.2.3 Operation and maintenance phase**(i) Air pollution (carbon emission) and Noise pollution**

The proposed intersection is dedicated to the tunnel access. The vehicular traffic will be smooth and there will be no traffic congestion. Vehicle emission will be substantially reduced at the same time even the noise pollution will also be less than the existing condition.

(ii) Impact of road side drains

The road side drains will be connected to the natural drain. Impact on the road side drains has not been foreseen.

(iii) Impact to Public land and private assets

Impact on the public land and private assets has not been foreseen.

(iv) Right of way encroachment

Right of way of the proposed flyover will be already ownership of DOR with fully compensation paid. Encroachment of the right of way has not been foreseen.

(v) Impact on traditional norms and values

The project respects the traditional norms and values of the local community. The construction of the flyover will not have any impact on the traditional norms and values during the operational stage.

(vi) Displacement of business

Displacement of the business has been compensated during the construction stage. Further displacement has not been foreseen during the operation stage.

(vii) Road safety (accidents)

The proposed flyover will ease the traffic movement and will improve the road safety.

Table 7-3: Layout of Impact Analysis

SN	Environmental Impacts	Nature	Magnitude	Extent	Duration	Total Score	Significance
Beneficial Impact							
	(i) Generation of employment	Direct	High (60)	Regional (60)	Short term(05)	125	Significant
	(ii) Opportunities of new income generating activities	Indirect	Low (20)	Local (20)	Long term (40)	100	Insignificant
	(iii) Increase in land values	Direct	High (60)	Site specific (20)	Long term (20)	100	Significant
	(iv) Enhancement in technical skills and know-how	Direct	Low (20)	Local (40)	Long term (20)	80	Insignificant
	(v) Improved access to services	Direct	Medium (40)	Local (40)	Long term (20)	100	Significant
	(vi) Poverty alleviation	Indirect	Low (20)	Local (40)	Long term (20)	80	Insignificant
	(vii) Road safety	Direct	Medium (40)	Site specific (20)	Long term (20)	80	Significant
	(viii) Gender specific benefits	Indirect	Low (20)	Site specific (20)	Long term (20)	60	Insignificant
Construction Stage							
Physical Environment							
	(i) Change in land use	Direct	Low (20)	Site specific (20)	Long term (20)	60	Insignificant
	(ii) Operation of quarry sites and crusher plants	Direct	High (60)	Site specific (20)	Long term (20)	100	Significant
	(iii) Operation of labour camps	Indirect	Low (20)	Site specific (20)	Short term (05)	45	Insignificant
	(iv) Scarification of the pavements/waste disposal management	Direct	Low (20)	Site specific (20)	Short term (05)	45	Insignificant
	(v) Use of bitumen and their storage	Indirect	Low (20)	Site specific (20)	Long term (20)	60	Insignificant
	(vi) Change Air quality, Water quality and Noise pollution	Direct	High (60)	Site specific (20)	Short term (050)	85	Significant
	(ix) Vibration due to heavy equipment	Direct	Low (20)	Site specific (20)	Short term (05)	45	Insignificant
	(x) Occupational health and safety	Direct	Low (20)	Site specific (20)	Short term (05)	45	Insignificant
Chemical Environment							
	(i) Hazard caused by chemical materials/fuel, chemical	Direct	High (60)	Site specific (20)	Short term (05)	85	Significant
	(ii) Bitumen Storage and heating	Direct	High (60)	Site specific (20)	Short term (05)	85	Significant

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SN	Environmental Impacts	Nature	Magnitude	Extent	Duration	Total Score	Significance
Biological impact							
	No biological impact has been envisaged						
Socio-Economic and Cultural Environment							
(i)	Land and property acquisition (private)	Direct	High (60)	Site specific (20)	Long term (20)	100	Significant
(ii)	Loss of private and community structures	Direct	High (60)	Site specific (20)	Long term (20)	100	Significant
(iv)	Impact of human health	Direct	Low (20)	Site specific (20)	Short term (05)	45	Insignificant
(v)	Damage of community infrastructures	Direct	High (60)	Site specific (20)	Long term (20)	100	
(vi)	Disturbance in livelihood	Direct	High (60)	Site specific (20)	Long term (20)	100	Significant
(vii)	Conflict in or with nearby host communities (between local and outsiders)	Direct	Medium(40)	Site specific (20)	Short term (05)	65	Insignificant
(ix)	Road safety (Accidents)	Direct	Medium(40)	Site specific (20)	Short term (05)	65	Insignificant
Operation Maintenance: Adverse impact has not been foreseen during the operation stage							

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8 ALTERNATIVE OF THE PROPOSAL

8.1 ALTERNATIVE DESIGN

The proposed access road to the tunnel is dedicated road with access control from the local side. The purpose of the tunnel road is smoothen traffic flow of inbound and outbound vehicles traffic from the Kathmandu. Initially, level crossing inter change was proposed at the intersection of the proposed access road of Flyover and Existing TRP. As the traffic volume at the intersection is like to be quite heavy resulting traffic congestion, level crossing has been replaced by the Flyover so that the movement of traffic flow would be smooth.

8.2 PROJECT SITE

The Flyover is to connect the tunnel access road from the existing TRP. There is no other alternative site.

8.3 TECHNOLOGY, PROCEDURES OF OPERATION, TIME SCHEDULE, RAW MATERIALS TO BE USED

8.3.1 Technology

The Flyover will have following components:

- (i) access ramp to the flyover and
- (ii) Flyover.

8.3.1.1 Access Ramp Construction

For the construction of the ramp, the road has to be raised in the limited space. This could be done either concrete retaining wall (CRW) or reinforced soil wall. A reinforced soil wall has number of advantage over the CRW. It is cost effective, faster and easier construction, flexible, has high strength and stability, environmentally friendly, durable and suitable for the various applications. A comparison between the RSW and CRW wall is presented in Table 8.1.

Table 8-1: Comparison between RCC and RSW

Feature	Reinforced Soil Wall (RSW)	Concrete Retaining Wall
Cost	Lower cost due to use of local materials and less concrete.	Higher cost due to more concrete, steel, and labor.
Construction Time	Faster and modular construction.	Slower due to formwork, curing, and reinforcement placement.
Flexibility	Highly flexible, can accommodate settlements and curves.	Rigid structure, prone to cracking underground movement.
Load Resistance	Distributes loads efficiently using reinforcement layers.	Depends on the structural design; may require deep foundations.
Foundation Requirement	Can be built on weak soil with proper reinforcement.	Requires strong foundations to prevent failure.
Seismic Performance	Better seismic resistance due to flexibility.	Rigid and may crack under seismic loads.
Durability	Long-lasting with minimal maintenance.	Prone to weathering, cracks, and reinforcement corrosion.
Aesthetic Options	Can be vegetated for a natural look.	Mostly plain concrete; can be textured but less eco-friendly.
Environmental Impact	More sustainable with local materials and vegetation options.	Higher carbon footprint due to cement and steel usage.
Maintenance	Low maintenance, especially with proper drainage.	Requires repairs for cracks, water seepage, and corrosion.
Application	Suitable for highways, embankments, bridge abutments, and slopes.	Used where high structural strength is needed, such as basements and heavy-load structures.

8.3.1.2 Flyover Construction

Further flyover will have mainly two sections (i) Sub structure and (ii) Super structure.

(i) Sub structure

The site located within the Tribhuvan Raj Path, one of the busiest highway of Kathmandu where average daily traffic is almost 10000 vehicle. It has not only limited space for the construction activities but also keep the road open. Under this circumstance, the project selected Shinso pile foundation over caisson foundation and well foundation which is best suited for this. A comparison among the three foundation type is presented in Table 8.2.

Table 8-2: A Comparison among Shinso Pile, Caisson foundation and Well Foundation

Criteria	Pile Foundation (Shinso)	Caisson Foundation	Well Foundation
Definition	Deep foundation using driven or bored piles to transfer loads to deeper soil or rock layers.	Large, watertight structures sunk into water bodies or deep soil for support.	Large, hollow structures (wells) gradually sunk and filled with concrete for stability.
Construction Speed	Fast (Piles can be quickly driven or drilled).	Slow (Caisson sinking requires careful underwater work).	Moderate (Wells take time to sink and stabilize).
Cost	Lower (Requires less material and equipment).	High (Expensive due to specialized construction methods).	Moderate to high (Labor-intensive, needs heavy machinery).
Load-Bearing Capacity	Moderate to high (Depends on pile depth and type).	Very high (Strong foundation for large structures).	Very high (Suitable for massive bridge piers).
Suitability for Water Bodies	Limited (Works well in shallow water or soft soil conditions).	Best (Ideal for deep-water and marine bridges).	Best (Used for river bridges).
Environmental Impact	Lower (Minimal disturbance to surroundings).	Higher (Underwater excavation can disturb ecosystems).	Higher (Soil dredging can affect water flow and marine life).
Scour Resistance	High (Deeply driven piles are less prone to erosion).	Moderate (Caissons are heavy but still need protection).	Low to Moderate (Can be affected by strong river currents).
Flexibility & Adaptability	High (Can be used in various soil conditions).	Low (Best for deep-water, not for all sites).	Low (Only suitable for large riverbed structures).
Maintenance Requirements	Low (Less maintenance after installation).	Moderate (Inspections needed for underwater integrity).	High (Well foundations may require grouting or reinforcement).
Best Used For	General bridges, urban flyovers, and mixed soil conditions.	Deep-water bridges, marine structures, large load requirements.	Bridges over large rivers with strong currents.

(ii) Super Structures

The option for the super structure is steel girder and reinforced cement concrete girder. The Project opted for the steel girder option due to following advantage:

- Steel girders have a much higher strength-to-weight ratio than RCC structures, allowing for longer spans with less material. This makes them ideal for bridges, flyovers, and elevated roadways where reducing dead load is crucial.
- Steel components are prefabricated in factories, reducing on-site work and speeding up construction. Unlike RCC, which requires formwork, curing, and extensive labor, steel girders can be assembled quickly. This is crucial for urban infrastructure projects where minimizing disruption is a priority.



- Steel girders allow for longer, continuous spans without the need for multiple piers, reducing foundation costs. The flexibility of steel makes it more resilient to dynamic loads, seismic activity, and heavy traffic.
- When properly maintained (painting, galvanization), steel girders have a longer service life than RCC. They are less susceptible to cracking, unlike RCC structures that develop shrinkage and thermal cracks over time.
- While steel requires periodic painting to prevent corrosion, RCC structures need frequent repairs due to cracking, water ingress, and reinforcement corrosion.
- RCC structures contribute to high carbon emissions due to cement production, while steel can be reused with minimal waste.

8.3.2 Procedure of Operation

The construction of the Flyover requires shifting of the existing TRP which has high traffic movement. The existing traffic on TRP also has to be in operation during the construction of Flyover which would be quite challenging.

8.3.3 Time Schedule

The tunnel road is planned to be operation from June 2025. The Flyover will have to be ready for the operation of the tunnel road. The construction period of the proposed Flyover is of 12 month. The construction schedule is presented in Table 3.6.

8.3.4 Construction Material to be used

The main construction materials for the Kisipidi (Mahadevsthan) Flyover would be cement, reinforcement bars, steel girders and bitumen are the finished products whereas sand, aggregates, and boulders would be the raw materials. There are no alternatives for these construction material in the Flyover construction works.



9 ENVIRONMENTAL MANAGEMENT PLAN

Both beneficial impact and adverse impact due to upgrading of the road have been identified in Chapter 7 of this report. The propose augmentation measures for enhancing the benefits and mitigation/compensatory measures for the adverse impact have been presented in this Chapter.

9.1 BENEFIT AUGMENTATION MEASURES

The project will bring a number of benefits and in order to maximize them enhancement measures have been identified. These measures shall be included in the design and bill of quantities of the contract document. They shall be specifically mentioned in the specification wherever applicable also indicated in the contract document. These measures shall be implemented. Table 9.1 presents the benefit enhancement measures and its implementation plan.

9.2 COMPENSATORY AND MITIGATION MEASURES

The construction of Flyover will also generate a number of adverse environmental impacts. The impacts have been identified and included in Chapter 6. The project tried to avoid the adverse impact in consultation with local communities and proposed mitigation measures for the adverse impact finally compensation is proposed for the impacts which could not be mitigated. Table 9.2 presents the compensation and mitigation measures for each identified adverse impacts. The table also present implementation plan for mitigation measures.

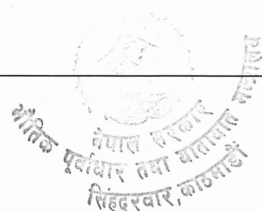


Table 9-1: Benefit Enhancement Measures

SI	Activities	Impact	Enhancement Measures	Location	Cost in Nrs	Responsibility		Remarks
						Implementati on	Monitoring	
Pre-construction								
	Generation of employment	Socio-economic environment (i) One of the major direct beneficial impacts is the creation of employment. The project would require 2585 person days of skilled and 4241 person days of unskilled human resources.	This beneficial impact will be augmented by providing employment to the local people to the extent possible. Priority will be given to the vulnerable group in the project area vicinity. A binding clause has been included in the contract agreement to provide employment to local people. However the involvement shall depend on availability and willingness. Furthermore the minimum wages for the construction labours shall not be less than the approved district rate.	Project site	Part of construction cost	Contractor	Consultant	There has been number of requests from different local groups for the employment. An understanding among the DOR, The Contractor and Municipality that the Contractor will provide the list of required human resources. An understanding has been made that the Contractor will provide list required human resources to the Municipality and the local people could apply for the position.
		(ii) Opportunities of new income generating activities:	The Project may provide income generating training to 82 person from severely project affected family	Project area	Rs 7,380,000.00 will be allocated for providing level II skill development training to the affected family.	Project	Consultant	
		(iii)Enhancement in technical skills and know-how:	The NTCP is a project for the transfer of technology in the road tunnel construction. The proposed flyover is also the first road flyover in Nepal. The Project is going to enhance the	Project area				

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Table 9-2: Mitigation Measures

SI	Activities	Impact	Mitigation Measures	Location	Cost in Nrs	Responsibility		Remarks
						Implementation	Monitoring	
Pre-construction								
	Land Clearing	Physical environment						
		The construction activities will be affecting • telephone poles • underground telecommunication lines • water supply lines, road side drains • sewer lines, communications lines located along the TRP.	Consent will be taken the respective owner of the facilities before the relocations of the public utilities. The consent will be taken from the Nepal Electricity Authority for Electric poles and lines and consent will be taken from the Nepal Telecommunication Authority. Similarly the consent will be taken from the Chandragiri Municipality for the relocation of the drinking water pipe lines and sewer lines	Project area	Part of construction cost	Contractor	Consultant	
		Biological Environment	Though the project will not have adverse biological impact, the project will carry out the road side plantation and bio engineering measures at the embankment slope of the flyover.	Project area	Part of construction cost	Contractor	Consultant	
		Socio-economic Environment						
		13.74- ropani of private land will be acquired	Compensation for the land will be paid at the market value. The loss of land will be compensated as per the market value. The proposed compensation rate is ranged from Rs 52 lakhs per anna of land which highest compensate so far in the history of land compensation in the construction of Roads. (* Additional 10% compensation amount will be paid if the affected land parcel is completely acquired)	Project area	Rs 734,544,915.66	Project	Consultant	
		16.17- ropani of government land will be acquired. A list of affected land parcels is presented in Annex 5	Compensation payment is not required for the government land	Project area		Project	Consultant	
		Total 56 private structures will be	The project will be compensating all the affected structures. Total Rs	Project area	Rs 141,785,757.76	Project	Consultant	

		affected by the Project. A list of affected structure presented in Annex 6.	141,477,107.28 has been proposed for the loss of the structures. Rate of compensation is based on the norms of the Department of Unbar Development and Building. Apart from the structure compensation, the project will allow to take away the reusable building materials and will also provide transportation cost as move away cost to each affected structure owners.				
		The project affecting number 70 of shops along TRP. A list of the affected business entrepreneurs is presented in Annex 7.	The project will be paying relocation cost to affected business entrepreneur.	Project area	Rs 3,563,000.00	Project	Consultant
Construction		Physical Environment (i) Change in land use: The existing TRP is 22.0 m (11.0 m from either side of the road center line). The land use beyond that points is urban settlement. The existing road width will be extended to from 11 m to maximum 25 m. Within that area the land use will be changed to road surface.	The require land area will be minimized to accommodate the flyover	Project area	No cost		
	Operation of batching plant, quarry sites and crusher plants	The sub component will be using the facilities of the main contract, The operation of crushing plants could lead to air pollution and noise pollution	The crushing plant equipment is fitted with noise reducing equipment. Sprinkle the water at dust prone area especially in the crusher plant Face mask and ear plug are provided to the worker working in the batching plants. The waste water generated in the batching plant is being treated in the sedimentation tank with pH control measures.	Batching plant sites Crusher plant site	Water sprinkling at the dust prone area is the part of construction cost Provision of the PPE is the part of construction cost Management of the waste water is the part of construction cost	Contractor	Consultant

[illegible]

10 MATTER TO BE MONITORED FOR THE IMPLEMENTATION OF ENVIRONMENTAL MANGEMENT PLAN

10.1 ENVIRONMENTAL MONITORING

Environmental monitoring is an integral part of the environment protection measures. It is carried out to confirm the compliance and effectiveness of the proposed mitigation measures. There are three types of monitoring namely baseline, compliance and impact monitoring. The pre-construction activities would include land acquisition of the affected land removal of the affected structures and relocation of the project affected utilities. Monitoring of baseline data will not be required as the project is already in the construction stage. This chapter focuses on the compliance and impact monitoring. The impact monitoring will be carried out during and after the construction stage to evaluate the effectiveness of the proposed EPMs. Environmental monitoring of the main tunnel component of the project is being carried out by the Supervisory Consultant Team. This unit will also carry out the environmental monitoring of the Flyover component.

10.2 MONITORING PARAMETERS

The monitoring parameters have been linked with the above EPMs. The following parameters will be monitored during the pre-construction, construction and operational stages of the project in accordance with the background of environmental information.

(i) Physical Environment

During the construction stage, the project will monitor the air quality, noise level and water quality of the project area at regular intervals particularly in the construction areas. The air pollutants and noise level from the crusher will also be monitored. Furthermore, the monitoring parameters such as the frequency of vehicle maintenance, water spraying on service roads during construction; number of safety gears provided to the construction workers including mask, helmet, glove and ear plugs; and other safety measures will also be monitored at regular intervals.

During the operational stage, air quality and noise level of the project area will be monitored.

(ii) Biological Environment

The project will monitor the actual number of felled trees/poles (species-wise). During the construction stage the project will monitor in particular the timber and firewood used by the construction workers. It will also monitor use of type of fuel by the construction workers and the tea stalls.

(iii) Socio-economic and Cultural Environment

During the pre-construction stage, the project will monitor the rate and amount of compensation paid for land or other properties. The project will monitor the number of construction workers in particular the PAP and the local people according to the type of work, number of women employed, number of outside laborers and their dependents and will record the salaries or daily wages. The project will also monitor health and sanitation facilities in the work camps and labor camps. Similarly frequency and types of illness of the construction workers and cases of construction-related respiratory diseases, type and number of accident, availability of first-aid and emergency services and awareness of the workers and roadside people on occupational health and safety will also be monitored. Furthermore, the project will monitor the events of social disharmony and related disputes, prostitution and liquor drinking, if any, and other disputes within the project area during the construction stage.

During the operational stage, the project will try to maintain the track of the PAFs and general socio-economic condition of PAFs.

After the completion of the project, the proponent will monitor the impact produced by the project, in particular, the socio-economic status of PAFs.

10.3 MONITORING LOCATIONS, SCHEDULES AND RESPONSIBILITIES

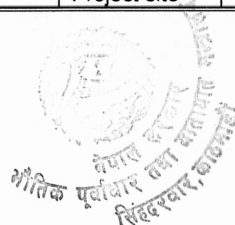
During the project construction and operation stages, two types of monitoring – compliance and impact monitoring – will be conducted, including the implementation status of all EPMs. Key baseline data will be updated prior to the construction stage which will be considered the baseline monitoring. The compliance monitoring provides information on the status of the project's performance in complying with the implementation of EPMs. Much focus will be given to impact monitoring in order to know the effectiveness of EPMs in improving the environmental condition and making the project environment-friendly. Monitoring will be carried out at different locations during the pre-construction, construction, and operational stages. In order to know the level of compliance and effectiveness of the EPMs, the Environmental impacts, monitoring indicators, method of monitoring and responsible agencies, and required budget for compliance monitoring and impact monitoring have been identified and presented in Table 10.1, to Table 10.5 respectively. The environmental monitoring will be done by the Environmental Monitoring Unit.

Table 10-1: Compliance Monitoring during Pre-construction Stage

Environmental Impact	Monitoring Indicators	Method of Monitoring	Responsible Agency	Budget
Loss of Land and other property	Loss of land	Record check	Consultant	
	Loss of structures	Record check	Consultant	
Relocation of the infrastructures	Number of electrical pole	Record check	Consultant	
	Number of telephone poles	Record check	Consultant	
	Length of the underground cable (telephone)	Record check	Consultant	
	Length of sewer line relocated	Record check	Consultant	

Table 10-2: Compliance Monitoring during Construction Stage

Parameters	Indicators	Method	Location	Responsible Agency	Budget
Physical Environment					
Borrow materials	Quantity of borrowed materials	Inspection of Truck movement record	Project site	Consultant	
Disposal of spoil materials	Spoil material generated and their disposal sites	Inspection of Truck movement record	Project site	Consultant	
Construction materials	Sand Aggregate Boulders	Record check of the truck loads	Quarry sites	Consultant	
Provision of drainage facilities	Relocation of the drainage	Field inspection	Project site	Consultant	
Water quality	Temperature, pH, turbidity, TSS, DSS, hardness, chloride, sodium, oil, grease, coliform, DO, BOD, P, S, chlorophyll, etc.	Water sampling and testing and comparison to ambient standards	Drainages emerging out of the project area	Consultant	
Air quality	TSP		Project site	Consultant	
	PM ₁₀		Project site		
	SO ₂		Project site	Consultant	
	NO _x		Project site	Consultant	



Parameters	Indicators	Method	Location	Responsible Agency	Budget
	Noise level (dBA)	Audiometer	Project site	Consultant	
	Water sprinkling	Observation, enquiry	Project site	Consultant	
	Vehicle maintenance	Record inspection	Work camp	Consultant	
Biological Environment					
Forest and Vegetation	Actual number of trees felled	Site visit, enquiry and record inspection	Project site	Consultant	
	Use of forest materials used in the construction and their sources	Record, enquiry	Project site	Consultant	
	Type of material used in the construction of huts/houses	Inspection	Project site	Consultant	
	Use of firewood or kerosene or LPG/month	Record, enquiry	Work camp	Consultant	
Socio-economic Environment					
Water supply/sanitation in the project area	Health and sanitation facilities in camp(s)	Site visit	Project site	Consultant	
	No. of labor force using public drinking water tap	Inquiry	Settlement area	Consultant	
Public health	First-aid and emergency services	Observation	Project site	Consultant	
	Number and type of safety equipment such as mask, helmet, glove and ear plugs	Record inspection, inquiry, and observation	Project site	Consultant	
	Information dissemination, safety and no horn signs	Observation, inquiry, record inspection	VDC, settlements, road bends	Consultant	
Gender and vulnerable groups	Working hour	Enquiry	Project site	Consultant	
	Disintegrated employment record	Record inspection	Project site	Consultant	
Law and order	Regular surveillance of site by security personnel	Inspection	Project site	Consultant	
	restrictions on late night operation of Bhatti's, restaurant and bars	Inspection	Project site	Consultant	
Economy	Compensation for land and property	Record	Project site	Consultant	
Occupational health and safety	Insurance coverage of the workers	Record	Project site	Consultant	
	Use of safety gears by the workers and number supplied	Record and enquiry	Project site	Consultant	

Note:

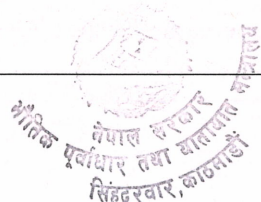


Table 10-3 : Impact Monitoring during Construction Stage

Parameters	Indicators	Method	Location	Responsible Agency	Budget
Socio-economic Environment					
Public health	Public awareness on occupational health and safety	Inquiry, information materials	Settlement	Consultant	
	Frequency of illness of the construction workers	Health record	Project site	Consultant	
	Cases of respiratory diseases	Inquiry, file record	Project site	Consultant	
	Type and number of accident	File record	Project site	Consultant	
Resettlement and rehabilitation	Number of PAFs and SPAFs	Record	Project site	Consultant	
	Social disharmony and related disputes	Inquiry, file record	Settlement	Consultant	
	Attitude of the local people towards the Project	Public meeting and interaction	Settlement	Consultant	
	Number of meetings with local people and CBOs	Record	Project site	Consultant	
Economy	Number of construction workers	Record, inquiry and observation	Project site	Consultant	
	Percentage of local construction laborers	Record, inquiry and observation	Project site	Consultant	
	Number of women employed	Record, inquiry and observation	Project site	Consultant	
	No. of outside laborers and their dependents	Record, inquiry and observation	Project site	Consultant	
Infrastructure	Impact on local infrastructures	Inquiry/ Observation	Project area	Consultant	

Table 10-4: Impact Monitoring during Operation and Maintenance Stage

Parameters	Indicators	Method	Location	Responsible Agency	Budget
Physical Environment					
Slopes	Condition of the spoil filled banks	Inspection/Obser vation	Project site	DOR	
	Effectiveness of drainage facilities	Inspection/Obser vation	Project site	DOR	
Air quality	Total suspended solid, particulate, SO ₂ , CO ₂ , NO ₂ , and PbO ₂ , Dust accumulation from construction activities in houses, vegetation and surrounding areas.	Low volume sampler, visual inspection, measurement and comparison of data with ambient standards	In and around the construction sites and along the access roads	DOR	

10.4 ORGANIZATION AND STAFFING

The supervising consultant of the Project will be responsible for the environmental monitoring related to compliance. The project has deputed a supervisory consultant as the Engineer to supervise construction works including to ensure the implementation of environmental enhancement and mitigation measures. Similarly, the impact monitoring will be conducted by the consultant team.

The Geo-Environmental and Social Unit (GESU) of the Department of Roads (DOR) will provide necessary technical backstopping to the project as and when necessary for the implementation of this plan.

The Engineer responsible for environmental management activities will be responsible to:



- incorporate environmental enhancement measures, and adverse impacts mitigation measures into the detail design, to the extent applicable;
- facilitate the incorporation of environmental requirements and budget in the contract document;
- Regularly check and confirm that environmental management activities are sufficiently implemented;
- monitor construction contractor's performance on environmental aspects;
- prepare necessary monitoring format(s) particularly for compliance monitoring including supervision, on a regular basis, of the records on compliance with environmental requirements;
- process for hiring consulting firms or consultants for impact monitoring;
- prepare and distribute environmental monitoring report(s); and
- facilitate inter-agency co-ordination meetings as and when necessary to brief on accomplishments and problems related environmental matters.

The Engineer responsible for environmental matters will be located in the Consultant's project's field office. S/he should have adequate knowledge and experience on environmental matters and should be assisted with necessary support staff. The environmental engineer may seek technical inputs from GESU of the DOR and it will also inform on accomplishments of environmental requirements.

The organization structure for the environmental monitoring is presented in Figure 10-1.

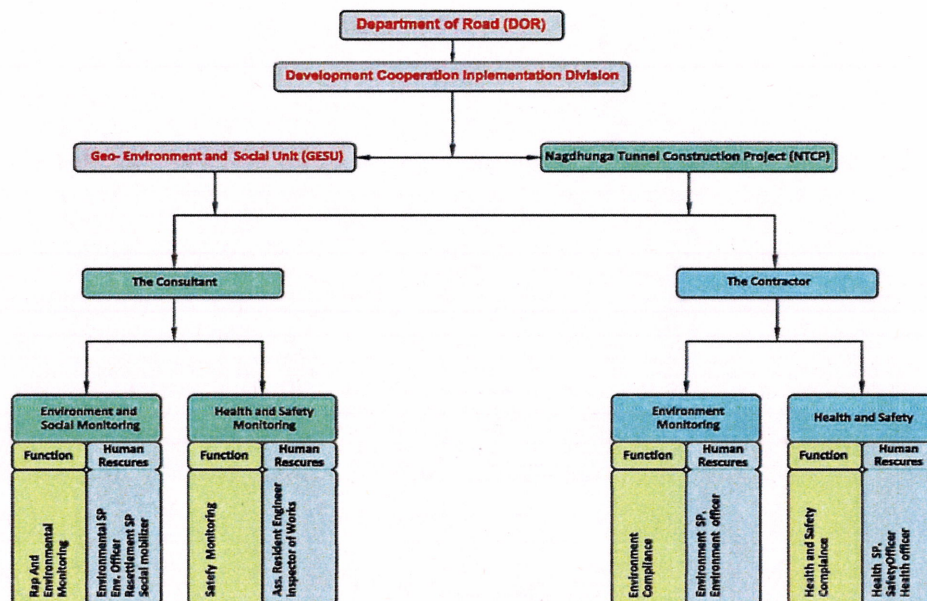


Figure 10-1: Organization Structure

10.5 MONITORING BUDGET

The compliance monitoring of the environmental management plan and impact monitoring of the construction activities will be carried out jointly by Consultant and The Contractor. The required human resources and activities budget are already included in Consultancy contract and construction contract of the Contractor. No addition budget provision has been made.

10.6 MONITORING REPORTING

The environmental, social, health and safety monitoring mechanism in the Project is as below:

- A weekly joint environmental monitoring of the construction sites is carried out by environmental team of the Consultant and the Contractor to assess the compliance of the proposed mitigation measures and construction impact.
- Monthly environmental monitoring report is prepared by the Contractor which is checked and approved by the Consultant
- A monthly Health and safety report of the project is prepared by the Contractor which is checked and approved by the Consultant
- The Consultant prepares Quarterly Project Management Report (PMR) which summarizes the activities of the Project including environmental monitoring, RAP monitoring, Health and Safety Monitoring.

A copy of the Monthly Environmental Monitoring Report and Monthly Health and Safety Report is presented in Annex 13 and Annex 14 respectively.



11 CONCLUSION

The proposed flyover is a small component of the Nagadhunga Tunnel Construction Project. It is a double-lane flyover of length of bridge 128 m and ramp 187 m. As per the EPT 2077 provision, IEE is a mandatory obligation for the construction of a double-lane flyover. It does not pass through any environmentally sensitive areas and but it will be affecting 4853.99 m² of private land of 81 people, 56 structures and 70 road side shops. Compensatory measures have been proposed for these losses. One of the main concerns of the local people is to maintain the existing traditional festival path which has been taken account during the construction. Apart from that project will have some construction-related adverse impacts of low significance and short term, as well as of reversible nature. The project is the first flyover in Kathmandu to ease the traffic congestion which will provide direct access to the road tunnel. In addition, local people will get direct employment as workers, which will contribute significantly to improving their livelihood. These benefits from the implementation of the project is more significant and long-term in nature compared to the adverse impacts, most of which can be mitigated or avoided. The proposed road sub-project is recommended for implementation with the incorporation of mitigation measures and the environmental management plan.